Cloich Forest Wind Farm

Volume 3 – EIA Report Technical Appendices

June 2021

ARCUS
An ERM Group Company

CLOICH FOREST WIND FARM

EIA Report – Volume 3 – EIA Report Technical Appendices

A3.1	Borrow Pit Assessment
A4.1	Scoping Report
A4.2	Scoping Opinion
A4.3	ECU Letter Responding to Tip Height Increase
A4.4	Tip Height Consultation Exercise Responses
A4.5	Gatecheck Report
A5.1	Landscape and Visual Impact Assessment Methodology
A5.2	Zone of Theoretical Visibility Mapping and Visualisation Methodology
A5.3	Residential Visual Amenity Assessment
A6.1	Desk-Based Assessment
A6.2	Pre-Application Consultation and Responses
A6.3	Setting Assessment
A7.1	Habitat Surveys
A7.2	Protected Species Surveys
A7.3	Bat Surveys
A7.4	Fisheries Surveys
A8.1	Cloich Forest Wind Farm Baseline Ornithology Report 2019-20
A8.2	Cloich Forest Wind Farm Baseline Ornithology Report 2019-20 – Confidential Annex
A8.3	Cloich Forest Wind Farm Collision Risk Modelling Report
A8.4	Cloich Forest Wind Farm Ornithology Consultation Report 2019
A8.5	Cloich Forest Wind Farm Ornithology Consultation Report 2020
A9.1	Peat Slide Risk Assessment
A9.2	Outline Peat Management Plan
A10.1	Outline Water Construction Environmental Management Plan
A10.2	Private Water Supply Risk Assessment
A12.1	Abnormal Load Route Assessment
A12.2	Construction Development Programme
A13.1	Current Tree Species Stocking within the Site
A14.1	Cloich Wind Farm Eskdalemuir Desktop Budget Calculations
A16.1	Carbon Balance Calculations

EDF renewables

ARCUS

ARCUS

CLOICH FOREST WIND FARM

VOLUME 3: TECHNICAL APPENDICIES

TECHNICAL APPENDIX A3.1: BORROW PIT ASSESSMENT

JUNE 2021

Prepared By:

Arcus Consultancy Services

7th Floor
144 West George Street
Glasgow
G2 2HG

T +44 (0)141 221 9997 | **E** info@arcusconsulting.co.uk
w www.arcusconsulting.co.uk

Registered in England & Wales No. 5644976

TABLE OF CONTENTS

1 INTRODUCTION

1.1 Preparation of the Borrow Pit Assessment

This preliminary Borrow Pit Assessment (BPA) for Cloich Forest Wind Farm ('the Development') has been prepared initially to provide details of potential borrow pit locations or aggregate extraction areas required for the construction of the Development.

It is anticipated that all of the turbine bases will be founded on bedrock composed of in-situ sedimentary rock types.

The purpose of the BPA is to:

- Assess potential borrow pit locations;
- Estimate available aggregate from the source location;
- Identify overlying superficial soils and define the materials that will be excavated as a result of the Development;
- Identify underlying rock types;
- Set out proposals for adequate intrusive investigations; and
- Detail management techniques for handling, storing and depositing peat for reinstatement.

Scottish Planning Policy (paragraph 243)[1] states that *'borrow pits should only be permitted if there are significant environmental or economic benefits compared to obtaining material from local quarries, they are time-limited; tied to a particular project and appropriate reclamation measures are in place'.* In the case of Development, progressing on-site borrowing provides significant environmental gains as the traffic volume on local roads (B class, C class and unclassified) would be reduced.

1.2 The Development Site

The Development is located within the Cloich Forest estate approximately 5.5 kilometres (km) north-west of Peebles ('the Site'). The Development is situated on ground ranging from approximately 270 m Above Ordnance Datum (AOD) to 465 m AOD with the potential borrow pits located close to proposed turbine locations and adjacent to existing forestry tracks. The main access route originates from the northeast of the site via the A703 public road.

The Development occupies an area of forestry and open hillside located to the west of the A703. The access road rises from approximately British National Grid (BNG) 324380, 648930 continuing west to the northern side of Cloich Rig, adjacent to agricultural land and forestry before reaching the site entrance. Figure 3.1a-d, 'Detailed Development Site Layout' is included EIA Chapter 3.

The Development includes a mix of new and existing track upgrade, twelve turbines and associated infrastructure, a construction compound, and a substation compound including a battery Energy Storage System (BESS) facility.

Two potential borrow pit locations were considered for the Development and details of the two borrow pits initially considered are summarised in Section 3.2. Borrow pit 1 is located north of T12 and borrow pit 2 is located east of the existing forestry track to the north of T5. The details of each borrow pit are included in Section 3.0. The assessment has been completed through a targeted desk-based review of geological maps, Ordnance Survey (OS) contour data, aerial photography, and from visual observations during a series of Site visits between March 2019 and May 2021.

No intrusive site investigation works have been undertaken to date.

[1] Scottish Government Planning Policy, December 2020 - https://www.gov.scot/publications/scottish-planning-policy/pages/7/

2 GEOLOGY

2.1 Superficial Soils

Published geological mapping[2] of superficial soils indicates a large proportion of the Site to be vacant of superficial soils while the remainder of site is underlain almost entirely by Devensian Till. Two small localised pockets of peat are noted in the centre of Site and in the east in areas of the Site where topography is flatter than the surroundings.

Figure 9.1 included in Chapter 9 of the EIA Report illustrates the superficial soils across the Site.

2.2 Bedrock Geology

Published geological mapping of bedrock geology indicates the entire Site to be underlain by Wacke of the Kirkcolm Formation. A single fault line noted to be at rockhead, was present orientated northeast to southwest through the array to T3 to T5.

Figure 9.2 included in Chapter 9 of the EIA Report illustrates the bedrock geology across the Site.

2.3 Peat

The peat depths recorded indicate there to be very little peat on Site, with two smaller pockets of peat in topographically flatter areas recorded up to 4.0 m in depth and several other pockets recording depths under 1.0 m.

Figure 9.5 included in Chapter 9 of the EIA Report illustrates the 'Interpolated Peat Depths' across the Site.

2.4 Hydrogeology

The natural soils onsite are considered to be glacial deposits, or peat. The glacial deposit soils generally have a low permeability while peat is fairly permeable but will have high retention properties.

The Site hosts several watercourses and tributaries from the surrounding hills, Ewe Hill, Whaup Law and Peat Hill, draining to the surrounding burns including Courhope Burn, Flemington Burn and Early Burn.

Details of the hydrology and hydrogeology of the Site are included in Chapter 10 of the EIA Report.

2.5 Mining and Quarrying

The Coal Authority interactive map viewer[3] indicates that the Site does not lie within a coal mining reporting area. Additionally, there are no active mines within the vicinity of the site as indicated by BGS GeoIndex.

Following Site walkover and detailed review of aerial photography, there are two quarries, one existing and one historical in the northern and central eastern Site areas respectively. The existing quarry is currently utilised by Forestry Land Scotland (FLS) for new and upgrading forestry operation tracks. The topography in this part of the site lends itself to an extension of this area.

[2] http://mapapps2.bgs.ac.uk/geoindex/home.html

[3] http://mapapps2.bgs.ac.uk/coalauthority/home.html

3 BORROW PIT ASSESSMENT

3.1 General

This section of the BPA identifies potential borrow pit locations within the Site that could be utilised in provision of aggregate for construction. This will be used in the construction of site access tracks, crane hardstanding areas, upgrades of existing forestry tracks, and potentially concrete batching.

The proposed borrow pit locations have been selected based on their:

- Topography;
- Current and Previous uses;
- Accessibility from existing or proposed access tracks;
- Orientation with respect to visibility;
- Potential aggregate volume; and
- Proximity of rock to the surface.

Steeper topography is preferable for quarrying, where soils coverage will be limited. Careful consideration was given to landscape and visualisation impacts, other considerations included proximity to watercourses, places of archaeological interest, and forestry. The borrow pit locations are in areas where there are currernt or historical working and the wider areas proposed for extending borrow pits are in areas where the peat cover is thin or vacant and where bedrock outcrops, aggregate reserves are expected to occur near the surface or there is historical/existing quarrying.

No intrusive site investigation works have been undertaken into the quality of rock that might be recovered at the time of preparing this BPA. However, it is anticipated that a full ground investigation will take place in advance of construction of the Development. The investigation will include the testing of material from within the proposed borrow pit areas to assess its suitability for reuse.

3.2 Borrow Pit Locations and Considerations

Two borrow pit search areas were initially identified from a combination of desk-based assessment of mapping and topography and site walkover survey. Other environmental constraints were also considered, including watercourse buffers and peat. A summary of both identified search areas is presented as follows.

3.2.1 Borrow Pit Location 1

Borrow Pit 1 (BP1) is located in the north of Site, to the west of Middle Burn and centres at approximately BNG 320440, 649060. The Site was selected due to it being adjacent to existing tracks and situated within a topographically steep area.

BGS superficial soils information indicates that this area of the Development is underlain entirely by Till. Peat probing undertaken at the borrow pit recorded depths in this area ranging from 0 m to 0.4 m in depth. The solid geology mapping indicates the underlying bedrock to be Kirkcolm Formation belonging to the Wacke Group. No geological faulting is present within the borrow pit search area or immediate vicinity. The location does not encroach any other environmental development constraints.

Photograph 3.1 - Borrow Pit 1 – Existing Quarry Area - Viewing North-West

3.2.2 Borrow Pit Location 2

Borrow Pit 2 (BP2) is located east of Ewe Hill, approximately centred at BNG 321190, 647330. The borrow pit location was selected due to being adjacent to existing track and being located within a topographically steep area.

BGS superficial soils information indicates that this area of the development is vacant of superficial soils. Peat probing undertaken recorded depths of less than 0.5 m in the general vicinity of this borrow pit search area. The solid geology mapping indicates the underlying bedrock to be Kirkcolm Formation belonging to the Wacke Group. No geological faulting is present within the borrow pit search area or immediate vicinity. The location does not encroach any other environmental development constraints.

Photograph 3.2 - Borrow Pit 2 – Existing Quarrying - Viewing South-East

3.3 Findings and Recommendations

The ground modelling of BP1 and BP2 informs the assessment summary as set out in section 3.4. It should be noted that further investigations would be required to fully understand the feasibility of these options which would comprise rotary percussive drilling and rock sampling through coring and suitable geotechnical testing, particularly in the areas proposed for extension of existing quarrying.

3.4 Design

A three-dimensional outline design was undertaken to establish the target capacity required from the proposed borrow pits. This involved the production of a civil design taking account of the overall proposed site layout levels and both existing and proposed access tracks in order to develop a viable borrow area. The outline design of each borrow pit included a main worked area with earthwork batters and indicative drainage cut-off ditches, and therefore was finalised as a total area situated within the initial search areas. The details of the outline borrow working design is summarised in Table 3.1 below while Borrow Pit Plans and Profiles are shown in Figure 3.13 and Figure 3.14 included in Chapter 3 of the EIA Report.

Table 3.1: Borrow Pit - Assessment Summary

Borrow Pit No.	Surface Area (m^2)	3D Model Total Cut Volume (m^3)	Interpolated Peat Depth (m)	Estimated Peat Volume (m^3)	Estimated Aggregate Available (m^3)
1	11,170	66,855	Peat < 0.5m	5585	61,270
2	11,351	183,130	Peat < 0.5m	5675	177,455
TOTAL	**22,521**	**249,985**	**-**	**11,260**	**238,725**

For the purposes of this outline BPA, the volumes indicated in the table above are based on the following parameter:

- Borrow Working 1 area of approximately 140 m x 70m;
- Borrow Working 2 area of approximately 120 m x 90 m;
- Borrow Working floor levels taken from the levels associated with the existing access track; and
- Cut profile at 63° from borrow pit floor for borrow working 1 and 63° from borrow pit floor for borrow working 2 to intersection point of existing terrain.

4 METHODS OF WORKING

The requirement to produce various grades of aggregate will necessitate the use of mobile quarrying plant and equipment. This operation will comprise a number of different elements which are summarised in the following Sections.

It is possible that the quarried material will require blasting methods should testing prove relatively high strengths and competencies. Where this is required, it is proposed that a lightweight crawler mounted blast hole drill rig is employed together with an attendant compressor. Explosives will need to be considered in detail by the Contractor at construction stage relating to safe operation, transportation and storage. The Contractor may also wish to consider alternative methods suitable to the quality of the rock. All aggregate materials won in borrow pits will be subject to crushing and screening. The primary component of this operation will consist of a mobile crushing and screening system.

The Contractor will provide a plant setup that meets the Development requirements processing the rock to produce the quantities, quality and sizes of the material required. The construction of the Development access tracks will be undertaken utilising the majority of the aggregate produced from the borrow pit operations. It is intended that the access tracks will be constructed on the basis of normal best practice for the accommodation of wind turbine components.

The Contractor should undertake testing of the materials as the borrow pits are worked to ensure material quality is maintained, with particular reference to the ability of the materials to resist freezing/thawing and wetting/drying, and therefore serve the lifespan of the Development.

The appointed Contractor will provide a detailed risk assessment and method statement to cover the working methods employed within the borrow pits for approval during the construction phase.

4.1 Overburden Handling

Prior to progressing works at borrow pits, the areas will require to be stripped of superficial material overlying the bedrock. Material storage areas should be identified and the superficial soils carefully placed in segregated stockpiles within the appropriate storage area.

Access routes to the borrow pits will form part of the enabling works prior to the mobilisation of quarry plant. The main items of mobile quarry plant will be tracked, typically low ground pressure capable of traversing surfaces which have had only limited surface preparation.

4.2 Drainage of Borrow Pits

Temporary interception/peripheral bunds and cut-off drainage ditches ('clean water drains') should be constructed upslope of the borrow pits and cuts to prevent surface water runoff entering the excavation. Swales to collect runoff should be placed on the downslope of borrow pits and overburden / stockpiles will be designed to treat potentially silty runoff before discharging back into the drainage system.

A drainage and surface water management system will be required in order to control surface water run-off from borrow pit areas. Due to the nature and size of the proposed excavations, the drainage system should consist of a peripheral cut-off ditch together with attenuation features and soakaways. Drainage ditches should be installed using a tracked excavator and, where necessary, a hydraulic breaker.

Waste water discharged onto vegetated surfaces from borrow pits and earthworks areas should be directed away from watercourses and drainage ditches to avoid direct discharge.

Any sediment suspended within the treated water should be deposited amongst the rough surface vegetation.

4.3 Reinstatement Proposals

It is envisaged that overburden/soils will be carefully stored adjacent to the extraction areas for re-use.

Each borrow pit should be suitably re-instated with topsoil and any available peat, peaty soils and turves to re-establish hydrological and ecological conditions and reduce any potential visual impacts. There is a potential for till or sands and gravels to be available for reinstatement purposes.

The reinstated peat/soil surface would be profiled to allow drainage and the re-introduction of appropriate vegetation cover would tie into existing topography. The upper part of the quarry face 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.

The reinstated profile will be of varying thicknesses above the base of the borrow pit and will be gently sloping from the track edge to the quarry face, generally with thicknesses representative to that of the peat and soils initially stripped from borrow pits areas.

The conjectured reinstatement profiles are shown in Figure 3.13 and 3.14 included in Chapter 3 of the EIA Report.

4.4 Borrow Pit Working Programme

Of the possible borrow pits recommended, both are of similar distance from the entrances, one from each, therefore may be worked consecutively during the construction programme. This borrow pit could be utilised for initial track construction, upgrade of existing tracks and any general enabling works from the site entrance including track widening where required.

5 CONCLUSION

The siting of the borrow pits within the Development has been made on the basis of proximity to the existing access tracks, consideration of topography, geology, and identified constraints. Based on the desk-based assessment, it is anticipated that there are adequate locations on Site to position proposed borrow pits which would achieve the required aggregate quantities for the Development.

Considerations for the assessment of borrow pits following consent of the Development include:

- Ground investigations and relevant geo-environmental analysis undertaken prior to finalising borrow pit proposals;
- Three-dimensional design should be undertaken following detailed design and ground investigations to confirm the capacity of the proposed borrow pits; and
- Detailed profiles of borrow pit excavations including existing ground levels, proposed excavation levels and a conceptual restoration profile for each borrow pit should be produced once final borrow pit extents have been agreed.

Prior to the construction of the Development, design and best practices, and any required mitigation measures, would be set out in full within a Construction Environmental Management Plan (CEMP) and agreed with the statutory bodies.

CLOICH FOREST WIND FARM

VOLUME 3: TECHNICAL APPENDICES

TECHNICAL APPENDIX A4.1: SCOPING REPORT

JUNE 2021

Prepared By:

Arcus Consultancy Services

7th Floor
144 West George Street
Glasgow
G2 2HG

T +44 (0)141 221 9997 l **E** info@arcusconsulting.co.uk
w www.arcusconsulting.co.uk

Registered in England & Wales No. 5644976

CLOICH FOREST WIND FARM

SCOPING REQUEST

OCTOBER 2019

Prepared By:

Arcus Consultancy Services

7th Floor
144 West George Street
Glasgow
G2 2HG

T +44 (0)141 221 9997 | **E** info@arcusconsulting.co.uk
W www.arcusconsulting.co.uk

Registered in England & Wales No. 5644976

TABLE OF CONTENTS

LIST OF FIGURES

1 INTRODUCTION

This Scoping Report has been prepared by Arcus Consultancy Services Ltd (Arcus) on behalf of EDF Energy Renewables (EDF-ER), hereafter referred to as 'the Applicant'.

Section 36 consent and deemed planning permission for the Cloich Forest Wind Farm was granted following a public inquiry on 8th July 2016. The Applicant is proposing to submit an application to the Scottish Government's Energy Consents Unit (ECU) under Section 36 of the Electricity Act 1989 to construct and operate a re-designed wind farm within the Cloich Forest in the Scottish Borders ('the Development'). Since the proposed re-design is expected to be different in terms of scale, turbine numbers and locations from those authorised by the existing consent, a new application will be submitted. This document is a request for a scoping opinion and provides supporting information to assist in that process.

1.1 The Applicant

The Applicant is Cloich Wind Farm LLP, wholly owned by EDF Energy Renewables Limited ("the Applicant"). EDF Energy Renewables Limited is part of one of the world's largest electricity companies. The EDF Renewables operating portfolio of 36 British wind farms is making a significant contribution to the delivery of new affordable, low carbon electricity to the UK. Work is also underway on the 450 MW Neart Na Gaoithe offshore wind farm project in the Firth of Forth. EDF Renewables has recently completed construction of the 177 MW Dorenell Wind Farm near Dufftown in the Scottish Highlands which is the largest onshore wind farm in Europe for the EDF Renewables group.

1.2 Planning History

Section 36 consent and deemed planning permission for Cloich Forest Wind Farm was granted following a Public Local Inquiry (PLI) on 8th July 2016 by the Scottish Ministers, under reference number WIN-140-1. During the course of the application process the tip height of the turbines was reduced to 115m. The PLI held for Cloich was conjoined with an appeal for Hag Law wind farm which was proposed on land adjacent to Cloich Forest. Hag Law Wind Farm was subsequently refused.

Since the time of the submission of the planning application in October 2012 and the submission of Supplementary Environmental Information in January 2014, there have been changes in government financial support for renewables, prompting the Applicant to review the consented development. Technology advances in wind turbine development have resulted in significantly more productive turbines with relatively minor increases in turbine dimensions that are able to produce lower cost renewable electricity.

The approved project's Environmental Statement (ES) and Supplementary Environmental Information (SEI) as well as the decision notice and PLI Report are available to view and download from the Scottish Borders Council website (ref 12/01283/S36). The consent is subject to 27 conditions. The PLI report provides a useful narrative of the issues that were most important for the previous application and it is anticipated that they will be similar for a revised design.

The extensive environmental assessment work undertaken for the consented layout provides a good understanding of the environmental issues and enables the scope of the forthcoming EIA to be focussed on topics that are likely to experience significant effects. It should also be possible to remove from the scope of the EIA those environmental topics where no significant effects were previously identified, and no additional significant effects are likely to arise as a result of changes to the scheme.

The planning principle for a wind farm has been established in this location by the current consent which was granted following in-depth examination at PLI. It is anticipated that

the planning test for the revised application will largely focus upon whether any additional likely significant environmental effects are anticipated.

Where policy and guidance has potential to change the conclusions reached in the EIA Report, it will be reviewed alongside those elements where the re-design has the potential to alter the previously assessed effects.

In order to highlight any potential changes in the conclusions between the consented scheme and the proposed re-design, a comparison document will be provided as a supporting document to the EIA. This will outline and highlight any differences in predicted effects, to ensure any potential changes from those previously assessed effects are clear, and understood in context of the consented site.

Table 1.1 Summary of Likely Environmental Changes

Environmental Topic	**Summary of likely changes between the consented scheme presented and the proposed re-design and requirement for re-assessment.**
Landscape and Visual	The changes in candidate turbine and layout are anticipated to result in a change to the ZTV and potential visibility. Updates to the landscape and visual Assessment are required. Due to the time elapsed since the assessment of the consented scheme it is likely the cumulative situation will have altered. The cumulative situation will be updated as part of the EIA.
Ornithology	The bird survey data collected for the consent wind farm is no longer up to date due to the time elapsed since the surveys. As such, the anticipated change is unknown. Updated bird surveys are underway and the effect of the Development will be assessed within the EIA.
Ecology	The ecology survey data collected for the consent wind farm is no longer up to date due to the time elapsed since the surveys and changes in legislation. As such, the anticipated change is unknown Updated ecology surveys are underway and the effect of the Development will be assessed within the EIA.
Noise	The changes in candidate turbine will result in a change of sound power levels of the turbine. This is to be re-assessed as part of the EIA.
Cultural Heritage	The changes in candidate turbine and layout are anticipated to result in a change to the ZTV and a change to the potential visibility and indirect setting effects. This will be re-assessed within the EIA. There is expected to be a limited change to direct effects on known features, with a possible reduction to previously assessed effects due to the reduced number of turbines and associated footprint. This will be re-assessed within the EIA. No change is anticipated to the previously assessed effects on unknown features – proposed mitigation measures are likely to remain relevant and appropriate. This will be confirmed within the EIA.
Hydrology, Flood Risk, Water Quality, Water Resources, Hydrogeology and Geology	There is likely to be a reduction in the overall footprint of the wind farm, therefore limited change to hydrology, flood risk, Water Quality, Water resources, Hydrogeology and Geology are anticipated and a reduction to previously assessed effects is possible. This will be confirmed within the EIA.
Access Transport and Traffic	A significant increase to the number or type of vehicles accessing the site during construction is unlikely. Potential for additional pinch point analysis to be required along the turbine delivery route due to larger dimensions. This will be assessed within the EIA.
Aviation, Radar and Telecommunication	It is anticipated that there will be a reduction in the overall footprint of the development. Therefore limited change to effects

	on other infrastructure including telecoms and television are likely to arise. Possible change to aviation effects. This will be assessed within the EIA.
Land Use, Socio Economics, Recreation and Tourism	There is anticipated to be a reduction in the overall footprint for the wind farm and the wind farm would not give rise to changes to land use, recreation or tourism activities. Socio economic benefits may arise from market changes and increased MW output. This will be assessed within the EIA.
Miscellaneous Issues	It is anticipated that there will be a reduction in the overall footprint of the development. Therefore, limited change is anticipated. This will be confirmed within the EIA.

2 SCOPING PROCESS

In line with The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (the "EIA Regulations"), the Applicant recognises that this is an 'EIA Development' following consideration of the characteristics of the Proposed Development, the location of the Site and the characteristics of the potential impacts as outlined within Schedule 3 of the EIA Regulations.

In line with Regulation 12 of the EIA Regulations, the Applicant is seeking to confirm the scope of the required assessment to be provided in the Environmental Impact Assessment Report (EIAR), i.e. a "Scoping Opinion". This document provides supporting information to help the ECU to form a Scoping Opinion for the Development. This is intended to guide the information to be included within the EIAR, which will accompany the Section 36 application.

To aid this process, this Scoping Report includes the following:

- A description of the location of the Proposed Development including figures identifying the Site and the parameters of development;
- Figures identifying the designated and sensitive environmental receptors surrounding the Site; and
- A brief description of the nature and purpose of the Proposed Development and its potential resultant effects.

This document identifies the different aspects of the environment likely to be significantly affected by the Proposed Development and proposes those topics which require further consideration as part of the EIA. Proposed methodologies are outlined, with a view to obtaining comments on the approach to the EIA and the content of the EIAR. As appropriate, and to aid consideration, the Report summarises survey work undertaken to date.

Given the iterative nature of the EIA process, the final layout of the Proposed Development is will be led by the forthcoming EIA process. This report includes illustrations of a preliminary turbine layout which represents an indicative geographical spread of turbine and infrastructure across the Site that will change in time. The results of the Scoping process will feed into the iterative design of the Proposed Development. For the purposes of the EIA, a precautionary approach will be taken and a worst case scenario will be identified and assessed for each receptor as appropriate.

3 THE PROPOSED DEVELOPMENT

3.1 Introduction

The Proposed Development is a wind farm consisting of up to 14 turbines and ancillary infrastructure. The ancillary infrastructure will likely include hardstanding areas, transformers, access tracks, cabling, a substation, temporary construction compound, borrow pits and an anemometry mast. It is likely that the Proposed Development will include onsite battery storage adjacent to the switchgear building, although this is to be confirmed. The ancillary infrastructure proposed may change as the final parameters of the Proposed Development are identified throughout the iterative EIA process.

3.2 The Site

The Site is located approximately 5.5 km north-west of Peebles, within the Scottish Borders, as shown on **Figure 1** of this Scoping Report. The site is centred on NGR 320514 647492, and lies between the A701 and A703, north of the A72. The Site boundary broadly follows the edge of Cloich Forest which covers the Cloich Hills. The area for development within the red line boundary is approximately 1,085 hectares (ha).

In the northern part of the Site, to the north-east of Peat Hill, there is a single farmstead which lies within the application boundary. The closest village is Eddleston and is located 2.5 km to the east of the Site.

The topography of the Site and immediate vicinity is complex, with elevation ranging from approximately 280 m Above Ordnance Datum (AOD) in the northeast part of the Site to approximately 476 m AOD at the peak of Crailzie Hill in the south. Vegetation across the Site largely consists of forestry and open moorland. The Site encompasses the rolling Cloich Hills, including Peat Hill (466m AOD), Ewe Hill (462m AOD), White Rig (325m AOD), and Crailzie Hill (476m AOD). The hills are dissected by a number of watercourses, including Middle Burn, Flemington Burn, Martyr's Dean, Corehope Burn and Harehope Burn. Those watercourses that flow southwest feed into the Flemington Burn on the west of the Site and eventually feeds into the River Tweed. Those watercourses that flow down to the northeast of the Site feed into Middle Burn and Shiplaw Burn which feeds into Eddlestone Water and eventually the River Tweed.

Coniferous plantation, at various stages of the planting, growing and felling cycle, is the primary land use within the Site; however the area around Courhope in the south of the Site consists of improved upland pasture, utilised for sheep grazing, and improved grassland which remains clear of forestry. A series of tracks provide access for management purposes and recreation, and the Cross Borders Drove Road cuts through the Site from east to west between Ewe Hill and Crailzie Hill.

3.3 The Infrastructure

3.3.1 *Turbines*

Since the time of the submission of the S36 application in October 2012 and the submission of SEI in January 2014, financial support for on-shore wind farms has been removed whilst technology advances in wind turbine development have resulted in significantly more productive turbines from relatively small changes in turbine dimensions. Whilst the development design will be environmentally led, the intention of the application is to enable use of more productive turbines to maximise the energy production and yield of the site whilst maintaining a development broadly in line with the extant consent. **Figure 2** shows the extant consent layout and the layout used for the purposes of this Scoping Report.

For the purposes of the EIA, a precautionary approach will be taken and a worst case scenario will be identified and assessed for each receptor, as appropriate. A candidate

turbine manufacturer and model would be selected where relevant for the purposes of the EIA.

A summary of the proposed turbine details is set out in Table 3.1.

Table 3.1: Summary of Candidate Turbines

	No. Turbines	**Generating Capacity per Turbine (Overall capacity)**	**Rotor Diameter**	**Blade Tip**
Consented Candidate Turbine	18	3 MW (54 MW)	90 m	115 m
New Candidate Turbine	Up to 14	~ 4.5 MW (63 MW)	117 m	145 m
Difference	**Approx. 4 turbines**	**+ ~1.5 MW (9 MW)**	**27 m**	**30 m**

3.3.2 *Access*

Access to the Site is afforded along unnamed roads (Route Numbers: D17/1 and D18/1) running from the A703 approximately 1.5km north of Eddleston to a forestry and farm track to the south of White Rig, as shown in **Figure 1**. From this road, the north end of the Site can be accessed from the unnamed roads, entering the Site at approximately NGR 322239 649905, where existing forestry tracks lead south through the centre of the Site.

New wind farm tracks will be proposed to provide access to each turbine and the construction compound. They will be constructed of stone and be approximately 5 m in width, or as appropriate for the ground conditions.

3.3.3 *Electrical Infrastructure*

Underground cabling, laid where possible alongside the access tracks, will link the turbine transformers to the onsite substation. The substation will likely take the form of a single storey building housing the electrical infrastructure, although certain elements may be external located within a fenced compound.

The grid connection to the electricity network falls under a separate consent process and will be subject to a separate environmental investigation and associated consent application if required. Despite this, it will be considered at a high level within the EIA as part of the wider Proposed Development.

3.3.4 *Battery Storage*

Battery Storage involves the installation of batteries and inverters housed in racks similar to server units in a self-contained building or container which will be located on a concrete hard standing area. It is likely that the battery storage would be located adjacent to the site substation. An underground cable will connect the battery storage facility to the onsite substation.

3.3.5 *Temporary Construction Compound*

A temporary construction compound will be required during the construction of the Proposed Development, forming an area of hardstanding providing space for portacabins, parking, lay down areas and potentially concrete batching.

3.3.6 *Anemometry Mast*

An anemometry mast may be required for the life span of the wind farm, of a height similar to the hub height of the proposed wind turbines.

3.3.7 *Borrow Pits*

Borrow pits will be required to provide stone for the track construction, as well as for other areas of hardstanding.

3.4 Construction

It is expected that the construction phase of the Development will take approximately 18 months, depending on the final design. This period is somewhat weather dependent and could be affected by onsite conditions. It is envisaged that the construction programme would follow this broad outline:

- Creation of borrow pits;
- Construction of site entrance, temporary construction compound, tracks and hardstanding areas;
- Excavation and construction of turbine foundations;
- Construction of substation;
- Excavation of cable trenches and the laying of cables;
- Erection and commissioning of turbines; and
- Reinstate land and remove temporary construction compound, with the exception of the area retained for Battery Storage.

3.5 Decommissioning

When the planning permission expires, the Proposed Development will require decommissioning or a new consent will be sought. Typically, all above ground infrastructure will be dismantled and removed, whilst cables and turbine foundations will be cut 1 m below ground level and covered with topsoil. All wind turbine infrastructure including transformers would be removed from the Site and recycled or disposed of in accordance with good practice guidance and available local facilities that operate at that time. The future of the Development substation would be discussed with network operators and agreed with the local planning authority prior to commencement of decommissioning. A Decommissioning Plan, to include timescales and transportation methods, will be agreed in advance with the local planning authority and is frequently a condition of consent.

4 ENVIRONMENTAL IMPACT ASSESSMENT

4.1 Introduction

EIA is an iterative assessment process with the aim of avoiding or reducing the potential effects resulting from the Proposed Development through the continual refinement of its design. These effects can occur throughout all phases of the Proposed Development from construction, through operation and during decommissioning. Any potential effects will be mitigated utilising the mitigation hierarchy of avoid, reduce, offset and compensate.

Schedule 4 of the EIA Regulations details what information is required to be included within the EIAR and states:

> *3. A description of the relevant aspects of the current state of the environment (the "baseline scenario") and an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of relevant information and scientific knowledge.*
>
> *4. A description of the factors specified in regulation 4(3) likely to be significantly affected by the development: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape.*

The EIAR is required include a *"description of the likely significant effects"* of the Proposed Development; and effects which are not considered to be significant do not need to be described. It is therefore necessary for the scope of the EIA to be appropriately defined to ensure that it focuses upon areas where significant effects may arise.

4.2 The EIA Process

The main steps of the EIA process are broadly summarised as follows:

- Scoping [CURRENT STAGE]: The Scoping Opinion from ECU and feedback from EIA consultees will be used to define the scope of the EIA;
- Baseline studies: Desk-based assessment, baseline surveys and site visits will be undertaken, where appropriate, in order to determine the baseline conditions of the environment and area that may be affected by the Proposed Development;
- Predicting and assessing effects: Potential interactions between the Proposed Development and the baseline conditions will be considered. The nature of the effects, e.g. direct or indirect; positive or negative; long, medium or short term; temporary or permanent, will be predicted and assessed. Potential cumulative effects arising from Development in conjunction with other proposed or consented developments will also be considered;
- Mitigation and assessment of residual effects: In line with the mitigation hierarchy identified in Planning Advice Note (PAN) 1/20131, where adverse effects are identified that cannot be avoided through layout design and embedded mitigation, suitable mitigation measures to reduce or offset effects will be proposed. The residual effects will then be assessed to determine any effects predicted to remain following implementation of the recommended mitigation measures; and
- Production of the EIAR: The results of the EIA will be set out in the EIAR.

[1] Scottish Government, 2013, Environmental Impact Assessment [Online] Available at: http://www.gov.scot/Resource/0043/00432581.pdf (Accessed 25/09/2019)

4.3 General Assessment Methodology

In order to assess the potential effects arising from the Proposed Development, the significance of such effects will be determined. The determination of significance relates to the sensitivity of the resource or receptor being affected and the magnitude of change as a result of the effect. The assessment of effects will combine professional judgement together with consideration of the following:

- The sensitivity of the resource or receptor under consideration;
- The magnitude of the potential effect in relation to the degree of change which occurs as a result of the Proposed Development;
- The type of effect, i.e. adverse, beneficial, neutral or uncertain;
- The probability of the effect occurring, i.e. certain, likely or unlikely; and
- Whether the effect is temporary, permanent and/or reversible.

A generalised methodology for assessing significant effects is detailed below, however each individual technical area will have a specific assessment methodology which may vary from that detailed in the following subsections.

4.3.1 *Sensitivity of Receptors*

The sensitivity of the baseline conditions, including the importance of environmental features on or near to the Site or the sensitivity of potentially affected receptors, will be assessed in line with best practice guidance, legislation, statutory designations and/or professional judgement.

Table 4.1 details a general framework for determining the sensitivity of receptors. Each technical assessment will specify their own appropriate sensitivity criteria that will be applied during the EIA and details will be provided in the relevant EIAR chapter.

Table 4.1: Framework for Determining Sensitivity of Receptors

Sensitivity of Receptor	Definition
Very High	The receptor has little or no ability to absorb change without fundamentally altering its present character, is of very high environmental value, or of international importance.
High	The receptor has low ability to absorb change without fundamentally altering its present character, is of high environmental value, or of national importance.
Medium	The receptor has moderate capacity to absorb change without significantly altering its present character, has some environmental value, or is of regional importance.
Low	The receptor is tolerant of change without detriment to its character, is low environmental value, or local importance.
Negligible	The receptor is resistant to change and is of little environmental value.

4.3.2 *Magnitude of Effect*

The magnitude of potential effects will be identified through consideration of the Proposed Development, the degree of change to baseline conditions predicted as a result of the Proposed Development, the duration and reversibility of an effect and professional judgement, best practice guidance and legislation.

General criteria for assessing the magnitude of an effect are presented in Table 4.2. Each technical assessment will apply their own appropriate magnitude of effects criteria during the EIA, with the details provided in the relevant EIAR chapter.

Table 4.2: Framework for Determining Magnitude of Effects

Magnitude of Effects	Definition
High	A fundamental change to the baseline condition of the asset, leading to total loss or major alteration of character.
Medium	A material, partial loss or alteration of character.
Low	A slight, detectable, alteration of the baseline condition of the asset.
Negligible	A barely distinguishable change from baseline conditions.

If effects of zero magnitude (i.e. none / no change) are identified, this will be made clear in the assessment.

4.3.3 *Significance of Effect*

The sensitivity of the asset and the magnitude of the predicted effects will be used as a guide, in addition to professional judgement, to predict the significance of the likely effects. Effects predicted to be of major or moderate significance are considered to be 'significant' in the context of the EIA Regulations, and are shaded in light grey in the above table.

Zero magnitude effects upon a receptor will result in no effect, regardless of sensitivity.

4.4 Cumulative Effects

In accordance with the EIA Regulations, this EIA will also give consideration to 'cumulative effects'. By definition, these are effects that results from incremental changes caused by past, present or reasonably foreseeable future actions together with the Proposed Development. For cumulative assessment, two types of effects will be considered:

- The combined impact of individual effects from the same development, for example noise, airborne dust or traffic on a single receptor; and
- The combined impact from the effects of several developments that may on an individual basis be insignificant but, cumulatively may be significant.

In line with good practice, the methodology to be adopted for assessing the cumulative effects of wind energy developments will be in accordance with advice from SNH[2,3] and the Scottish Government[4,5]. The extent of any cumulative assessment relative to each technical assessment will be agreed during the consultation process and can include both existing and proposed wind farm developments as well as other forms of development.

Wind energy development has been stimulated by the policy support shown by the UK and Scottish Governments. At the time of writing it is known that there are other operational wind farms and a number of wind energy proposals located in the vicinity of the Site. Known wind farm developments are shown on **Figure 7.**

Cumulative effects will be considered for each technical area assessed within the EIA. The extent of the cumulative assessment relative to each technical assessment are proposed in the following sections.

[2] Scottish Natural Heritage (2014) *A Handbook for Environmental Impact Assessment*

[3] Scottish Natural Heritage (2012) *Assessing the Cumulative Impact of Onshore Renewable Energy Sites*

[4] Scottish Planning Policy (SPP) (June, 2014) *Scottish Planning Policy*, The Scottish Government.

[5] Draft Scottish Planning Policy.

4.5 Structure and Content of the EIAR

The content of the EIAR will broadly follow the specifications detailed within Schedule 4 of the EIA Regulations. The EIAR will consist of three volumes and a Non-Technical Summary (NTS).

- Volume 1 – Main EIAR text;
- Volume 2 – Figures; and
- Volume 3 – Technical appendices.

The front end of the main EIAR text will include:

- An introduction, including a summary of the EIA process and methodology;
- Description of the Site and its surroundings;
- Details of alternatives considered within the context of how design has considered the environmental and economic balance; and
- A summary of the relevant planning policy and environmental context.

The technical chapters of the EIAR will present details of the assessments undertaken, including any cumulative effects, required mitigation and residual effects.

4.6 Questions for Consultees

- Do Consultees agree with the general strategy for assessing the effects?
- Can the Consultees provide any further information on developments that they think should be included in the cumulative assessment?

5 LANDSCAPE AND VISUAL

5.1 Introduction

The Landscape and Visual Impact Assessment (LVIA) will be undertaken by Chartered Landscape Architects at LUC. The Landscape and Visual Impact Assessment (LVIA) will consider direct and indirect effects on landscape resources, landscape character, and designated landscapes. It will examine the nature and extent of effects on existing views and visual amenity. The effects of the proposed turbines, as well as the ancillary infrastructure (access track, masts, transformers etc.) will be assessed during the construction and operational phases of the Development. The LVIA will also consider cumulative effects i.e. the incremental effects of the Development in combination with other wind farm developments.

The LVIA will inform modifications and refinements to the consented layout design and will be undertaken following the approach set out in Guidelines for Landscape and Visual Impact Assessment: Third Edition (GLVIA3)[6]. The assessment will also draw upon current good practice guidance issued by SNH and the Landscape Institute.

5.1.1 *Comparison with Extant Consent*

The Project Comparison document will consider the differences between the extant consent and the revised development. At this stage it is predicted that there will be changes to landscape and visual effects resulting from the change in turbine layout, and the increase in tip height.

5.2 Baseline Conditions

5.2.1 *Site Context*

The Site is located approximately 5.5km to the north west of Peebles, as shown on **Figure 1 and Figure 3**. A full description of the Site and its context is outlined in Section 3.2.

A study area of 40 km from the outermost turbines in all directions is proposed for the LVIA, as recommended in current guidance for turbines between 131-150m to blade tip.[7]

A Zone of Theoretical Visibility (ZTV) plan will used to identify which landscape and visual receptors require consideration in the assessment, and which can be scoped out because they are unlikely to be significantly affected. While the design of the Development is subject to change, the following figure is provided to illustrate the theoretical visibility of the indicative turbine layout:

- **Figure 6** Maximum Blade Tip Height (145m) ZTV and Suggested Viewpoint Locations.

5.2.2 *Landscape Character*

Scottish Natural Heritage (SNH) has recently made available via their website an updated national Landscape Character Assessment for Scotland.

The Site is located within the Plateau Outliers Landscape Character Type (LCT), as shown in **Figure 4**. Key characteristics include:

- "Discrete hill masses separated from main plateau by major river valleys;
- Greater height difference between summits and valley floors;
- Gradation of landscape scale between hill slopes and valleys;
- Mosaic of land cover types: heather moor, grassland and plantation woodland;

[6] Landscape Institute and Institute of Environmental Management and Assessment (2013) Guidelines for Landscape and Visual Impact Assessment. Third Edition (GLVIA3).
[7] SNH (2017), Visual Representation of Windfarms, Version 2.2.

- Low density settlement, mainly confined to sheltered valleys; and
- High density of prehistoric burials and settlements."

The LVIA will consider the potential for direct effects upon the LCT within the Site boundary and for indirect effects upon LCTs in the study area from which potential visibility is indicated by ZTVs.

5.2.3 *Landscape Designations*

The Site itself is not designated but there are a number of landscape designations within the Study Area, including National Scenic Areas (NSAs), Special Landscape Areas (SLAs), and Designed Landscapes, within 10 km of the Site boundary. The latter are considered in Chapter 6 (Archaeology and Cultural Heritage). Given the relatively close proximity of these landscape designations, and the extent of theoretical visibility of the proposal from within them, an assessment of potential effects on specific relevant special qualities of the national and local landscape designations will be included in the LVIA. As with LCTs, the theoretical inter-visibility with the Development will be described in the LVIA, and used as a means of identifying which designated areas require further assessment.

Consideration of potential effects on other designations across the Study Area is likely to be included within the LVIA. However, as distance from the Site increases significant effects on these areas are considered less likely.

Nationally and locally designated landscapes within the study area are listed in **Table 5.1** and shown on **Figure 5**.

Table 5.1: Designated Landscapes within the Study Area

Name	Designation	Approximate Distance from the Site (km)
Upper Tweedale	National Scenic Area	2.3
Eildon and Leaderfoot	National Scenic Area	33.2
Tweed Valley	Special Landscape Area	1.4
Tweedsmuir Uplands	Special Landscape Area	3.2
Gladhouse Reservoir and Moorfoot Scarp	Special Landscape Area	4.4
Pentland Hills	Special Landscape Area	5.8
Pentland Hills and Black Mount	Special Landscape Area	8.3
South Esk Valley and Carrington Farmland	Special Landscape Area	8.8
North Esk Valley	Special Landscape Area	9.5
Upper Clyde Valley and Tinto	Special Landscape Area	13.7
Tyne Valley	Special Landscape Area	15.5
Almond and Linehouse Valleys	Special Landscape Area	18.8
Fala Moor	Special Landscape Area	19.0
Tweed, Ettrick and Yarrow Confluences	Special Landscape Area	20.1
River Esk	Special Landscape Area	22.3
Fala Rolling Farmland and Policies	Special Landscape Area	22.4

Name	Designation	Approximate Distance from the Site (km)
Ephinstone Ridge	Special Landscape Area	22.6
Humbie Head Waters	Special Landscape Area	23.5
Fisherrow Sands	Special Landscape Area	24.2
Ormiston Yew & Fountainhall	Special Landscape Area	25.0
Lammermuir Hills	Special Landscape Area	25.6
Bathgate Hills	Special Landscape Area	26.6
Moffat Hills	Special Landscape Area	27.4
Middle Clyde Valley	Special Landscape Area	27.4
Winton Walks	Special Landscape Area	28.5
Forth Coast	Special Landscape Area	29.2
Lammer Law & Hopes to Yester	Special Landscape Area	29.4
Lammermuir Moorland	Special Landscape Area	31.3
Douglas Valley	Special Landscape Area	32.7
Leadhills and Lowther Hills	Special Landscape Area	33.5
Backridge Heights	Special Landscape Area	34.2

5.2.4 *Wild Land Areas*

Wild Land Areas (WLA) are not statutory designations, but NPF3 recognises wild land as a "nationally important asset" (NPF3, p.42), while SPP notes that development plans "should identify and safeguard the character of areas of wild land as identified on the 2014 SNH map of wild land areas" (SPP, p.47) and lists areas of wild land as Group 2: Areas of Significant Protection (SPP, Table 1, p.39).

Although there are no WLAs within the Site boundary, Wild Land Area (WLA) 2: Talla – Hart Fells is located approximately 22.1 km to the south of the Site, at its closest point. However, the ZTV (145m to tip) indicates that there will be no theoretical visibility of the Development from within the WLA. There are no other WLAs within the study area. The potential for visibility will be reviewed, but based upon current proposals, it is unlikely that a Wild Land Assessment will be required.

5.2.5 *Visual Receptors and Visual Amenity*

The LVIA will consider potential effects upon visual receptors within the study area, i.e. the people who may be affected by changes in views resulting from the Development. Visual receptors to be considered will include:

- people within settlements, including individual properties within 2 km of the nearest turbine;
- people travelling on major roads and railways;
- people using walking routes and cycle routes; and
- people visiting areas of interest such as visitor attractions, scenic viewpoints and hill summits.

As noted above, there is an isolated farmstead within the Site boundary, currently believed to be unoccupied, and there are other residential properties within 2 km of the Site, particularly to the south-east of the Site. With reference to **Figure 6**, settlements in the study area with potential visibility of the current indicative layout include several located along the main roads surrounding the Site (e.g. Eddleston, Lamancha, West Linton, Romannobridge, and Peebles). More distant settlements with theoretical visibility of the indicative turbine layout include Penicuik, Roslin and Bilston in the north, and smaller settlements in the south including Kirkton Manor and Castle Craig in the south and south-west. Key transport routes within the local area include the A701 Dumfries-Edinburgh road, the A703 Peebles-Penicuik road and the A72 Hamilton-Galashiels road.

Visual receptors also include people making recreational use of the area, e.g. those travelling on the core path network and long distance routes such as the Cross Borders Drove Road, or walking towards landmarks such as hill tops or cairns. ZTV analysis will determine whether recreational routes within the study area are to be included in the LVIA. There are no Munros in the study area but there are three Corbetts – Broad Law (840m AOD), Hart Fell (808m AOD) and White Coomb (821m AOD) – from which there is indicated visibility at the summits of Broad Law and Hart Fell.

5.2.6 *Other Wind Farm Developments*

The closest commercial scale wind farm development to the Site, Bowbeat Wind Farm, is situated approximately 7 km to the east of the Development in the Moorfoot Hills. The potential cumulative landscape and visual effects arising from the Development alongside Bowbeat Wind Farm will be a key consideration during the assessment.

Approximately 15 km north-east of the Site, there is a small cluster of wind energy developments including Carcant Wind Farm, Wull Muir, Falahill, Gilston Hill, Toddleburn, Dun Law, Poogbie and its extension, and Keith Hill.

A larger cluster is concentrated in an area of upland plateau to the west of the Site, to the south of the A71 near West Calder, which includes the Black Law schemes, Tormywheel and its extension, Heathland, Longhill Burn, Pates Hill, Pearie Law, Harburnhead, Camilty and Muirhall and its extensions. Another large cluster of wind farms is present to the south-west of the Site in the upland hills adjacent to the A74 and River Clyde near Crawford. It includes Clyde Wind Farm and its extension, Whitelaw Brae, Glenkerie and its extension, Whitelaw Brae, Harryburn, Crookedstane and Lion Hill schemes. Both clusters are at a distance of approximately 20 km from the Site.

5.3 Key Sensitivities

The following sensitivities will inform the subsequent iterative design of the Development and are key considerations for the LVIA:

- Effects on the special qualities of the Upper Tweedale NSA;
- Effects on the special qualities of the SLAs in the immediate vicinity of the Site, including the Upper Clyde Valley and Tinto SLA; Tweedsmuir Uplands SLA; Tweed Valley SLA; Pentland Hills SLA; Pentland Hills and Black Mount SLA; and Gladhouse Reservoir and Moorfoot Scarp SLA;
- Visual effects on sensitive residential receptors within nearby settlements;
- Visual effects on receptors travelling along the road network;
- Visual effects, including cumulative, on sensitive recreational receptors using the core path network, long distance routes, and at nearby hill summits.

5.4 Assessment Methodology

5.4.1 *Guidance*

The LVIA will be undertaken in line with current guidance and good practice to produce a robust and reliable assessment. This will be achieved using LUC's most recent methodologies which have been developed in accordance with GLVIA3, drawing on subsequent technical clarifications published by the Landscape Institute, and LUC's extensive experience in the field. The following guidance will be referred to where appropriate:

- Landscape Institute and the Institute of Environmental Management and Assessment (2013), Guidelines for Landscape and Visual Impact Assessment. Third Edition. (GLVIA3);
- Countryside Agency and SNH (2002), Landscape Character Assessment: Guidance for England and Scotland;
- Scottish Borders Council (2018), Supplementary Guidance Renewable Energy;
- Scottish Borders Council (2016), Wind Energy Consultancy Update of Wind Energy Landscape Capacity and Cumulative Impact Study;
- SNH (2012), Assessing the Cumulative Impacts of Onshore Wind Energy Developments;
- SNH (2017), Siting and Designing Wind Farms in the Landscape. Version 3a;
- Countryside Agency and SNH (2004), Topic Paper 6. Techniques and Criteria for Judging Capacity and Sensitivity;
- Landscape Institute (2011), Photography and Photomontage in Landscape and Visual Impact Assessment - Advice Note 01/11[8];
- Landscape Institute (2019), Residential Visual Amenity Assessment (RVAA) – Technical Guidance Note 02/19;
- SNH (2017), Assessing impacts on Wild Land Areas - technical guidance (consultation draft);
- SNH (2017), Visual Representation of Wind Farms Guidance. Version 2.2; and
- SNH (2015), Spatial Planning for Onshore Wind Farms: Natural Heritage Considerations

5.4.2 *Landscape Effects*

Predicted changes on both the physical landscape of the Site and landscape character within the 40 km Study Area will be identified. However, it is anticipated that potential significant direct and indirect effects will be limited to a more focussed area extending within c. 10-15 km from the Site.

Effects will be considered in terms of the magnitude and type of change to the landscape, including its key characteristics as set out in published landscape character assessments. The sensitivity of the landscape will also be taken into account, acknowledging value placed on the landscape through designation.

5.4.3 *Visual Effects*

Visual effects are experienced by people at different locations throughout the Study Area, at static locations (for example settlements or viewpoints) and transitional locations (such as sequential views from routes, including roads, foot paths and ferry routes). Visual receptors are the people who will be affected by changes in views at these places, and they are usually grouped by what they are doing at those places (for example residents, motorists, recreational users etc.).

[8] Updated guidance from the Landscape Institute is due to be published imminently and will be used in the LVIA pending publication.

GLVIA3 states that the nature of visual receptors, commonly referred to as their sensitivity, should be assessed in terms of the susceptibility of the receptor to change in views/visual amenity and the value attached to particular views. The nature of the effect should be assessed in terms of the size and scale, geographical extent, duration and reversibility of the effect. These aspects will all be considered to inform a judgement regarding the overall significance of effect.

An initial review of key receptors and sensitivities indicated within the Environmental Statement for the consented Cloich Forest Wind Farm S36 application[9] has informed the scoping of visual receptors likely to be significantly affected by the Development.

Assessment of the visual effects of the Development will be based on analysis of ZTVs, field studies and assessment of representative viewpoints.

Assessment of the visual effects of the Development will be based on analysis of the ZTVs, field studies and assessment of representative viewpoints. **Figure 6** shows a maximum turbine blade tip height (145 m) ZTV of an indicative turbine layout, which is subject to further refinement, with proposed assessment viewpoint locations. The assessment viewpoint locations have been selected to provide a representative range of viewing distances and viewing experiences, including views from settlements, points of interest and sequential views from routes. A list of proposed viewpoints for the assessment is set out in **Table 5.2**. Please note that viewpoints will be subject to further refinement in the field, subsequent to the scoping process.

Table 5.2: Proposed Assessment Viewpoints

VP	Viewpoint Name	Grid Reference		Distance from Site boundary (km)	Reasons for Selection
1	Cross Borders Drove	322538	644772	1.3	Representative of views for recreational walkers along the Cross Borders Drove (one of Scotland's Great Trails) which passes through the Site.
2	Core Path 154 near Eddleston	324570	647307	1.6	Representative of views for walkers travelling along Core Path 154 to the east of Eddleston.
3	White Meldon	321936	642842	2.2	Representative of views experienced by recreational receptors at a hilltop location within the Tweed Valley SLA.
4	A703 Lay-by	324043	654112	3.2	Representative of views for road users along the A703, to the north-east of the Site.
5	A703 near Langside Farm (North of Peebles)	324947	641851	5.0	Representative of views for road users and residents, adjacent to the A703 to the north of Peebles and within the Tweed Valley SLA.
6	Path near Wester Happrew Burn	315433	640430	5.7	Representative of views experienced by recreational receptors along the path near Riding Hill and within the Tweedsmuir Uplands SLA.
7	A702, approach to West Linton	315341	652636	5.7	Representative of views for road users on the A702. This viewpoint is within the Pentland Hills SLA.

[9] Partnerships for Renewables (2012) Cloich Forest Wind Farm Environmental Statement

VP	Viewpoint Name	Grid Reference		Distance from Site boundary (km)	Reasons for Selection
8	John Buchan Way near Easter Dawyck	319758	637523	7.4	Representative of views experienced by recreational receptors travelling along the John Buchan Way, within the Upper Tweedale NSA.
9	Cademuir Hill Fort	322451	637059	8.0	Representative of views experienced by recreational receptors visiting Cademuir Hill Fort, within the Upper Tweedale NSA.
10	Gladhouse Reservoir	330387	654407	8.1	Representative of views experienced by road users and visitors to Gladhouse Reservoir, in the Gladhouse Reservoir and Moorfoot Scarp SLA.
11	A702, Dolphinton	310608	646793	8.2	Representative of views for road users and residents adjacent to the A702, near Dolphinton. This viewpoint is within the Pentland Hills and Black Mount SLA.
12	Carnethy Hill	320372	661898	10.5	Representative of views experienced by recreational receptors at a hilltop location within the Pentland Hills SLA.
13	Stob Law	323047	633281	11.7	Representative of views experienced by recreational receptors at a hilltop location within the Upper Tweedale NSA.
14	Lee Pen	332594	638598	13.1	Represents views from recreational receptors at a hilltop location within the Tweed Valley SLA.
15	Bleak Law	306505	651248	13.5	Represents elevated views experienced by receptors at the hill summit, within the Pentland Hills and Black Mount SLA.

5.4.4 ***Cumulative Effects***

The cumulative landscape and visual assessment (CLVIA) will be carried out in accordance with the principles contained in SNH's Assessing the Cumulative Impact of Onshore Wind Energy Developments (March 2012[10]).

A review of patterns of development will be provided for operational, consented and proposed wind farms which are the subject of a valid planning application, up to 60 km from the Site, following SNH guidance.

The CLVIA will focus on wind energy developments considered to have potential to give rise to significant cumulative effects. This is likely to primarily be those wind farms in the more immediate landscape context within 20 km. Turbines under 50 m to tip and single turbines beyond 5 km from the Site will not be included. **Figure 7** illustrates the locations of operational, consented, proposed and scoping wind farms within 60 km of the Site.

The LVIA will consider the potential effects of the addition of the Development to the existing landscape against a baseline that includes existing wind farms and those under construction. The CLVIA will consider the potential additional effects of the Development, against a baseline that includes wind farms that may or may not be present in the landscape in the future (i.e. including wind farms that are consented but unbuilt, undetermined

[10] Updated guidance from SNH is due to be published imminently and will be used in the LVIA pending publication.

planning applications or currently at scoping. Consideration will also be given to 'total' cumulative effects (assessment which considers all current and future proposals, including the Development). Wind farm proposals that have been refused but that are going to appeal will also be considered in the assessment. As noted above, schemes at scoping stage will be included in the cumulative assessment where it is deemed appropriate and sufficient design information is available in the public domain.

5.4.5 *Residential Visual Amenity*

Given the nearest residential properties are located within 1 km from the Site, a Residential Visual Amenity Assessment (RVAA), to accompanying the LVIA, is anticipated to be beneficial within the scope of work. This will be prepared in accordance with the recently published Landscape Institute Residential Visual Amenity Assessment Technical Guidance Note 2/19 (2019).

A detailed assessment of potential visual effects on residential properties within a 2 km study area (measured from the nearest proposed turbines) will be undertaken as follows:

- Production of a ZTV for the 2 km study area including the location of all residential properties (with reference) indicated as having theoretical visibility of the Development;
- A detailed description of existing and proposed views from the primary orientation of residential properties (or groups of properties) will be prepared, taking consideration of the distance and direction to the Development, proportion of attainable view occupied and the context/ baseline situation at the residence (for example number of floors or the presence of vegetation within the curtilage) to determine the nature of the predicted change to residential visual amenity; and
- The assessment will also be supported by baseline photography (from the nearest publicly accessible location) and a wireframe of the Development.

5.4.6 *Visualisations*

Wireframes and photomontages will be used to consider and illustrate changes to views. Photomontages will involve overlaying computer-generated perspectives of the Development over the photographs of the existing situation to illustrate how the views will change against the current baseline. Other (cumulative) wind farms visible from each of the viewpoints will be shown on the wireframes. Visualisations will be prepared in accordance with SNH (2017) visualisation guidance[11].

Ancillary elements such as permanent anemometer masts, access tracks and the onsite substation will be shown in photomontages for viewpoints within 5 km when they would be visible. Beyond 5 km it is considered unlikely that these ancillary elements would form more than a minor element of the entire development when compared to the turbines.

5.5 Scope of Assessment

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

5.5.1 *Scoped In Effects*

Based on baseline conditions, it is proposed the following receptors are scoped into the assessment:

- Plateau Outliers LCT and other LCTs within a 10-15 km radius within which there may be potential for significant effects;

[11] Visual Representation of Wind Farms Guidance – Version 2.2 (February 2017) SNH

- Upper Tweedale National Scenic Area;
- Special Landscape Areas (SLAs) located within close proximity to the Site, where there may be potential for significant effects including the Upper Clyde Valley and Tinto SLA; Tweedsmuir Uplands SLA; Tweed Valley SLA; Pentland Hills SLA; Pentland Hills and Black Mount SLA; and Gladhouse Reservoir and Moorfoot Scarp SLA;
- Residential receptors living nearby and travelling throughout the Study Area; including residents at Peebles, Eddleston and West Linton, scattered dwellings to the south-east of the Site, and users of the A701 and A703, and the minor road network; and
- Recreational receptors e.g. those at hill tops and on recognised walking and cycling routes including the Cross Borders Drove Road.

In addition, potential cumulative landscape and visual effects arising through combined, successive, and/or sequential interactions with other existing and proposed wind farms will be included in the assessment. Most notably, the cumulative effects arising from the operational Bowbeat Wind Farm which is within approximately 7 km of the Site will be a key consideration, as well as the relationship with other existing and proposed wind farms situated within the Study Area.

5.5.2 *Scoped Out Effects*

Based on the baseline conditions recorded and distance from the Site, it is proposed that the following are scoped out:

- Landscape character areas outside a 10-15 km radius of the Site with limited intervisibility;
- All other SLAs within the Study Area which have limited potential theoretical visibility of the Development;
- The Eildon and Leaderfoot NSA; and
- WLA 2: Talla – Hart Fells, which is not anticipated to have theoretical visibility of the Development.

5.6 Questions for Consultees

- Are there any comments on the overall methodology proposed to assess effects on landscape and visual receptors, or to assess cumulative effects?
- Are there any comments on the proposed list of assessment viewpoint locations?
- Are there any further wind farm sites, to those shown on **Figure 7**, to consider as part of the cumulative assessment?
- Has the Consultee identified any further landscape or visual receptors to be considered within the assessment (i.e. where it is expected that significant effects may occur)?

6 ARCHAEOLOGY AND CULTURAL HERITAGE

6.1 Introduction

The assessment will consider direct, indirect, and cumulative effects upon archaeology and cultural heritage. This will include the consideration of the following:

- Nationally designated assets including World Heritage Sites, Scheduled Monuments, Listed Buildings, Inventoried Gardens and Designed Landscapes, Inventoried Battlefields, and Conservation Areas;
- Undesignated assets (including above and below ground assets) as recorded by the local Historic Environment Record (HER), cartographic record, photographic record, or identified through the walkover survey; and
- The potential for unknown (buried) archaeological remains to survive within the Development Site.

The assessment will be conducted with reference to the relevant statutory and planning frameworks for cultural heritage. In addition to those mentioned in the Planning and Policy Section, cognisance will also be taken of Historic Environment Policy for Scotland May 2019 (HEPS)[12]. The assessment will be undertaken in accordance with current best practice and guidelines which includes the Chartered Institute for Archaeologists (CIfA) Standards and Guidance[13] and Historic Environment Scotland's Managing Change in the Historic Environment Series, specifically 'Managing Change in the Historic Environment: Setting' (2016)[14].

6.1.1 *Comparison with Extant Consent*

The Project Comparison document will consider the differences between the extant consent and the revised development. At this stage it is predicted that the footprint of the Development is likely to be reduced from that of the footprint of the extant consent.

The reduction in the number of turbines may reduce the indirect effect to heritage assets due to reduced visibility and would be fully assessed within the EIA Report.

6.2 Key Sensitivities and Baseline Conditions

Initial information relating to archaeology and cultural heritage has been gathered through a preliminary desk top search using available online resources to indicate potential heritage features of interest, as listed below.

Three Scheduled Monuments have been identified within the Site Boundary, as shown in **Figure 8**. These include Whaup Law, cairn (SM2755), Courhope, ring enclosures 750 m NE of Greenside (SM2756), and Nether Stewarton, settlement 850m W of (SM3998). Additional undesignated sites are also present within the Site, which include cairns, sheepfolds, enclosures, a medieval village and buildings, and a prehistoric burnt mound.

Preliminary desk surveys show that within the 5 km Study Area, there is one Inventoried Garden and Designed Landscape (GDL) (Portmore - GDL00318), 59 Scheduled Monuments (as detailed in **Table 6.1**), 68 Listed Buildings of all grades (as detailed in **Table 6.2**), and Eddleston Conservation Area. Note only Category A Listed Buildings are shown in **Figure 8**. Due to their proximity to the Development, these are the assets considered most likely

[12] Historic Environment Scotland, 2019, *Scottish Environment Policy for Scotland May 2019* [Online] Available at: https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=1bcfa7b1-28fb-4d4b-b1e6-aa2500f942e7 (Accessed 22/08/2019)

[13] Chartered Institute for Archaeologists (2017) *Standard and Guidance for Historic Environment Desk-Based Assessment*, Published December 2014, Updated January 2017 [Online]Available at: http://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_3.pdf (Accessed 22/08/2019)

[14] Historic Environment Scotland, 2016, *Managing Change in the Historic Environment: Setting*. [Online] Available at: https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=80b7c0a0-584b-4625-b1fd-a60b009c2549 (Accessed 22/08/2019)

to receive changes to their setting resulting in potential significant indirect effects from the Development. Additional consultation will be undertaken with the Council Archaeologist and Historic Environment Scotland to ensure any potential effects are appropriately considered, together with the scope and extent of any supporting assessment and illustration to be provided in the EIAR chapter.

No World Heritage Sites or Inventoried Battlefield are within the 5 km Study Area.

Table 6.1: Scheduled Monuments within 5 km Study Area

Scheduled Monument Number	Scheduled Monument Name
114	White Meldon, fort
731	Northshield Rings, fort, The Camps
1492	Lyne ,Roman fort ,annexes and fortlet
1493	Easter Happrew, Roman fort
1494	Lyne, Roman temporary camp
1495	Drochil Castle
2393	Terrace Wood, cultivation terraces
2416	Milkieston Rings, fort
2677	Harehope Rings, fort, Harehope Hill
2678	Old Deepsykehead, enclosed cremation cemetery 270m SSE of
2703	Black Meldon, fort
2710	White Meldon, cairn
2711	White Meldon, platform settlement 640m NW of
2712	White Meldon, platform settlement 730m NNW of
2713	South Hill Head, homestead
2718	Sheriff Muir Cottages, standing stones 520m W of
2728	Romanno Mains, two barrows 550m SE of
2729	Romanno Mains, four barrows 910m ESE of
2730	Romanno Mains, barrow 910m SE of
2732	Drum Maw, settlement 780m SE of
2733	Romanno Hope, barrow & enclosures S of
2734	Green Knowe, two ring enclosures & barrow 550m SSE of
2735	Whiteside Hill, ring enclosures 820m SE of
2736	Hamildean, homestead 1140m NE of
2737	Black Meldon, settlement and scooped homestead 550m E of
2738	Wether Law, cairn
2755	Whaup Law, cairn
2756	Courhope, ring enclosures 750m NE of Greenside
2759	Harehope, palisaded settlement 730m NNE of
2760	Green Knowe, platform settlement
2774	Cavarra Hill, settlement
2777	Dundreich, cairn
2821	Flemington, ring enclosures 840m NE of
2840	Henderland Hill, fort
2912	Harehope, cairn 1510m ESE of
2917	Cringletie, ring enclosure 600m WNW of
2940	Wormiston, cairn 360m NNW of

Scheduled Monument Number	Scheduled Monument Name
114	White Meldon, fort
731	Northshield Rings, fort, The Camps
2944	Wester Happrew, fort 360m NW of
2955	Whiteside Hill, fort & enclosure
2956	Drochil Castle, fort & enclosure 1190m NNW of
2957	Hamildean Hill, fort
3010	Bordland Rings, fort, Bordlands Hill
3027	Tor Hill, fort 600m WNW of Torbank
3071	Newlands Church
3074	Callands House, earthwork S of
3075	Upper Kidston, fort & settlement NNW of
3093	Paulswell, sundial
3158	Green Knowe, cairn NE of
3165	White Meldon, enclosures W of
3171	Sheriff Muir, cairn
3212	South Hill Head, settlement WNW of
3237	Harehope, earthwork SW of
3243	Nether Stewarton, cairn 960m SW of
3269	Meldon Bridge, pit alignment 250m W of
3527	Jeffries Corse, cairn
3790	Harehope, earthwork 550m NNE of
3998	Nether Stewarton, settlement 850m W of
4624	Upper Whitfield, enclosures 375m SE and 350m ESE of
6065	Bents Quarry, lime kilns and quarry

Table 6.2: Listed Buildings within 5 km Study Area

Listed Building Number	Listed Building Name	Category
2037	Portmore	A
8361	Spitalhaugh House Including Stable and Bridge	A
13863	Drochil Castle	A
15177	Sundial, Lamancha	A
19724	Court of Offices, Whim House	A
2020	Eddleston Parish Church and Graveyard	B
2021	Moredun, And Adjoining 2 Cottages (Glen Nevis And Old School House)	B
2022	Eddleston Village Nos. 1-23 And 2-22. Station Road	B
2035	Cringletie House, Including Lodges, Walled Garden, Sundial and Dovecot	B

Listed Building Number	Listed Building Name	Category
2039	Old Harehope	B
2040	Black Barony Hotel	B
2041	Ice House, Black Barony.	B
2042	Summerhouse, Black Barony	B
8337	Castlecraig, Entrance Gates and Twin Lodges.	B
13862	Newlands Parish Church	B
13896	Hallyne House	B
15136	Newlands Manse	B
15137	Newlands Old Kirk	B
15138	Mackay Of Scotstoun Tomb in Kirkyard	B
15139	Bridgend Cottage and Camitswalls	B
15140	Newlands Bridge	B
15141	Old Romanno Bridge Over the Lynne Water	B
15142	The Steak House Romanno Bridge	B
15151	Cowden Lodge at Drive Entrance To Whim House	B
15152	Flemington Tower	B
15166	Romanno Bridge Hotel and Adjoining House and Two Cottages	B
15169	Scotstoun House	B
15173	Macbiehill Gateway And Lodge	B
15176	Lamancha	B
15178	Entrance Gateway, Lamancha	B
15180	Whim House (Now the White House Hotel)	B
15181	Ice House, In Policies of Whim House	B
15209	Rosetta House	B
15211	Chapelhill Farmhouse and Courtyard Farm Buildings	B
15212	Chapel Hill Bridge	B
15213	Winkston Farm House	B
15214	Winkston Tower House	B
15215	Redscarhead, George Meikle Kemp Memorial (At Moy Hall)	B
15357	Lyne Parish Church	B
15358	The Beggar Path Bridge	B
19665	Lyne Viaduct	B
19717	Romanno Toll	B
19722	Romanno Post Office and Adjoining Range	B
19723	Halmyre House	B
19728	Rosetta Stables	B
19741	Lynesmill Bridge	B
19742	Five Mile Bridge	B

Listed Building Number	Listed Building Name	Category
51957	Barony Castle Hotel, The Great Polish Map of Scotland	B
157	The Horse Shoe Inn, Eddleston	C
2023	Eddleston Bridge Eddleston	C
2038	Entrance Gateway and Lodge, Portmore	C
2043	Bellevue Temple In Former Policies of Black Barony.	C
8334	Paulswell Farmhouse and Steading	C
13898	Smithy Cottages, Near Whim	C
15150	Cistern, In Policies of Whim House	C
15170	Stable Square, Scotstoun	C
15171	Drochil Castle Farm House	C
15172	Tarth Bridge Over Tarth Water	C
15174	Beresford Burial Vault	C
15175	Lower Grange	C
15179	Madrisa Farmhouse and Steading, Lamancha	C
15182	Dovecot, Whim House	C
15208	Edston Toll (Also Known as Lyne Toll)	C
15210	Rosetta, Walled Garden and Garden Building	C
15375	Brownsland	C
19744	Wester Happrew	C
48932	Standalane Cottage	C
51628	Spitalhaugh, Doocot House	C

6.2.1 ***Key Sensitivities***

It is anticipated that potential direct effects on surviving undesignated archaeological remains will be reduced by avoidance through design, and whereby this is not possible, mitigation, resulting in no direct effects to archaeological assets.

The Listed Buildings, Scheduled Monuments, and Inventoried GDLs within the 5 km Study Area have the potential to receive significant indirect effects as a result to changes in their setting caused by the Development. As such, a detailed assessment of these heritage assets will be undertaken in the EIA Report.

Heritage assets between 5 and 10 km may be included in assessment where the assets lie in elevated positions or their setting incorporates long distance views towards the Development (*i.e.* Forts and duns). The final selection of heritage assets for inclusion in the assessment of indirect effects will be based on professional judgement agreed through consultation.

6.3 Assessment Methodology

6.3.1 ***Desk-Based Assessment***

A DBA of cultural heritage records will be compiled to establish the baseline against which the impact assessment will be carried out. Data will be gathered from the following sources:

- Historic Environment Scotland (HES) Datasets including Canmore;

- The Council's Historic Environment Record (HER);
- Aerial photographs and other cartographic information detailing previous land uses;
- The Statistical Accounts of Scotland; and
- Local studies libraries and other archives, as appropriate.

The 1 km Study Area around the Site will be used to collect data to inform on the archaeological potential of the Site.

The DBA will be augmented by a walkover survey in order to:

- Assess and validate documentary data collected;
- Identify the extent and condition of any visible archaeological remains; and
- Determine whether previously unrecorded historic features are visible.

6.3.1 ***Environmental Impact Assessment and Report Chapter***

The cultural heritage assessment will proceed from a consideration of the 'sensitivity' of a cultural heritage feature against the 'magnitude' of any potential change, to arrive at the 'significance' of the effect. The assessment of sensitivity of archaeological and historical assets reflects the relative weight which statute and policy attach to them.

6.3.1.1 Direct Effects

Known archaeology, as identified during the DBA, will be avoided during site design, where possible. The assessment of physical effects will consider direct effects where sites or potential sites / buried archaeology are in danger of being disturbed or destroyed during the construction phase of the Development.

6.3.1.2 Indirect Effects

The assessment of indirect effects considers changes in setting which have the potential to affect the understanding, appreciation and experience of heritage assets. For the purposes of evaluating indirect effects upon heritage assets, designation status, proximity to the Development, and location within the Zone of Theoretical Visibility (ZTV) will determine whether further assessment is required.

For the purposes of this document, designated heritage assets include Listed Buildings, Scheduled Monuments, Inventoried Gardens and Designed Landscapes, Inventoried Battlefields and World Heritage Sites as well as regionally designated Conservation Areas. All nationally designated heritage assets that are within the 5 km Study Area will be assessed as part of the EIA as well as designated assets between 5 km and 10 that fall within the ZTV. This may include assets which do not themselves lie within the ZTV but for which the views over/ across the asset are from within the ZTV. The final list of assets requiring assessment will be agreed during consultation.

To aid the assessment of indirect effects, reference will be made to the extent of the potential visual changes in setting as determined through the LVIA. This will include using the following LVIA Viewpoints:

- VP2: Core Path 14 near Eddleston, which is representative of views from the Listed Buildings within Eddleston; and
- VP3: White Meldon, representative of the view from White Meldon fort (SM114) and the surrounding Scheduled Monuments which include Upper Kidston, fort & settlement NNW of (SM3075), White Meldon, enclosures W of (SM3165), White Meldon, platform settlement 640m NW of (SM2711), and White Meldon, platform settlement 730m NNW of (SM2712).

If required, further specific cultural heritage specific viewpoints will be agreed.

The archaeology and cultural heritage assessment will include proposals for mitigation of any identified impacts where necessary.

The assessment of indirect effects upon the setting of undesignated archaeology and cultural heritage assets is broadly based upon their designation status or lack thereof. Undesignated sites are often of low sensitivity and therefore will not receive a significant indirect effect as defined by the EIA Regulations. As such, they can be scoped out of the EIA at this stage unless specific undesignated assets of higher sensitivity are requested during consultation.

6.3.1.3 Cumulative Effects

For the purposes of the assessment of cumulative effects, only wind farm developments (operational, under construction, consented, or in planning) within approximately 10 km of the Site will be considered. The potential for a significant cumulative effect is considered most likely to occur within the 5 km study area. As such, the 10 km Study Area allows for the assessment of effects within the 5 km radius of the Development and other wind farms, specifically where the ZTVs for the Development and cumulative wind farms overlap, i.e. where each is theoretically simultaneously visible.

6.4 Scope of Assessment

6.4.1 ***Scoped In Effects***

Based on baseline conditions, it is proposed the following receptors are scoped into the assessment:

- Direct effects on undesignated archaeological features;
- Direct effects on designated heritage assets;
- Indirect effects on all designated assets within the 5 km Study Area;
- Indirect effects on designated heritage assets between 5 km and 10 km where the assets, or key views towards to asset, lie within the ZTV; and
- The cumulative effect of the Development in conjunction with other wind farm developments within a 10 km.

6.4.2 ***Scoped Out Effects***

Based on the baseline conditions recorded and distance from the Site, it is proposed that the following are scoped out:

- Indirect effects on undesignated heritage assets;
- Indirect effects on designated heritage assets beyond the 10 km Study Area;
- Indirect effects on designated heritage assets within the 10 km Study Area where the assets, or key views towards the asset, do not lie within the ZTV; and
- Cumulative effects from wind farm developments outwith the 10 km Study Area.

6.5 Questions for Consultees

Key questions for consultees are:

- Do the Council and Consultees agree with the proposed methodology and scope of assessment?
- Are the Council and Consultees content to scope out indirect effects upon non-designated heritage assets?
- Are the Council and Consultees content to scope out assets between 5 km and 10 km where the assets, or key views towards the asset, do not lie within the ZTV?;
- Are the Council and Consultees content that the selection of landscape viewpoints will support and aid the heritage assessment?

- Do the Council and Consultees have any information regarding current or recent archaeological work or projects being undertaken within or in the vicinity of the Site, particularly those whose results may not be yet recorded in the Historic Environment Record? and
- Do the Council and Consultees have details of any cultural heritage sites in the vicinity of the Site which it considers may raise significant issues within the EIA process for this Development.

7 ECOLOGY

7.1 Introduction

The ecological assessment will focus on the potential indirect and direct impacts upon protected and/or notable species and habitats, during construction, operation and decommissioning phases of the Development. This will be assessed in terms of, but not limited to, the effects of the following impacts:

- Habitat loss; and,
- Disturbance to faunal species.

Alternative solutions and mitigation will be identified where the assessment indicates that there is a potential for significant effect on protected and/or notable species and habitats as a consequence of the Development.

All ecology surveys (including desk study and field surveys) will be based on habitats within the Site (shown as the red-line boundary in **Figure 1**) and within the appropriate buffers, as described in detail below.

7.1.1 *Comparison with Extant Consent*

The EIA assessment for ecology was conducted by AMEC Environment & Infrastructure UK and reported in the ES in 2012. The Extant Consent consisted of 18 turbines across the Site and ancillary structures. The Site's ecological assessment identified a number of sensitive features including; statutory & Non-statutory designated sites; groundwater dependent terrestrial ecosystems, bats, otter, badger, red squirrel and reptiles.

The Project Comparison document will consider the differences between the extant consent and the revised development. At this stage it is predicted that the reduced footprint of the Proposed Development from the Extant Consent has the potential to reduce effects of construction related impacts (such as habitat loss, and disturbance of species) and operational phase impacts (such as bat turbine collision), when compared to the extant consent.

7.2 Relevant Guidance and Legislation

Since the writing of the 2012 ES Chapter, both survey and EIA guidance has changed. All relevant guidance is detailed and cross-referenced within this document in Section 7.4.

7.3 Key Sensitivities and Baseline Conditions

7.3.1 *Designated Sites*

Information relating to statutory designated sites was obtained from the Scottish Natural Heritage (SNH) Sitelink[15] and ArcGIS information system. Sites designated for their ornithological interest (such as Special Protection Areas (SPAs)) or geological interests are considered separately and therefore are not discussed below.

A 5 kilometre (km) buffer of the Site was searched for statutory designated sites of ecological interest, shown in **Figure 9**, including:

- Local Nature Reserves (LNR);
- National Nature Reserves (NNR);
- Marine Protected Area (MPA)
- Ramsar sites;
- Site of Special Scientific Interest (SSSI); and,

[15] SNH. *SNH Sitelink. Available at:* https://sitelink.nature.scot/home. [Accessed on 06/09/2019]

- Special Area of Conservation (SAC).

In addition, a search was also undertaken to identify woodland listed on the Ancient Woodland Inventory (AWI)[16] within 2 km of the Site. Further consultation will be undertaken as described in Section 7.4.2.

7.3.1.1 Statutory Designated Sites

Four statutory designated sites were recorded within 5 km of the Site. Information relating to these statutory designated sites is provided in **Figure 1**, Appendix A and in **Table 7.3**, below.

Table 7.3: Statutory Designated Sites within 5 km of the Site

Name	Designation	Approximate Distance and Direction From the Site	Designated Features
River Tweed	SAC	0.3 km west	Atlantic salmon (*Salmo salar*), brook lamprey (*Lampetra planeri*), river lamprey (*Lampetra fluviatilis*) and otter (*Lutra lutra*).
Whim Bog	SSSI	2.5 km north	Raised bog.
Auchencorth Moss	SSSI	4 km north	Raised bog.
Dundreich Plateau	SSSI	5 km east	Blanket bog, subalpine flushes.

7.3.1.2 Non-Statutory Designated Sites

A total of 4 patches of woodland listed on the Ancient Woodland Inventory are located within 2 km of the Site, however, the closest recorded approximately 1.5 km east none are located within the Site boundary.

7.3.1.3 Recent Ecological Records

A summary of publicly available biological records[17] is presented in **Table 7.2**, and includes recent records (within 20 years) of internationally and nationally protected species within 5 km of the Site (extended to 10 km for bats); and records of invasive, non-native species within 2 km of the Site.

Table 7.2: Recent Protected Species Records* with Desk Study Area

Species	Conservation Value	Records
Up to 5 km from Site		
Atlantic Salmon	European Protected Species[18]	6 records (2000-2002)
Otter		9 records (2007-2013)
Badger	Nationally Protected Species[19]	58 records (2002-2016)
Red squirrel		2 records (2006 & 2012)

[16] Scottish Natural Heritage. *A guide to understanding the Scottish Ancient Woodland Inventory (AWI).* Available online at: https://www.nature.scot/guide-understanding-scottish-ancient-woodland-inventory-awi. [Accessed 06/09/2019]
[17] National Biodiversity Network Atlas Scotland. Available online at: https://scotland.nbnatlas.org/
[18] Fully protected under the European Commission Conservation (Natural Habitats, &c.) Regulations 1994 (as amended).
[19] Protected under the Protection of Badgers Act 1992 as amended by the Wildlife and Natural Environment (Scotland) Act 2011.

Species	Conservation Value	Records
Pine marten	Nationally Protected Species[20]	1 record (2013)
Great crested newt	European Protected Species	1 record (2006)
Up to 10 km from Site		
Brown Long-eared bat (*Plecotus auritus*)	European Protected Species	11 records (2000-2017)
Common pipistrelle (*Pipistrellus pipistrellus*)		87 records (1999-2018)
Daubenton's bat (*Myotis Daubentonii*)		26 records (1999-2016)
Natterer's bat (*M. Natterii*)		6 records (2007 & 2016)
Noctule bat (*Nyctalus noctula*)		1 record (2012)
Soprano pipistrelle (*Pip.pygmaeus*)		192 records (1999-2018)
Bat Species		59 records (1999-2017)
Pipistrelle species		80 record (1999-2017)
Myotis species		12 record (2009-2017)
**Publicly available data provided by; Highland Biological Recording Group, Bat Conservation Trust British Trust for Ornithology, Scottish Wildlife Trust, Amphibian People's Trust for Endangered* Species and Reptile Groups of the UK, The Mammal Society, *SNH and Biological Record Centre, via the NBN Gateway*.		

Other notable species recorded with 5 km of the Site were; bank vole, field vole, brown hare, mountain hare, common frog, adder, common lizard, common toad, sika deer, fallow deer, roe deer, European eel, grayling and brown trout*.

Non-native invasive species recorded within 2 km of the Site included American mink, grey squirrel and rainbow trout*.

7.4 Assessment Methodology

7.4.1 ***Approach to Assessment***

7.4.1.1 Overview of Ecological Impact Assessment (EcIA)

The assessment of ecological impacts will follow the guidance document produced by the Chartered Institute of Ecology and Environmental Management (CIEEM)[21], ensuring a transparent and scientifically rigorous approach to Ecological Impact Assessment (EcIA). These guidelines set out the process for assessment through the following:

- Collation of baseline ecological information through desk study and field surveys;
- Identification of Important Ecological Features (IEFs) including designated sites, protected and/or notable species and habitats, legally controlled species;
- Identification and characterisation of impacts to IEFs including positive or negative, extent, magnitude, duration, timing, frequency and reversibility;

[20] Protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended).
[21] CIEEM (2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine.* 3rd edition, Chartered Institute of Ecology and Environmental Management, Winchester.

- Assessment of cumulative impacts;
- Identification of measures to avoid and mitigate impacts to IEFs and an assessment of the residual significance; and,
- Identification of appropriate compensations measures to offset significant residual effects and opportunities for ecological enhancement.

Assessment of ecological impacts from decommissioning or redevelopment of the Site will be considered as part of the EcIA, informed by the outline decommissioning plan to be submitted as part of the EIAR.

The Ecology Chapter of the EIAR will be supported by Technical Appendices detailing the desk study results, consultation, survey methods and results, and will be further supported by relevant figures, tables and photographs, where necessary. Where sensitive data is recorded, the Ecology Chapter will be supported by confidential appendices which will not be released to the public domain.

7.4.2 ***Desk Study***

In order to augment baseline data and, if necessary, refine the survey scope, recent records (within 20 years) of protected and/or notable species and details of sites of ecological interest will be sought. In the first instance, requests for the provision of data will be made to the following organisations:

- SNH;
- The Wildlife Information Centre (TWIC);
- Borders Bat Group;
- Scottish Wildlife Trust; and,
- The River Tweed Commission (RTC).

Consultation will aim to collect the following:

- Records of statutory designated sites located within 5 km of the Site, extended to 10 km for those designated for bat, and;
- Records of non-statutory designated sites located within 2 km of the Site, extended to 5 km for those designated for bats;
- All records of rare, notable or protected flora and fauna within 5 km of the Site (extended to 10 km for bats); and,
- All records of invasive, non-native species within 2 km of the Site.

7.4.3 ***Field Surveys***

7.4.3.1 Habitat and Vegetation

Extended Phase 1 Habitat Survey

An Extended Phase 1 Habitat Survey (EPHS) will be undertaken in accordance with Joint Nature Conservation Committee (JNCC)[22]. The EPHS will aim to record and map all semi-natural habitats within the Site, and including a 250 m buffer. The EPHS will record plant species, documenting their abundance in accordance with the DAFOR scale[23].

The EPHS will aim to record habitats of conservation value including Annex 1, Scottish Biodiversity List (SBL), Local Biodiversity Action Plan (LBAP) habitats and wetland habitats. Where habitats of conservation value are recorded, further surveys will be undertaken (as described below).

[22] JNCC (2010) Handbook for Phase 1 habitat survey: A technique for environmental audit. JNCC, Peterborough.
[23] The Flora of North-east England. *Guidance notes for recording DAFOR scores.* Available online at http://www.botanicalkeys.co.uk/northumbria/dafor.asp [Accessed September 2019]

The EPHS will also aim to record habitat suitability to support notable and/or protected species including, but not limited to, bats, otter, water vole (*Arvicole amphibius*), badger and red squirrel. The EPHS will also aim to record any invasive, non-native floral and faunal species.

National Vegetation Classification

National Vegetation Classification (NVC) surveys will be undertaken on all habitats of conservation value identified within the Site and inclusive of a 250 m buffer in accordance with Scottish Environmental Protection Area (SEPA) guidelines[24] which states:

- For works which require excavations of less than 1 m in depth, potential Groundwater Dependent Terrestrial Ecosystems (GWDTEs) within 100 m will be considered for potential effects; and,
- For works which require excavations of 1 m in depth or more, potential GWDTEs within 250 m will be considered for potential effects.

NVC surveys will aim to map homogenous habitat communities based on their floristic composition in accordance with methods described in Rodwell[25].

Target notes and photographs will be taken to document features of importance including habitats which may require further surveys.

Timing: April - September[26]

7.4.3.2 Bats

Bat surveys will be undertaken within the Site and neighbouring habitats, where possible, in accordance with the latest SNH survey guidance[27]. Habitats within the Site are dominated by standing and recently-felled coniferous plantation woodland and are considered suboptimal for high-risk species (such as Nathusius' pipistrelle (*Pipistrellus nathusii*), Leisler's bats (*Nyctalus leisleri*) and noctule (*Nyctalus noctula*)). A low-risk level survey effort is considered appropriate for this Site which will include the following surveys:

Remote Monitoring Activity Surveys

Bat detectors will be used to automatically record bat activity on three seasonal survey sessions, between April and October inclusive. New SNH Guidance defines these survey sessions as Spring (April-May); Summer (June- mid-August) and Autumn (late August to October).

Based on an assumed 14 turbines, to ensure surveys are in line with new guidance, 12 bat detectors will be deployed for a minimum of ten consecutive nights per survey session. The detectors will be located within the potential turbine layout and across a range of representative habitats where feasible.

All bat data recorded will be analysed using specialist analysis software, (such as Analook Incite and BatExplorer) ideally within a month of it being recorded to ensure that potential issues are identified promptly.

[24] Badger, A., Pritchett, C., Schutten, J. (2014) *Land Use Planning System SEPA Guidance Note 31: Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems.* SEPA. Version 1.
[25] Rodwell, J. (1991 et seq.) *British Plant Communities (Vol 1-5)*
[26] SNH. Nature's Calendar. Available online at: https://www.nature.scot/natures-calendar. [Accessed September 2019]
[27] SNH, Natural England, Natural Resources Wales, RenewableUK, Scottish Power Renewables, Ecotricity Ltd, the University of Exeter and the Bat Conservation Trust (2019). *Bats and onshore wind turbines – survey, assessment and mitigation.* Available online at: https://www.nature.scot/bats-and-onshore-wind-turbines-survey-assessment-and-mitigation. [Accessed September 2019]

Due to the requirements of the new bat survey guidance, which states that full spectrum bat detectors must be used (zero crossing detectors was the previously accepted industry standard), Arcus will use new state of the art bat detector equipment (Anabat Swift Full Spectrum Bat Detectors) and software to ensure the data collected is valid and in accordance with best practice.

Roost Surveys

Data searches will be conducted to identify known roost sites in the vicinity of the Site. Potential bat roosts on site will be identified and assessed during initial site visits and, if necessary, emergence/re-entry surveys carried out at potential roost sites considered to be at risk. The Site is dominated by conifer plantation and upland habitats so bat roosts are considered unlikely to occur within the Site.

Timing: April to October inclusive[27]

7.4.3.3 Otter

All suitable watercourses and waterbodies located within the Site, and within a 200 m buffer, where possible, will be surveyed by suitably qualified ecologists for the presence of otter in accordance with current guidance[28]. The survey will aim to identify and record evidence of otter including spraint, prints, paths, slides, feeding signs and resting sites (lay-up sites, holts and couches).

The surveys will aim to avoid periods following prolonged heavy rain to maximise the opportunity of recording evidence of otter.

Timing: Year-round.

7.4.3.4 Water Vole

All suitable watercourses and waterbodies located within the Site, and within a 200 m buffer where possible, will be surveyed for the presence of water vole, by a suitably qualified ecologist in accordance with current guidance[29,30]. The survey will aim to identify and record evidence of water vole including droppings, latrines, feeding remains, burrows and footprints. The survey will aim to avoid periods following prolonged heavy rain to maximise the opportunity of recording evidence of water vole.

An initial survey visit will be under between mid-April and the end of June to record evidence of water vole. Following this, an assessment will be undertaken with regards to the requirement for a second visit in accordance with current guidance. This assessment will take into consideration suitability of the habitats within the Site, and within a 200 m buffer, evidence recorded during the initial visit and data obtained during the desk study.

Timing: Initial visit mid-April to end of June with a second visit July to September, inclusive (where deemed necessary).

7.4.3.5 Badger

A badger survey will be undertaken on all suitable habitats located within the Site and including a 100 m buffer to ensure legal compliance in relation to badger sett disturbance

[28] SNH *Protected Species Advice for Developers: Otter*. Available online at: https://www.nature.scot/species-planning-advice-otter [Accessed September 2019]
[29] SNH *Protected Species Advice for Developers: Water Vole.* Available online at: https://www.nature.scot/species-planning-advice-water-vole [Accessed September 2019]
[30] Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016). *The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series).* Eds Fiona Mathews and Paul Chanin. The Mammal Society, London.

buffers[31]. The survey will aim to identify and record evidence of badgers including setts, foraging signs, latrines, dung pits, prints, hairs and paths. If a sett is recorded, it will be classified in accordance with SNH guidance (i.e. main, annexe, subsidiary and outlier)[32], where possible. Where access to all habitats within the Site and the 100 m buffer is restricted (i.e. for health and safety reasons or landowner restrictions), habitats will be surveyed as best as possible for neighbouring fence-lines and boundaries with the aid of binoculars.

Timing: Year-round, but optimal between September and April, inclusive.

7.4.3.6 Red Squirrel

Suitable habitat (such as existing woodland) located within the Site, and within a 50 m buffer, will be surveyed for the presence of squirrel in accordance with current guidance[33]. The survey will aim to record evidence of squirrel including dreys, feeding remains and footprints. It is not possible to distinguish red squirrel dreys, feeding remains and footprints from those of the invasive grey squirrel. If this evidence is recorded, further surveys (such as camera trapping) may be required to confirm the presence. If a sighting of either red squirrel or grey squirrel is recorded during the surveys, any unconfirmed evidence will be considered likely that of the sighted species.

Timing: Year round.

7.4.3.7 Pine Marten

Suitable habitats (such as woodland) within the Site, and within a 250 m buffer, will be surveyed for the presence of pine marten in accordance with SNH guidelines[34]. The survey will aim to record evidence of pine marten including denning sites, sightings, scats and prints.

Timing: Year-round.

7.4.3.8 Great Crested Newt

Due to the presence of several waterbodies throughout the Site, a Habitat Suitability Assessment (HSA) of all ponds within the Site will be carried out using the great crested newt Habitat Suitability Index (HSI) developed by Oldham et al. and described by Amphibian and Reptile Groups of the UK (ARG UK) guidance[35]. If any ponds are found to be suitable for breeding great crested newts, further surveys may be required.

Timing: Year-round for HSA; April to June inclusive for presence/absence surveys if required.

7.4.3.9 Fisheries Survey

The Site is within potential connectivity to the River Tweed SAC, a designated Scottish salmon river[36], via the Flemington Burn which flows out of the Site. Therefore, a Fisheries

[31] SNH (2001) *Scotland's Wildlife: Badgers and Development.* SNH. ISBN 1 85397
[32] SNH *Best Practice Badger Survey Guidance Note.* Available online at: https://www.nature.scot/sites/default/files/2018-05/Guidance-Licencing-Best-practice-badger-survey-methodology-%20on%20website.pdf [Accessed September 2019]
[33] SNH *Protected Species Advice for Developers: Red Squirrel.* Available online at: https://www.nature.scot/species-planning-advice-red-squirrel [Accessed September 2019]
[34] SNH *Protected Species Advice for Developers: Pine Marten.* Available online at: https://www.nature.scot/species-planning-advice-pine-marten [Accessed September 2019]
[35] ARG UK *Advice Note 5: Great Crested Newt Habitat Suitability Index*. Available online at: https://www.arguk.org/info-advice/advice-notes/9-great-crested-newt-habitat-suitability-index-arg-advice-note-5/file
[36] https://marinescotland.atkinsgeospatial.com/nmpi/

Habitat Survey (FHS) will be carried out by qualified surveyors for all representative/suitable survey locations in accordance. A detailed assessment of fish habitat quality and utilisation potential will be undertaken for each suitable survey location using baseline information collected following literature review, consultation and field survey.

The FHS will identify sensitive areas, such as salmonid fish spawning habitat and will inform the need for further surveys (e.g. electrofishing surveys). Electrofishing surveys are included in the current scope as it is considered that they are likely to be required due to the importance of the Flemington Burn to salmon and trout populations.

The EIA for the extant consent concluded that following mitigation and enhancement measures, there would be no likely significant effect on the interest features of the River Tweed SAC and that no Appropriate Assessment was required.

Timing: April–September inclusive.

7.4.3.10 Important Ecological Features

Baseline ecological surveys were not complete at the time of writing however a preliminary appraisal of the Site suggests that a number of ecological sensitivities may be present. These include, but are not limited to:

- Sensitive habitats (such as Annex 1, SBL, LBAP and potential GWDTEs);
- Riparian mammals - a number of watercourses and waterbodies are located within and in close proximity to the Site;
- Woodland mammals - standing and recently-felled coniferous plantation woodland may have potential to support badger, red squirrel and pine marten; and,
- Bats - habitats within the Site have potential to support roosting and foraging bats.

7.4.3.11 Determining Significance

Effects will be considered as 'significant' or 'not significant'. In accordance with CIEEM guidelines, a significant effect is an effect which "*supports or undermines biodiversity conservation objectives for 'important ecological features' or for biodiversity in general*"***Error! Bookmark not defined.***. An assessment of the significance of the effect o f a potential impact will follow from considerations of:

- positive or negative - if the impact will improve or reduce the quality of the IEF;
- Extent - the spatial or geographical area the impact or effect may occur;
- Duration - consideration to be given to timescale of the effect in relation to IEF's lifecycle;
- Frequency and timing; how the occurrence of an impact may influence its effect
- Reversibility - if the IEF will recover from the effect; and,
- Cumulative - consideration will be given to effects on identified IEFs from similar developments in the Scottish Borders region.

7.4.3.12 Avoidance, Mitigation, Compensation and Enhancement

As part of the on-going EcIA process, scoping will be iterative and may continue throughout the early stages of the Development. As part of the EcIA process, measures will be taken to avoid and/or minimise impacts to IEFs, where possible. Measures in the form of 'embedded mitigation' will feed into the design stage and may include;

- Careful re-design of the Development to avoid IEFs;
- Identification of opportunities to compensate significant effects;
- Identification of opportunities to enhance features; and,
- Measures whereby the above will be delivered (e.g. protection plans).

7.5 Scope of Assessment

7.5.1 ***Scoped In Effects***

Until the ecological baseline surveys are complete, the potential for significant effects to arise relating to the predicted IEFs remains, as does the potential for effects on IEFs that come to light at a later date. Following completion of the ecological baseline surveys, further consultation will take place with SNH to determine if any further IEFs can be scoped out at that stage.

7.5.2 ***Scoped Out Effects***

Given the existing baseline data obtained from the desk study and site visits to date, it is possible to scope out the need for further consideration to be given to IEFs. The IEFs which have been scoped out at this stage are described in detail below.

7.5.2.1 Designated Sites

Based on the distances from the Site (2.0-4.6 km) and the features for which they are designated, there is considered to be no connectivity between the Site and the following statutory designated sites:

- Whim Bog SSSI;
- Auchencorth Moss SSSI; and
- Dundreich Plateau SSSI.

In addition, there is considered to be no connectivity to the four areas of AWI woodland located within 2 km of the Site.

7.5.2.2 Bats

Transect Surveys

In accordance with new guidelines, the need for transect surveys should be assessed on a site by site basis. The Site has been assessed as relatively low risk to bats, therefore, transect surveys have been scoped out.

7.6 Questions for Consultees

The following questions have been designed to ensure that the proposed methods and ecological assessment are carried out in a robust manner and to the satisfaction of the determining authorities:

- Could consultees confirm they are satisfied with the proposed baseline ecology surveys for habitats and protected species, and the overall survey effort?
- Could consultees confirm they are satisfied with the proposed approach to the evaluation and impact assessment methods for IEFs: and,
- Could consultees provide details or any current or recent ecological work or projects being undertaken within or in the vicinity of the Site, the results of which may not yet be in the public domain?

8 ORNITHOLOGY

8.1 Introduction

This Section sets out the approach to the evaluation of the ornithological interests making use of the Site and surrounding area and to the assessment of potential impacts on birds throughout the construction, operation and decommissioning phases of the Development.

8.1.1 *Comparison with Extant Consent*

The EIA assessment for ornithology was conducted by AMEC Environment & Infrastructure UK and reported in the ES in 2012. The Extant Consent consisted of 18 turbines across the Site and ancillary structures. The Site's ornithological assessment identified a number of sensitive features including; statutory designated sites; pink-footed goose (*Anser brachyrhynchus*); golden plover (*Pluvialis apricaria*)*;* merlin (*Falco columbarius*); osprey (Circus cyaneus) and goshawk (*Accipiter gentilis).*

The Project Comparison document will consider the differences between the extant consent and the revised development. At this stage it is predicted that the reduced footprint of the Proposed Development from the Extant Consent has the potential to reduce effects of construction related impacts (such as habitat loss, and disturbance of species) and operational phase impacts (such as bird turbine collision), when compared to the extant consent.

8.2 Relevant Guidance and Legislation

Since the writing of the 2012 ES Chapter, both survey and EIA guidance has changed. All relevant guidance is detailed and cross-referenced within this document in Section 8.4.

8.3 Key Sensitivities and Baseline Conditions

8.3.1 *Desk-based Study*

To supplement the baseline data, a desk-based study will be undertaken to obtain information on important ornithological features present within the vicinity of the Site. In addition, statutory sites designated for ornithological interests that could have potential connectivity with the Site have been identified, as detailed below.

8.3.1.1 Existing Ornithological Data

Existing ornithological records from within 10 km of the approximate site centre will be sought from the following record holders:

- Royal Society for the Protection of Birds (RSPB);
- Lothian and Borders Raptor Study Group (LBRSG); and
- The Wildlife Information Centre (TWIC).

8.3.1.2 Statutory Sites

The following statutory sites designated for ornithological features were identified using the SNH 'Sitelink' website[37] and 'MAGIC' interactive online mapping tool[38]:

- Sites of European importance within 20 km of the Site:
  - Special Protection Areas (SPAs); and
  - Ramsar sites.

[37] SNH Sitelink: Available at: https://sitelink.nature.scot/home (last accessed 09/09/2019)

[38] SNH Sitelink: Available at: https://magic.defra.gov.uk/home.htm (last accessed 09/09/2019)

- Sites of national importance within 10 km of the Site:
  - SSSIs.

Two statutory sites of international importance were identified within 20 km of the Site, both of which have multiple qualifying interests for ornithological features. No sites of national importance (SSSIs) with ornithological features were identified within 10 km of the Site. Information relating to these statutory sites is summarised in Table 8.1, and locations are shown in **Figure 10**.

Table 8.1: Summary of Statutory Sites of International Importance Designated for Ornithological Interest

Site name	Designation	Qualifying ornithological interests	Proximity to/ direction from the Site
Sites of European Importance			
Gladhouse Reservoir	SPA Ramsar site	- Pink-footed goose, non-breeding	6.9 km to northeast
Westwater	SPA Ramsar site	- Pink-footed goose, non-breeding - Waterfowl assemblage, non-breeding	8.5 km to northwest

8.3.2 *Baseline Surveys*

At the time of writing, baseline data for 2019 breeding season surveys was yet to be analysed, and as a result this data has not been included within this Scoping Report. As mentioned, baseline ornithology surveys were completed between April 2011 and March 2012, these have as been summarised below.

8.3.2.1 Breeding Season Survey

Flight Activity Surveys (FAS) (2011)

A minimum of 36 hours of survey effort was completed at each of six VP locations[39] during the breeding season (April to August 2011 inclusive) to record target species flight lines in the area planned for turbines within the Site. VP locations for these surveys can be seen in Figure 10.1 in the original Cloich Forest Wind Farm ES.

A total of four target species were recorded during the FAS between April and August 2011. Goshawk was the species recorded most frequently (nine flights), followed by merlin (five flights), osprey (*Pandion haliaetus;* three flights) and peregrine (*Falco peregrinus;* one flight).

Black Grouse Surveys (2011)

Surveys for lekking black grouse (*Lyrurus tetrix*) were carried out between late March and May 2011, following SNH survey guidance[40] and the methods set out in Gilbert *et al.* (1998)[41]. This involved two visits to all areas of potentially suitable lekking habitat within the Site and a surrounding 500 m buffer.

No black grouse were recorded during the targeted surveys for this species completed in 2011, nor during any of the other surveys.

Breeding Bird Territory Mapping Surveys (2011)

[39] Note that these VP locations differ from the proposed VP locations.
[40] SNH (2010). Survey Methods for Use in Assessing the Impacts of Onshore Wind Farms on Bird Communities. SNH Guidance Note December 2010.
[41] Gilbert, G., Gibbons, D.W. & Evans, J. (1998). *Bird Monitoring Methods*. RSPB, Sandy.

Breeding bird surveys were undertaken in the single area of open habitat within the Site to document the presence of breeding moorland birds. Two survey visits were completed on 17th May and 7th July 2011. Survey methods followed Brown and Shepherd (1993)[42]. This area was also visited during the black grouse surveys on 15th April and 11th May 2011 and the two methods were undertaken concurrently on these dates.

A total of 10 species were recorded as breeding at the open area of habitat at Courhope or adjacent woodland, of which one is included on the UK Birds of Conservation Concern (BoCC) Red list: mistle thrush (Turdus viscivorus). Additionally, crossbill (Loxia curvirostra), a Schedule 1 species, was identified as breeding during the survey.

Breeding Season Point Count Surveys (2011)

Point count surveys were undertaken to assess the breeding bird community within the plantation woodland. Twenty points were used, located in representative sections of woodland habitats within the Site. Point count surveys were undertaken over three visits, one in each of April, May and June 2011.

A total of 16 species were recorded as breeding within the woodland habitats during the point count surveys, of which two are Red-listed BoCC: mistle thrush and tree pipit (Anthus trivialis).

Breeding Raptor Surveys (2011)

Walkover surveys for evidence of breeding raptors was undertaken within plantation forestry, mainly for goshawk but clearfell/re-stocked sections were also surveyed for merlin, hen harrier and short-eared owl (*Asio flammeus*). Although the guidance at the time stated that all suitable habitats within 1 km of the wind farm should be surveyed for goshawk, access was unavailable to adjacent forestry during the breeding season. Much of the adjacent plantations were, however, visible during vantage point surveys and it was considered that should birds have been nesting in the buffer they would have been detected during FAS (for example during display flights)[43]. Surveys followed the methodology in Hardey *et al*. (2006)[44], which recommends four visits to confirm occupancy and breeding. Surveys were undertaken between April and July inclusive.

Two target raptor species were recorded during the breeding raptor surveys: goshawk and peregrine.

- **Goshawk**: an active goshawk territory was confirmed to be present within the Site, from which three chicks were successfully reared and fledged.
- **Osprey**: the only observation was of a single bird circling over the southeast of the Site carrying a fish. No indication of breeding was recorded on any other occasion

8.3.2.2 Non-breeding Season Survey

FAS (2011-12)

A minimum of 45 hours of survey effort was completed at each of six VP locations (in the same positions that were used in the breeding season (2011) FAS) during the non-breeding season (September 2011 to March 2012 inclusive) to record target species flight lines in the area planned for turbines within the Site.

A total of seven target species were recorded during the FAS between September 2011 and March 2011. Goshawk and golden plover were the species recorded most frequently

[42] Brown, A., F. & Shepherd, K., B. (1993). A method for censuring upland breeding waders. *Bird Study* 40, 189-195.
[43] Note that buffers weren't specified for any other raptor species in the ES.
[44] Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B., Thompson, D. 2006. Raptors: A field guide for surveys and monitoring. The Stationery Office.

(nine flights each), followed by merlin and pink-footed goose (eight flights each), hen harrier (three flights), goosander (*Mergus merganser*; one flight) and greylag goose (*Anser anser*; one flight).

Non-breeding Season Point Count Surveys (2011-12)

Surveys for non-breeding woodland birds were conducted from 20 representative points (in the same positions as in the breeding season point count surveys (2011)) during the 2011/12 non-breeding season. Point count surveys were undertaken over six visits, completed monthly between October 2011 and March 2012 (inclusive).

A total of 16 species were recorded as breeding within the woodland habitats during the non-breeding season point count surveys, of which two are Red-listed BoCC: starling (*Sturnus vulgaris*) and fieldfare (*Turdus pilaris*).

Car Transect Surveys for Foraging Geese

A large area of agricultural land surrounding the Site to the north-east, north, north-west and west (see Figure 10.4 in ES for precise area) was checked regularly for feeding/loafing geese throughout the autumn/winter season. Weekly 'car transect' surveys were conducted during the autumn period (late September to early November) which then reverted to twice-monthly visits between December and March inclusive. These surveys generally followed a dawn VP survey over-looking the Westwater Reservoir roost site (see below), to determine where geese from the roost were dispersing to.

The car-transect surveys confirmed that small numbers of pink-footed geese roosting at the Westwater SPA feed in fields to the north and west of the Site (on average over 3 km from the Site boundary) and that the Site does not appear to lie on a regular flight path; indeed, just one flight was recorded over the northern top of the Site during the targeted goose surveys. Figure 10.16 in the ES shows the locations of the feeding geese flocks and associated flight lines.

Westwater Reservoir SPA Goose Roost Surveys

Dawn VP surveys were undertaken from a single VP overlooking Westwater Reservoir SPA, each of approximately two hours in duration. Surveys were conducted on a weekly basis during the autumn period (late September to early November) and then reverted to fortnightly surveys between December and March inclusive. The aim of the surveys was to map the flight lines of goose flocks commuting from the roost site to surrounding feeding areas.

Significant numbers of pink-footed geese were recorded using off-Site habitats during the targeted VP surveys at Westwater Reservoir SPA. A maximum flock size of 5,300 individuals was observed feeding on improved grassland approximately 15 km west of the Site and 9 km south of Westwater Reservoir.

8.3.2.3 Collision Risk Modelling

Based on the results of the 2011-12 baseline FAS, collision risk modelling (CRM) was carried out for five species, with the following estimated collision mortality estimates presented in the Ornithology Chapter of the EIAR:

- **Pink-footed goose**: undetectable, likely to be no collisions.
- **Golden plover:** 1.7 birds per year;
- **Merlin:** 0.01 birds per year;
- **Osprey**: 0.02 birds per year; and,
- **Goshawk**: 0.08 birds per year.

Other target species recorded during FAS were either recorded at such low frequencies (peregrine) that their risk of collision with turbines was considered to be negligible or, in the case of greylag goose, goosander and hen harrier, flights were not at collision risk height.

8.3.2.4 Ecological Impact Assessment

No significant effects (including cumulative effects) were predicted for any bird species associated with the Site. However, slight (non-significant) impacts on goshawk were predicted and it was proposed that best practice measures would be followed during construction to protect breeding goshawk. However, as potential impacts on important ornithological features may change due to the revised turbine layout and specifications, potential impacts will be re-assessed based on the existing ornithological baseline information (and including the 2019-20 baseline data), as described in Section 8.4.

8.4 Assessment Methodology

The ornithological assessment will be undertaken following guidance produced by the CIEEM for EcIA[45] which sets out a recommended process for assessment via the following stages:

- Collation of baseline ornithological information obtained through desk-based study and field surveys to identify important ornithological features;
- Identification and characterisation of ornithological impacts, including collision risk (see below), from all phases of the Development;
- Incorporation of measures to mitigate identified impacts;
- Assessment of significance of residual impacts following mitigation;
- Identification of appropriate compensation to offset any significant residual impacts; and
- Identification of opportunities for ornithological enhancement.

Potential cumulative impacts on ornithological features and assessment of ornithological impacts from decommissioning or redevelopment of the Development will be considered as part of the EcIA.

The Ornithology Chapter of the EIA Report will be supported by a Technical Appendix containing full survey and analysis methods and detailed results. Sensitive data relating to breeding Schedule 1 birds will be included in a Confidential Annex, which will not be released in the public domain.

8.4.1 ***Collision Risk Modelling***

As part of the EcIA, collision risk modelling (CRM) will be completed based on baseline flight activity survey data and using the Band model[46]. CRM will be completed for all target species considered to fly over the Development frequently enough to allow robust analysis. Details of the CRM will be included in the Ornithology Chapter of the EIA Report, with the results used to inform the assessment potential impacts of collision on target species.

8.4.2 ***Assessment of Significance***

In line with the latest CIEEM guidance, rather than using a matrix approach to determine significance of effects, the approach used for the EcIA will be to consider the importance

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

[46] Band, W, Madders, M, & Whitfield, D.P. (2007) *Developing field and analytical methods to assess avian collision risk at wind farms*. In: Janss, G, de Lucas, M & Ferrer, M (eds.) *Birds and Wind Farms*. Quercus, Madrid. 259-275.

and sensitivity of the ornithological feature, and the characteristics and severity of the impact, and applying professional judgement as to whether the integrity of the feature will be affected. For the purposes of the EcIA, an effect that threatens the integrity of an ornithological feature will be considered to be significant.

8.4.3 ***Baseline Survey Methods***

One year of baseline ornithology data for the consented development was recorded between 2011 and 2012, and informed the Environmental Impact Assessment (EIA) for the consented development. As the recorded data are more than five years old, it some of the 2011-12 baseline ornithology surveys are required to be repeated in 2019-2020, and includes the following;

- Flight Activity Surveys (2019-2020);
- Breeding Raptor Surveys (2019);
- Black grouse surveys (2019); and
- Foraging Goose Surveys (2019-2020).

Flight Activity Surveys

Surveys are currently being undertaken from suitable Vantage Points (VPs) to record the flight activity of target species such as wildfowl, waders and protected raptors. Surveys follow the most recent SNH guidance[47]. As the turbine layout has changed since the original EIA, it has been agreed with SNH in March 2019 that four VP locations would provide appropriate coverage of the revised turbine footprint.

Breeding Season Flight Activity Surveys

In accordance with the SNH guidance[47], surveys will be carried out year round; with 36 hours of watches per VP carried during the breeding season (April to August 2019). Surveys included a representative spread of dawn, daytime and dusk observations, including regular observations at dawn (starting one hour before sunrise) and dusk (ending one hour after sunset).

Target species for Flight Activity Surveys will include all divers, all grebes, all herons, all raptors and owls listed on Annex I (2009/147/EC Birds Directive) or Schedule 1 (Wildlife and Countryside Act 1981 as amended), black grouse and all waders and wildfowl. Secondary species include cormorant, all other raptors, all gulls, raven and selected passerines in noteworthy numbers

Non-breeding Season Flight Activity Surveys

Due to the Site's proximity to European Designated Sites for geese, in addition the above, Flight Activity Surveys will be carried out to for wintering geese. The surveys will be carried out over a minimum of 45 hours, evenly spread between September 2019 and February 2020. Surveys will include a representative spread of dawn, daytime and dusk observations, including regular observations at dawn and dusk.

Target species for Flight Activity Surveys will include SPA associated goose species; pink-footed goose, as well as other winter/migratory goose species, all divers, all grebes, all herons, all swans, all ducks, all raptors and owls listed on Annex I (2009/147/EC Birds Directive) or Schedule 1 (Wildlife and Countryside Act 1981 as amended), black grouse and all waders. Secondary species include cormorant, Canada goose, all other raptors, all gulls, raven and selected passerines in noteworthy numbers.

Breeding Raptor Surveys

[47] SNH. (2014). *Recommended bird survey methods to inform impact assessment of onshore wind farms*. SNH.

Breeding raptor surveys were undertaken to identify breeding territories of protected raptor and owl species[48]. Surveys covered the area within 1-2 km[49] of the access track and revised turbine footprint, with a particular focus on the revised turbine footprint. The survey methods involved a combination of watches from suitable VPs and walkovers, and would be based on the most recent guidance for surveying raptors[50]. A minimum of four survey visits were undertaken between March and July 2019.

Black Grouse Surveys

Black grouse surveys were undertaken to identify lek sites within 1.5 km of the access track and revised turbine footprint. The survey methods were based on standard guidance[51] with two visits would being undertaken between late March and mid-May 2019.

Foraging Goose surveys

To gain a more detailed understanding of how goose species, particularly SPA associated goose species; pink-footed goose is using the local area, surveys to record the locations and numbers of foraging geese will be carried out across suitable habitat within 3 km of the Site (where accessible). Surveys will take place twice per month, during the non-breeding season between September 2019 and February 2020.

8.5 Scope of Assessment

8.5.1 *Scoped In Effects*

Based on baseline conditions, it is proposed that impacts on qualifying ornithological interests of the following statutory sites are scoped in:

- Gladhouse Reservoir SPA and Ramsar (pink-footed goose); and
- Westwater Reservoir SPA (pink-footed goose)
-
- In addition, it is proposed that the following will be scoped in:
- Potential impacts on breeding Schedule 1 and/or Annex I species listed in Section 8.5 (such as goshawk and osprey) due to habitat loss, disturbance and/or displacement;
- Potential impacts on additional breeding wader species (including golden plover) due to habitat loss, disturbance and/or displacement; and
- Potential collision risk to all target species for which sufficient flights were recorded during Flight Activity Surveys.

8.5.2 *Scoped Out Effects*

Given the existing baseline data obtained from the desk study and site visits to date, it is possible to scope out the need for further consideration to be given to IEFs. The IEFs which have been scoped in at this stage are described in detail above.

8.6 Questions for Consultees

- Are consultees content with the proposed methods for assessment?
- Are consultees content with the extent of ornithological datasets obtained as part of the desk-based study?
- Are consultees content with the scope of the completed surveys? and
- Are consultees in agreement with the scoped in/out effects as described above?

[48] Species listed on Schedule 1 of the Wildlife & Countryside Act 1981 (as amended and/or Annex I of the EU Birds Directive.
[49] In line with SNH guidance, the survey area would include a 1 km buffer of the turbines/track for goshawk and barn owl, and a 2 km buffer for other species.
[50] Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B. and Thompson, D. (2013). *Raptors: a field guide to survey and monitoring*, 3rd edition. The Stationery Office, Edinburgh.
[51] Gilbert, G., Gibbons, D.W. and Evans, J. (1998). *Bird Monitoring Methods*. RSPB.

9 HYDROLOGY AND HYDROGEOLOGY

9.1 Introduction

A hydrogeological survey will be undertaken in order to establish the baseline conditions of the Site, assess the predicted impacts and their significance and propose a programme of mitigation where appropriate. The site varies significantly in elevation and encompasses a network of watercourses which flow southwest and northeast from the central topographic high ridge.

9.1.1 *Comparison with Extant Consent*

The EIA assessment for hydrology and hydrogeology was conducted by AMEC Environment & Infrastructure UK and reported in the ES in 2012. The Extant Consent consisted of 18 turbines across the Site and ancillary structures. The Site's hydrology and hydrogeology assessment identified surface water and groundwater to be of low sensitivity and that a Flood Risk Assessment was not required.

The Project Comparison document will consider the differences between the extant consent and the revised development. At this stage it is predicted that the reduced footprint of the Proposed Development from the Extant Consent has the potential to reduce effects of chemical pollution, sedimentation, impediment to flow, acidification of watercourses, runoff and flood risk, when compared to the extant consent.

9.2 Relevant Guidance and Legislation

The following legislation, guidance and information sources have been considered in carrying out this assessment:

- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations (2017) (the EIA regulations)[52]
- The Water Framework Directive (WFD) (2000/60/EC)[53]
- The Water Environment and Water Services (Scotland) Act 2003[54] and subsidiary Regulations
- The Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003[55];
- The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017[56]; and
- The Public and Private Water Supplies (Miscellaneous Amendments) (Scotland) Regulations 2015[57]

Measures in order to protect the water environment will be outlined in a Water and Construction Management Plan (WCMP) and will be based on good construction practice outlined in the following guidance and legislative documents:

- Pollution Prevention Guidelines (PPGs and GPPs) 1 to 22[58];

[52] Scottish Government (2017).The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations [Online] Available at: http://www.legislation.gov.uk/ssi/2017/101/contents/made
[53] European Commission (2000) The Water Framework Directive (2000/60/EC) [Online] Available at: http://ec.europa.eu/environment/water/water-framework/index_en.html
[54] Scottish Government (2003) the Water Environment and Water Services (Scotland) Act 2003 [Online] Available at: http://www.legislation.gov.uk/asp/2003/3/contents
[55] Scottish Government (2003) Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003 [Online] Available at: http://www.opsi.gov.uk/legislation/scotland/acts2003/asp_20030015_en_1
[56] Scottish Government (2017) the Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017 [Online] Available at: https://www.legislation.gov.uk/ssi/2017/282/note/made (Accessed 09/11/2018)
[57] The Scottish Government (2014) Scottish Planning Policy [Online] Available at: http://www.gov.scot/Publications/2014/06/5823
[58] Netregs (N.d) Pollution Prevention Guidelines [Online] Available at: http://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/

- Scottish Natural Heritage (SNH) (2015), Good Practice During Wind Farm Construction[59];
- The Construction Industry Research and Information Association (CIRIA) (2015), Environmental Good Practice on Site (C741)[60]; and
- CIRIA (2001), Control of Water Pollution from Construction Sites (C532)[61].

9.3 Key Sensitivities and Baseline Conditions

An initial desk-based review of the hydrological and ground conditions of the Site has been undertaken to outline potential sensitive receptors and baseline conditions. This section outlines the key potential hydrological, hydrogeological receptors within the Site and wider area.

9.3.1 *Surface Water*

The Site lies within the catchments of the Eddleston Water, which is classified by SEPA as having an overall status of "Poor", and Flemington Burn and Harehope Burn, which are both classified by SEPA as having an overall status of "Good"[62].

The Cowieslinn Burn, a tributary of Eddleston Water, rises at the northwest boundary of the Site and flows northeast to join Eddleston Water approximately 1.3 km east of the Site. The Middle Burn rises in the centre of the Site, to the west of Peat Hill at approximately 430 mAOD and flows north to join the Cowieslinn Burn and Eddleston Water. The Eddleston Water discharges to the River Tweed in Peebles, approximately 6 km southeast of the Site.

The Early Burn rises to the east of the Site, flows northeast to form the Shiplaw Burn and eventually flows into the Eddleston Water and the River Tweed. There are a number of small tributaries associated with the Early Burn within the Site boundary.

The Cour Hope Burn rises in the centre of the Site to the northeast of Ewe Hill at approximately 450 mAOD and flows southwest to form the Flemington Burn at the western boundary of the Site. The Flemington Burn flows west and discharges to the Lyne Water and eventually the River Tweed approximately 5 km to the south of the Site.

There are a number of smaller tributaries of the Cour Hope Burn and Flemington Burn within the Site boundary, including Corbie Linn which is a tributary of Flemington Burn.

The Harehope Burn rises in the south of the Site, 100 m north of the southern boundary, and flows east to join the Eddleston Water and then joins the River Tweed at the confluence in Peebles.

A tributary of the Stewarton Burn is located to the southeast of the Site and drains to the east into Stewarton Burn and Wormiston Burn before discharging to the Eddleston Water approximately 2.5 km east of the Site.

Site surveys will ground truth the presence of watercourses and drainage features within the Development and highlight any changes to the hydrological regime since the submission of the 2012 ES.

Appropriate buffers will be applied to watercourses and drains during the design phase.

[59] SNH (2015) Good Practice During Wind Farm Construction [Online] Available at: https://www.nature.scot/guidance-good-practice-during-wind-farm-construction
[60] CIRIA (2018) Environmental Good Practice On Site [Online] Available at: https://www.ciria.org/Training/Training_courses/Environmental_good_practice_on_site.aspx
[61] CIRIA (2001) Control of Water Pollution from Construction Sites [Online] Available at: http://www.orkneywind.co.uk/advice/SEPA%20Pollution%20Advice/ciria%20c532.pdf
[62] https://www.sepa.org.uk/data-visualisation/water-environment-hub/

9.3.2 *Geology*

The Development is underlain by Wackes of the Kirkcolm Formation and Portpatrick Formation. Superficial deposits are present across the majority site and consist of glacial Till[63].

9.3.3 *Hydrogeology (Groundwater)*

The groundwater unit underlying the Development is the Peebles, Galashiels and Hawick groundwater unit which is classified by SEPA as having an overall status of "Good"[64].

The BGS classified bedrock aquifer units, the Kirkcolm Formation and Portpatrick Formations, are "low productivity aquifers" with limited groundwater in near surface weathered zones and secondary fractures[65].

The superficial glacial Till deposits are largely impermeable and slows infiltration to bedrock aquifers, where present.

An assessment the potential effects on the groundwater resource will be undertaken in the ER.

9.3.4 *Groundwater Dependent Terrestrial Ecosystems (GWDTEs)*

The 2012 ES for the Extant Consent identified potentially significant effects on GWDTEs from the impacts of changes to the hydrological regime including chemical pollution incidents and sedimentation. The GWDTEs are identified in the 2012 ES as being heavily modified through conifer management and coupe rotation and would be permanently removed during normal forestry practices. The effects on GWDTEs were identified in the 2012 ES as having a small impact magnitude and therefore not significant.

The location, type and extent of the GWDTEs of the Site will therefore be determined with the aid of a National Vegetation Communities (NVC) survey, which inform the assessment of the hydrological function of the GWDTEs, in accordance with Land Use Planning System Guidance Note 31, Version 2, (SEPA, 2014). It is anticipated that peat deposits are located onsite and that GWDTEs will exist within the Site.

9.3.5 *Statutory Designated Sites*

Review of the SNH datasets available through the Scotland's Environment mapping service was used to identify statutory designated sites related to the water environment within 10 km of the Site boundary. Statutory designated sites are detailed in Table 9.1.

Table 9.1: Statutory Designated Sites within 10km of the Site boundary

Designation	Distance from Site	Qualifying Interest	Hydrological Connectivity to the Development
River Tweed SSSI and SAC	5 km south	Atlantic salmon (Salmo salar); beetle assemblage; brook lamprey (Lampetra planeri); fly assemblage	Yes – downstream of the Development
Whim Bog SSSI	1.9 km north	Raised Bog	No – separated by river catchment boundary

[63] BGS (2019) Bedrock and superficial geology 1:50,000 scale map [Online] Available at: http://mapapps2.bgs.ac.uk/geoindex/home.html
[64] https://www.sepa.org.uk/data-visualisation/water-environment-hub/
[65] BGS (2019) Hydrogeology 1:625000 scale map [Online] Available at: http://mapapps2.bgs.ac.uk/geoindex/home.html

Designation	Distance from Site	Qualifying Interest	Hydrological Connectivity to the Development
Auchencorth SSSI	3.5 km north	Raised Bog	No – separated by river catchment boundary
Black Burn SSSI	6.4 km north	Fen meadow; lowland acid grassland	No – upstream of the Development
Dolphinton - West Linton Fens and Grassland SSSI	6.4 km west	Bryophyte assemblage; lowland calcareous grassland; valley fen	No – separated by the River Tweed
Dundreich Plateau SSSI	5 km east	Blanket bog; subalpine flushes	No – separated by Eddlestone Water
Gladhouse Reservoir SSSI & SPA	6.9 km northeast	Pink-footed goose (non-breeding)	No – separated by Eddlestone Water
Mount Bog SSSI	8.75 km southwest	Basin fen; beetle assemblage	No – separated by the River Tweed
Peeswit Moss SSSI & SAC	6.8 km northeast	Active raised bog; degraded raised bog	No – separated by Eddlestone Water
Moorfoot Hills SSSI	7.8 km east	Blanket bog; dry heaths	No – separated by Eddlestone Water
Carlop Meltwater Channels SSSI	6.6 km northwest	Geological (Quaternary of Scotland)	No – upstream of Development
North Esk Valley SSSI	7.5 km northwest	Anthropoda (excluding insects and trilobites); Llandovery; Lowland acid grassland; valley fens	No – upstream of Development
Westwater Reservoir SSSI & SPA	8.4 km northwest	Pink-footed goose (non-breeding); waterfowl assemblage (non-breeding)	No – upstream of Development

The statutory designation of River Tweed SSSI and SAC is hydrologically connected to the Development and the potential effects of the Development on the designation will be scoped into the assessment. All other designations are hydrologically disconnected from the Development and will therefore be scoped out of the assessment.

9.3.6 *Private and Public Water Supplies*

The 2012 ES identified nine private water supply sources within 3 km of the Site and two water wells. The water wells are identified on the British Geological Survey (BGS) as Waterheads borehole 1.4 km to the northeast and Cringletie House borehole 1.8 km to the southeast of the Site.

Updated information pertaining to the location, type and source of public and private water supplies will be identified through consultation with relevant statutory consultees. Residents of properties with private water supplies will be contacted to obtain further information on the source and type of water supply.

It is proposed that a 2 km search radius from Development infrastructure is used to request details on public and private water supplies.

9.3.7 ***Flood Risk***

The Indicative River and Coastal Flood Map (Scotland) produced by SEPA shows the areas of Scotland with a 0.5 % (1:200) or greater chance of flooding. These areas are known as medium to high risk areas for flooding.

The SEPA Flood Map shows there is a 'High' annual probability of river flooding in any year in the lower reaches of the Cowieslinn Burn.

The Flemington Burn along the southeast boundary of the Site is indicated by the SEPA Flood Map to have a 'High' annual probability of river flooding in any year.

Isolated areas throughout the Site are categorised as having 'High' and 'Medium' annual probability of surface water flooding in any year of 1 in 200 (0.5%).

An initial 50 m buffer will be placed around watercourses onsite, therefore it is not anticipated that turbines or electrically sensitive equipment will be located within these areas of potential flood risk. As such, a concise section within the ER will consider how the Development will impact surface water run-off and effects on off-site receptors, in accordance with paragraphs 255 to 268 of the Scottish Planning Policy (SPP).

9.4 Assessment Methodology

A site walkover, consultation, desk studies and data requests will be undertaken to inform the hydrological baseline and assessment.

A hydrological (surface water) and hydrogeological (groundwater) assessment will be undertaken, including the following components:

- Review of the existing ES for the extant consent;
- Review of published data and maps;
- Consultation with SEPA, Scottish Borders Council and the British Geological Survey (BGS);
- Identification of solid and surface geologies;
- Review of Pollution Prevention Guidelines;
- Identification of surface water features, catchments and Ground Water Dependent Terrestrial Ecosystems (GWDTEs);
- Preparation of a catchment plan;
- Identification of data on public and private abstractions and supplies, and risk assessment of these;
- Identification of other similar developments within 10 km;
- Collation of flood plain information, water quality data and groundwater vulnerability information;
- Production of a Water and Construction Environmental Management Plan (WCMP); and
- Concise section within the ER to assess Flood Risk to meet the requirements of the SPP Framework.

The EIAR chapter will describe the potential effects of the Development including:

- Details of consultation undertaken;
- Assessment methodologies for construction and decommissioning phases;
- Hydrological walkover survey details and results;
- Assessment of the operational and decommissioning phases of the project to establish the effect on the hydrological resource;
- Identify mitigation measures, where necessary;
- Identify any residual effects following mitigation; and

- Cumulative assessment with other developments within 10 km of the Development; and
- Statement of significance in accordance with the Electricity Works (Environmental Impact Assessment) (Scotland) Amendment Regulations 2017.

9.5 Scope of Assessment

9.5.1 *Scoped In Effects*

Based on baseline conditions, it is proposed the following receptors are scoped into the assessment:

- Migration of pollutants from contaminated land as the Site has been previously developed;
- Effects on Cowieslinn Burn, Middle Burn, Flemington Burn and Harehope Burn and smaller unnamed tributaries and watercourses as there is potential for sedimentation, pollution and impediments and alterations to watercourses and near-surface water flow;
- Effects on quantity and quality of groundwater, as there is potential for pollution and impediments to flow;
- Effects on the functionality of GWDTEs as there is potential for pollution and impediments and alterations to watercourses and near-surface water flow;
- Effects on quantity and quality of Public and Private Water Supplies; and
- Effects on the River Tweed SSSI statutory designation.

9.5.2 *Scoped Out Effects*

Based on the baseline conditions recorded and distance from the Site, it is proposed that the following are scoped out:

- Designated receptors not hydrologically connected to the Development; and
- Receptors at distances greater than 10 km from the Site boundary, as pollution and sedimentation effects on the water environment beyond this distance is unlikely.

9.5.3 *Embedded Design Measures*

A 50 m buffer zone will be established for all turbine bases and ancillary structures / infrastructure around the watercourses on the site, where possible.

The requirement for wind farm tracks crossing watercourses will be minimised, where possible, during the design stage.

A WCMP will accompany the EIA Report and form part of the embedded development design. The WCMP will comprise methods and works that are established and effective measures to which the Applicant will be committed through the development consent. Accordingly, the assessment of significance of effects of the Development should be considered with the inclusion of the WCMP.

9.6 Questions for Consultees

The following questions have been designed to ensure that the proposed methodologies and assessment are carried out in a robust manner and to the satisfaction of the determining authorities:

- Do the Council and the consultees agree with the proposed methodology and scope of the hydrology and hydrogeology assessment?
- Does the Council, SNH, SEPA or other consultees have any information that would be useful in the preparation of the hydrology and hydrogeology assessment?

- Does the Council, SEPA or other consultees have any information regarding Private Water Supplies, and associated water source, that would be useful in the preparation of the hydrology and hydrogeology assessment?

10 NOISE

10.1 Introduction

Sources of noise during operation of a wind turbine are both mechanical (from machinery housed within the turbine nacelle) and aerodynamic (from the movement of the blades through the air). Modern turbines are designed to minimise mechanical noise emissions from the nacelle through isolation of mechanical components and acoustic insulation of the nacelle. Aerodynamic noise is controlled through the design of the blade tips and edges. In most modern wind turbines, aerodynamic noise is also restricted by control systems which actively regulate the pitch of the blades.

Whilst noise from the wind turbines increases with wind speed, at the same time ambient background noise (for example wind in trees) usually increases at a greater rate. Planning conditions are used to enforce compliance with specified noise level limits.

The effects of noise from the Development will be assessed in consultation with the Environmental Health Officer (EHO) of the Scottish Borders Council.

10.1.1 *Comparison with Extant Consent*

The EIA assessment for Noise and Vibration was undertaken in 2012 for a development of 18 turbines. The noise assessment identified sensitive receptors and included baseline noise monitoring results for representative noise receptor locations in the vicinity. The Extant Consent, permitted in 2016, includes noise limits derived in accordance with current best practice.

The Project Comparison document will consider the differences between the extant consent and the Wind farms ability to operate within the limits set by the existing noise planning condition.

10.2 Relevant Guidance and Legislation

Since the 2012 noise assessment, additional good practice guidance[66] (the GPG) was published in 2013 by the Institute of Acoustics (IOA). This guidance is endorsed by the Scottish government as current good practice for wind farm developments. Notwithstanding this, it should be noted that the 2012 was undertaken in accordance with current best practice, despite being prepared before the publication of the GPG.

Relevant guidance and information sources pertinent to the assessment of wind turbine noise are summarised as follows:

- The Scottish Government's planning information on onshore wind turbines[67];
- Planning Advice Note 1/2011 (PAN1/2011): Planning and Noise[68];
- ETSU-R-97: The Assessment and Rating of Noise from Wind Farms[69]; and
- A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise.

10.2.1 *Scottish Government Planning Information on Onshore Wind*

The Scottish Government's Online Renewables Planning Advice states that ETSU-R-97 should be used to assess and rate noise from wind energy developments, together with the Institute of Acoustics' Good Practice Guide.

[66] Institute of Acoustics (2013) A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise
[67] Scottish Government (2014) Onshore Wind Turbines [Online] Available at: http://scotland.gov.uk/Resource/0045/00451413.pdf (Accessed 12/09/19)
[68] The Scottish Government (2011) PAN 1/2011: Planning and Noise
[69] ETSU (1996) ETSU-R-97 The Assessment and Rating of Noise from Wind Farms

10.2.2 ***PAN 1/2011: Planning and Noise***

PAN 1/2011 provides advice on the role of the planning system in helping to prevent and limit the adverse effects of noise. It promotes the principles of good acoustic design and the appropriate location of new potentially noisy development. An associated Technical Advice Note offers advice on the assessment of noise impact and includes details of the legislation, technical standards and codes of practice appropriate to specific noise issues.

Appendix 1 of the Technical Advice Note: Assessment of Noise describes the use of ETSU-R-97 in the assessment of wind turbine noise.

10.2.3 ***ETSU-R-97***

ETSU-R-97 provides a framework for the assessment and rating of noise from wind turbine installations. It is the accepted standard for wind farm developments in the UK as supported by national guidance.

The aim of ETSU-R-97 is to provide *"indicative noise levels thought to offer a reasonable degree of protection to wind farm neighbours, without placing unreasonable restrictions on wind farm development or adding unduly to the costs and administrative burdens on wind farm developers or local authorities"*.

The report makes it clear from the outset that any noise restrictions placed on a development must balance the environmental impacts of the development against the national and global benefits which would arise through the development of renewable energy sources.

10.2.4 ***The Good Practice Guide***

The GPG was published by the IOA in May 2013 and has been endorsed by the Scottish Government as current industry good practice. The guide presents current good practice in the application of ETSU-R-97 assessment methodology for wind turbine developments at the various stages of the assessment, and will be followed throughout the assessment.

10.3 Key Sensitivities and Baseline Conditions

The noise assessment undertaken as part of the 2012 ES included baseline monitoring survey results and derived background levels for representative noise-sensitive receptors surrounding the Development site.

The 2016 Decision Notice provided noise limits at relevant receptor locations for the Development in isolation, which were derived in accordance with current best practice. The operational noise assessment in the EIA Report will assess the revised project's ability to operate within the noise limits detailed in the Extant Consent. As these apply to the Development in isolation, no updates to the baseline are required.

10.4 Assessment Methodology

A detailed noise modelling exercise will be undertaken for the Proposed Development, based upon a revised candidate turbine type to be confirmed. Noise levels will be predicted at the noise-sensitive receptors identified in the consented noise limits.

In addition, a search will be undertaken to identify any dwellings constructed since the time of the Extant Consent. In the event that any additional dwellings are identified which are closer to the Development that those originally assessed, the noise limits for those dwellings will be selected following the methodology described in Condition 19(7) of the Extant Consent, i.e. the noise limits of the most representative dwelling for which limits have been derived will be applied.

The predicted noise levels due to the Proposed Development will then be assessed against the respective noise limits to determine compliance with the Extant Consent and ETSU-R-97.

For reference, an initial noise contour plot is presented in **Figure 11** to illustrate potential noise levels from the Proposed Development, alongside residential receptors.

At this stage, the candidate turbine for the Proposed Development has not been determined. As such, for the purposes of this initial modelling, a Vestas V117 4.2 MW turbines with serrated edges has been assumed, being typical of the scale of turbine likely to be selected. The noise contour plot has been prepared in full accordance with the GPG, including a 2 dB allowance for uncertainty, resulting in a maximum sound power level of 108 dB, L_{WA}.

This initial noise model will be utilised to inform the design of the Proposed Development. It will be updated in line with the finalised design, and the resulting predictions used to assess compliance with noise limits, following the methodology described in Section 10.4.

10.5 Scope of Assessment

10.5.1 *Scoped In Effects*

A remodelling of the operational noise based on the Proposed Development layout and revised candidate turbine selection will be undertaken.

10.5.2 *Scoped Out Effects*

No change is anticipated with regard to construction noise effects; construction noise is therefore scoped out of the assessment.

As the Proposed Development is to be assessed against the noise limits provided in the Extant Consent, no cumulative assessment is required and has therefore been scoped out of the assessment.

10.6 Key Questions for Consultees

The following questions have been designed to ensure that the proposed methodologies and assessment are carried out in a robust manner and to the satisfaction of the determining authorities. Key questions for consultees are:

- Do the Council and consultees agree with the proposed methodology and scope of assessment?
- Are the Council of Consultees aware of any residential dwellings which have been consented or constructed in the vicinity of the Development since the time of the Extant Consent?

11 TRAFFIC AND TRANSPORT

11.1 Introduction

The Traffic and Transportation Chapter will consider the effects of vehicle movements to and from the Site associated with construction, operation and decommissioning phases of the Development. Vehicle movements to the Site will likely consist of abnormal load vehicles (for the delivery of turbine components), heavy goods vehicles (HGVs), light goods vehicles and cars.

This Scoping Report will outline the proposed methodology to be employed in the EIA for assessment of Traffic and Transportation effects on the chosen delivery routes and on the wider road network as required.

11.1.1 *Comparison with Extant Consent*

The number of turbines has been reduced from the Extant Consent, although their size has been increased. Calculation of material volumes will determine the net effect of this change on Traffic and Transport.

An Abnormal Load Route Assessment (ALRA) will be undertaken for the revised turbine specification, this will be used to inform the route to site and will indicate any road improvement works which are required to permit delivery.

11.2 Key Sensitivities and Baseline Conditions

Potential routes to the Site for construction materials have been identified, each of which will be explored at depth during the EIA process. Baseline traffic flow conditions on routes within the vicinity of the site will be established and detailed in the EIA. The geographic scope of baseline assessment will be confirmed in consultation with the relevant Local Authorities and Transport Scotland as appropriate. This scope is expected to extend to all approach routes to the site, except where good reason for their omission can be demonstrated.

It is proposed that where publically available traffic count information is available (e.g. that provided by the Department for Transport (DfT)) this shall be used as a basis for baseline assessment. Where no such information is available then traffic surveys shall be conducted, in accordance with best practice. It is expected that a number of routes will be covered by DfT counts and that a number of routes will require traffic surveys to be conducted.

11.3 Assessment Methodology

Assessment methodology will follow the 'Guidelines for the Environmental Impact of Road Traffic'. A screening process using two broad rules outlined in the aforementioned guidelines are used to identify the appropriate extent of the assessment area. These include:

- Highway links where traffic will increase by more than 30% (or where the number of HGVs will increase more than 30%); and
- Any other specifically sensitive areas where traffic flows have increased by 10% or more.

Where the predicted increase in traffic flows is lower than the thresholds, the guidelines suggest the significance of effects can be stated to be low or not significant and further detailed assessments are not warranted. Peak traffic flows will be identified to assess a worst case scenario.

Traffic movements on the public roads resulting from construction, operation and decommissioning will be based on the Development design. Traffic generation will take into account the import of construction materials and the export of surplus materials; and the

movement of equipment, construction plant and labour required during each phase of the Development.

Predicted traffic generation associated with any forestry clearance required to accommodate the Development will be included in the assessment. Only forestry clearance that deviates from ongoing forestry management activities will be considered (i.e. forestry traffic attributable to the Development).

Peak traffic flows will be identified to assess a worst case scenario. An assessment of effects on road safety, driver delay, pedestrian amenity, severance, noise and vibration will be undertaken as appropriate.

In addition to the aforementioned guidance, the Traffic and Transport Chapter will take into account the following statutory guidance documents published by the Scottish Government:

- SPP;
- PAN 75 – Planning for Transport; and
- Scottish Government Planning Specific Advice Sheet for Onshore Wind Turbines (last updated December 2013).

It should be noted that the above list may be subject to change in the case that various policies and guidance are replaced or updated during the delivery of the project.

As Transport Assessments (TA's) principally relate to developments that generate a significant permanent increase in traffic as a direct consequence of function, it is not proposed a formal TA will accompany the application, as wind farms are temporary in nature and the operation of the wind farm will not result in a permanent increase.

11.4 Scope of Assessment

The main potential effects are considered to be during construction as a result of:

- Temporary increase in HGV traffic;
- Delay related to the movement of abnormal loads;
- Abnormal road wear and tear;
- Effects on sensitive receptors; and
- Road widening/improvements to accommodate abnormal loads.

The approach to assessing sensitivity and magnitude of effects is a judgement based approach as used in recent EIA and the methodology detailed below. In terms of road networks, the sensitivity to change in traffic levels of any given road segment or junction is generally assessed by considering the residual capacity of the network under existing conditions. Where there is a high degree of residual capacity, the network may readily accept and absorb an increase in traffic, and therefore the sensitivity may be said to be low. Conversely, where the existing traffic levels are high compared to the road capacity, there is little spare capacity, and the sensitivity to any change in traffic levels would be considered to be high.

The determination of the magnitude of the effects will be undertaken by reviewing the outline proposals for the Development, establishing the parameters of the road traffic that may cause an effect, and quantifying these effects.

The study would consider effects during construction, operation and decommissioning.

In brief, the steps involved in this study would be as follows:

- Define the most suitable route of turbine delivery and other construction traffic to the Site and site access point;
- Consultation with the relevant highways authorities and emergency services (the Council, Transport Scotland, Police, etc.) to identify constraints;

- Undertake an Abnormal Load Route Assessment, or utilise historical assessments where appropriate, to define possible constraints to the delivery of abnormal vehicles to the site. This will include Swept Path Analysis where required to define locations where existing road alignments constrain the proposed delivery vehicles;
- Procure existing traffic data, and arrange additional surveys where necessary;
- Undertake route inspections including detailed observations at each community potentially affected by the Development within the study area. We would provide general effects statements for major roads however, the detailed and numeric assessment would be limited to the roads in closer proximity to the site;
- Based on the route inspections, sensitive receptors would be identified;
- In consultation with the Applicant and the relevant highway authorities, route options would be explored;
- An initial assessment of traffic generation from the Development, assignment of traffic to the network and an initial assessment of effects would be undertaken. This would be based on professional judgement rather than transportation network modelling;
- Obtain refined project needs, refine traffic generation, and re-assess effects, using obtained / gathered baseline traffic data;
- Assess residual effects following the primary mitigation built in by virtue of the above-mentioned iteration, and any required residual mitigation needs; and
- Identify and assess the potential for cumulative effects based on other known developments.

11.5 Questions for Consultees

The following questions have been designed to ensure that the proposed methodologies and assessment are carried out in a robust manner and to the satisfaction of the determining authorities:

- Do the Consultees agree with the proposed method of assessment?
- Are the Consultees aware of any specific access restrictions or limitations on the proposed abnormal loads route?

12 GEOLOGY AND PEAT

12.1 Introduction

An assessment of the impact of the Development on geology and peat will be undertaken This will establish the baseline conditions, inform the assessments and designs whilst determining any suitable mitigation measures required.

12.2 Key Sensitivities and Baseline Conditions

The available British Geological Survey (BGS)geological mapping[70] indicates that the majority of the site is underlain by Kirkcolm Formation or Portpatrick Formation wackes in the central and northern, and southern areas respectively. Minor geological faulting is recorded throughout the site. Basalt rocks were noted in the north-west.

The available British Geological Survey (BGS)geological mapping indicates that the majority of the site is underlain by superficial deposits of Diamicton Till of Devensian Age. The highest areas in the vicinity of Whaup Law, Ewe Hill, Kilrubie Hill and Crailzie Hill are shown to have no drift cover. Small pockets of Peat and Alluvium (comprising gravel, sand and silt) are located in the north and central areas of the site and a small area of Glaciofluvial Deposits of gravel, sand and silt is located near the northern boundary.

Carbon and Peatland mapping 2016[71] indicates the site is underlain by pockets of Class 3, 4 and 5 soils, comprising predominantly peaty soils, mineral soils and some peat. Unknown or mineral soil classes were also noted throughout. The National soils map of Scotland[72] indicates the site to be predominantly peaty gleys comprising some peat, peaty podzols, non-calcareous gleys and brown forest soils of the Ettrick Soil Association derived from drifts from Lower Paleozoic greywackes and shales.

12.3 Assessment Methodology

A desk study will be undertaken within the application site boundary. The desk study will include an overall appraisal of geology and ground conditions for input to an ES chapter. It will also include an initial risk map for the site identifying potential or actual constraints and those areas requiring further consideration and will inform the scoping of areas for the peat probe surveys.

The purpose of this assessment will be to:

- Define the peat extent, depth and properties across the Site;
- Identify any areas susceptible to peat slide, using peat thickness and digital terrain
- model (DTM) data to analyse slopes;
- Advise on the micrositing of turbines and tracks to areas of shallow or no peat;Assess potential effects on soils, peat and geology, and sensitive habitats; and

- Develop an acceptable code for construction that will adopt best practice procedures, effective management and control of onsite activities to reduce or offset any detrimental effects on the geology and soils including peat.

12.3.1 ***Peat Probing***

Peat Probing will consist of two phases, a preliminary phase (Phase 1) and a more detailed phase exercise once the proposed infrastructure has been defined (Phase 2). Phase 1 peat probing would comprise a 100m x 100m centres across the proposed scoped turbine layout areas. This will be supplemented by Phase 2 peat probe survey works which will focus on

[70] http://www.bgs.ac.uk/GeoIndex/
[71] https://soils.environment.gov.scot/maps/thematic-maps/carbon-and-peatland-2016-map/
[72] http://map.environment.gov.scot/Soil_maps/?layer=1

the design freeze site layout. Phase 2 peat probing survey will be undertaken at 50 m centres along tracks and at 25m spacing either side to allow for micro-siting. Peat probing will also be undertaken at 10 m centres at each turbine location.

This approach is in accordance with Energy Consents Unit (ECU) Scottish Government guidance Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments (Second Edition). The information gathered will be utilised in preparation of Peat Landslide Hazard and Risk Assessment and outline Peat Management Plan

12.3.2 *Peat Slide Risk Assessment*

Should significant quantities of peat be present within the Site, a Peat Slide Risk Assessment will be undertaken in accordance with Energy Consents Unit (ECU) Scottish Government guidance 'Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments (Second Edition)' April 2017' along with full consultation with the relevant consultees.

The Peat Slide Risk Assessment will comprise of detailed analysis and reporting on the design freeze and will include a hazard and slope stability assessment and preliminary peat management recommendations.

The hazards existing on the site will be ranked based on factors that influence stability, namely peat depth and slope gradient. In addition, potential receptors exposure to risk will be established and hazard rankings applied across the site, with management and mitigation measures recommended for an acceptable construction.

12.3.3 *Outline Peat Management Plan*

Arcus will undertake an outline peat management plan which will include high level estimation on peat excavation and re-use volumes. This will be based on the approximate infrastructure dimensions and anticipated re-use streams. This will include;

- Defining the materials that will be excavated as a result of the Development, focusing specifically on the excavation of peat;
- Determine volumes of excavated arisings, the cut/fill balance of the Development and proposals for re-use or reinstatement using excavated materials; and
- Detail management techniques for handling, storing and depositing peat for reinstatement.

12.4 Scope of Assessment

12.4.1 *Scoped In Effects*

Based on baseline conditions, it is proposed the following are scoped into the assessment:

- Potential peat slide risk;
- Inform the assessment of effects on peatlands;
- Informs outline management measures for excavation and re-use of peat and peaty soils; and
- Details of embedded mitigation and restoration relative to Geology and Soils

12.4.2 *Scoped Out Effects*

Based on the baseline conditions recorded and distance from the Site, it is proposed that the following are scoped out:

- Desk based researches suggests no areas of contaminated land are likely within the site and therefore no effects are anticipated. Potential effects arising from contaminated land have, therefore, been scoped out of this assessment.

- The solid geology of the Development site influences the site design and is not likely to receive a significant effect as a result of the Development. Any borrow workings are likely to be representative of minimal or no change to a geological site or mineral deposit. It is therefore proposed to scope out the effects on solid geology out from any further assessment.

12.5 Questions for Consultees

Key questions for consultees are:

- Do the consultees agree with the proposed methodology and scope of the Geology and Peat Assessment?
- Do the consultees have any information that would be useful in the preparation of the Geology and Peat assessment, including details of local quarrying activity?

13 FORESTRY

13.1 Introduction

This section will provide an assessment of the impacts of the construction and operation of The Proposed Development on the commercial forest crops present on the site.

13.1.1 *Comparison with Extant Consent*

A variation to the previous Long Term Forest Plan was approved under the last planning application for the Site and it is likely that the felling design for any revised project will be broadly similar. Though, as the intention is to reduce the number of turbines within the site, it is anticipated that the area of tree removal required for the project will be reduced from the previously approved area of 50.5 hectares.

13.2 Assessment Methodology

The purpose of the assessment will be to:

- Confirm the present age and species structure of the forestry crops.
- Analyse the impact of any necessary tree removal to facilitate The Proposed Development on any existing Land Management Plan.
- Identify any measures necessary to mitigate the impact of the development on the existing forestry crops.

Existing forestry records will be analysed and augmented as required through further survey and assessment to document the full detail of the existing tree cover over the site.

The forestry report will be presented within a chapter of the EIA and the principal output will be the preparation of a revision to the current Land Management Plan documenting the timing and extent of the area of woodland to be felled during the life of the Proposed Development. It will also include restocking proposals to illustrate areas which would be replanted during the life of the wind farm.

13.3 Key Sensitivities and Baseline Conditions

The site is located within an extensive area of commercial forestry. The woodlands within the site comprise predominantly of commercial conifer species with associated areas of broadleaves, designed open ground, access roads and rides.

The forestry baseline will describe the crops existing at the time of preparation of the EIAR including information on species, planting year and both felling and restocking design proposals within any existing agreed Forest Plans.

13.4 Scope of Assessment

There is a presumption against permanent woodland removal within the UK unless it addresses other environmental concerns or delivers additional and clearly defined public benefits. The Scottish Government's "Control of Woodland Removal Policy" (2009) records the assessment requirements and compensatory measures which should be considered when removing woodland cover and the requirements under this policy will be addressed within the EIA.

Areas of woodland will need to be felled for the construction and operation of the wind farm including wind farm tracks, turbine locations and other infrastructure. Further woodland may need to be felled for wind yield and other technical reasons. The structure of the woodlands may therefore change, resulting in a potential loss of woodland area. This will be addressed through the redesign of the existing forest including, for example, the use of designed open space or alternative woodland types or the provision of compensatory woodland planting on an alternative site.

The Scottish Forestry (SF) South Scotland Conservancy will be consulted on the development of the proposals relating to the restructuring of the forestry cover as a consequence of The Development Project to ensure that the proposed changes to the existing forestry crops are appropriate and suitably address the requirements of the Control of Woodland Removal Policy.

The forestry proposals will be prepared in accordance with the current industry best practice and guidance including, but not limited to:

- Scottish Borders Council (2005): Scottish Borders Woodland Strategy. Scottish Borders Council, Newton St Boswells.
- Forestry Commission Scotland (2009): The Scottish Government's Policy on Control of Woodland Removal. Forestry Commission, Edinburgh;
- UKWAS (2017): The UK Woodland Assurance Standard Third Edition. UKWAS, Edinburgh;
- Forestry Commission (2011): Forests and Water. UK Forestry Standard Guidelines (and other guidelines in the same series). Forestry Commission, Edinburgh;
- SEPA (2014): Use of Trees Cleared to Facilitate Development on Afforested Land. Land Use Planning System SEPA Guidance Note LUPS-GUS2.
- Forestry Commission (2017): The UK Forestry Standard, The Government's Approach to Sustainable Forestry. Forestry Commission, Edinburgh;
- The Scottish Government (2019): Scotland's Forestry Strategy. The Scottish Government, Edinburgh;

The changes to the woodland structure will be analysed and described in relation to species composition, age class structure, commercial timber production etc with supporting text, tables, diagrams and maps as necessary.

Any wider effects of forest felling and restocking will be assessed in the relevant chapters of the EIA as described in the other sections of this document.

14 AVIATION, RADAR AND TELECOMMUNICATION

14.1 Introduction

The development of wind turbines has the potential to cause a variety of adverse effects on aviation during turbine operation. These include but are not limited to:

- Physical obstructions;
- Generation of unwanted returns on Primary Surveillance Radar (PSR); and
- Adverse effects on overall performance of Communications, Navigation and Surveillance (CNS) equipment; and
- Interfere with electro-magnetic signals and potentially affecting television reception and fixed telecommunication links.

14.1.1 *Comparison with Extant Consent*

The Project Comparison document will consider the differences between the extant consent and the revised development. At this stage it is predicted that, the Proposed Development is unlikely to present any additional adverse effects on aviation, radar and telecommunication this will be confirmed through consultation.

14.2 Aviation and Radar

Since many issues must be considered when assessing the potential effect of the Development, the local Air Navigation and Air Traffic Services Providers are best placed to provide expert interpretation of what those effects might be and how they might affect safety, efficiency and flexibility of their operations. A well-established regulatory and policy framework that has been in force for a number of years, and subject to constant amendments and updating; this, in addition to guidance documents, has been taken into account when preparing the assessment methodology to ensure compliance.

Where line of sight exists between turbines and air traffic control radars it is possible that the turbines may be detected by the radar, dependant on atmospheric conditions, and appear as clutter on the controllers' screens; such clutter can have a direct operational impact on air traffic control operations.

Potential effects on other aviation interests will be evaluated by considering the consultation response from National Air Traffic Services En Route Plc (NATS) and Ministry of Defence (MOD) in the context of the likelihood of identified aviation operators using the airspace in the vicinity of the Development.

It is therefore expected that an aviation assessment will be required to identify and assess the likely aviation issues associated with the Development.

14.2.1 *Baseline Conditions*

The closest radar equipped civilian airport is at Edinburgh, approximately 25 km to the north which is also the closest licenses aerodrome. The closest military airfields are the Spadeadam RAF base, approximately 80 km to the south-southwest; and the Prestwick RAF base, located 80 km west-southwest.

The majority of the Site is located dominantly within a regular Low Flying Zone that is categorized by the MoD as '*where mitigation may be necessary to resolve concerns'*. Within 10 km to the southwest of the Site, the area is partially within a zone of high priority military flying which is '*likely to raise considerable and significant concerns'*.

It is possible that the MoD will raise concerns in relation to the Development's location relative to the proximity to the red low flying zone, although this will be confirmed during consultation.

The NATS radar at Lowther Hill is located approximately 45 km southwest of the Site. The NATS online self-assessment maps indicate that the Site will be within an area where turbines are likely to interfere with the primary surveillance radar of NATS En-Route Ltd (NERL). While the assessment maps do not differentiate between specific radars, it is assumed that any interference will be on the PSR at Lowther Hill. This will be confirmed during consultation.

The Development site is located approximately 55 km west southwest of the Eskdalemuir Seismological Recording Station, and therefore outwith the 50 km consultation zone.

14.2.2 *Assessment Methodology*

The general approach to wind farm development is to avoid adverse effects on aviation infrastructure, where possible, and to find appropriate technical mitigation solutions where this cannot be achieved.

Consultation with relevant aviation providers is a routine part of wind farm development and the consultation process that is required to be undertaken is also laid down in Civil Aviation Publication (CAP) 764 (for civil aviation issues) and the Wind Energy and Aviation Interests Interim Guidelines (for both civil and military consultation). In relation to the Development the following consultees have been identified:

- Ministry of Defence (Defence Infrastructure Organisation);
- Edinburgh International Airport;
- National Air Traffic Services (NATS); and
- Civil Aviation Authority (CAA).

A search for private airfields will be conducted in parallel with the consultation process, and any identified airfields will also be consulted on the proposed turbine development. It is therefore expected that an aviation assessment will be required to identify and assess the likely aviation issues associated with the Development.

14.3 Telecommunications

Wind farms have the potential to interfere with broadcast communications and signals.

To identify any existing infrastructure constraints, a desk-based study as well as consultation will be conducted. Consultation with relevant telecommunication and utilities providers is a routine part of wind farm development and consultees will include:

- Spectrum licensing/ OFCOM;
- Television and telecommunications providers as appropriate; and
- Water, gas and electricity utilities providers.

Additional scoping work will identify all fixed link radio facilities, all broadcast television and radio transmitters within a 10 km radius of the Site.

The probability of a significant impact on fixed radio links and broadcast television signals will be assessed on the basis of site proximity to transmitter-receiver paths and rebroadcast links and calculation of Ofcom-recommended clearance zones. Potential changes to the telecommunications environment as a result of the Proposed Development will be predicted by an assessment of the proximity of turbines to radio facilities and consultations with Ofcom.

A preliminary search has indicated that the Development may cause interference with existing fixed telecommunications links that are currently in operation by BT Group, Vodafone, and Atkins within 5 km of the Site. This can however be mitigated through design by maintaining the recommended 100 m clearance from the turbine blade to the link path.

14.4 Scope of Assessment

14.4.1 *Scoped In Effects*

The scope of any aviation impact assessment, if required, will be based on the outcome of consultation discussions with the relevant aviation consultees. Recommended consultees and relevant scoped in effects for aviation and radar include:

- Edinburgh Airport – consultation with BAA Aerodrome Safeguarding in relation to airport safeguarding;
- MOD – consultation to confirm that the turbines will be sufficiently screen by terrain from RAF Spadeadam and RAF Prestwick; and
- NATS – consultation to confirm that the turbines will be sufficiently screened or separated from the Communications, Navigation and Surveillance (CNS) Network.

Similarly, for telecommunication links, the scope of impact assessment will be based on the response of initial consultation with the relevant telecommunications and utilities to identify any existing infrastructure that could constraint development. Recommended consultees include:

- Spectrum;
- Ofcom;
- Joint Radio Company (JRC);
- Atkins;
- City Fibre; and
- BT Radio Network Protection.

14.4.2 *Scoped Out Effects*

Should the further consultation with the CAA and other consultees conclude no objections, the effects of aviation may be scoped out.

The Proposed Development will be designed to ensure that there are no effects on telecommunication links. Ongoing consultation with relevant consultees will ensure any potential effects are identified.

14.5 Questions for Consultees

- Are BAA Aerodrome Safeguarding satisfied that the Development will be manageable in relation to operations at Edinburgh Airport?
- Are any Consultees aware of any additional aviation or telecommunication stakeholders that should be taken into account?
- In the event that all Consultees return a 'not significant' response, are Consultees content to scope out Aviation?

15 SOCIO-ECONOMICS, LAND USE, RECREATION AND TOURISM

15.1 Introduction

Socio-economic effects will be considered based on the guidance from Guidelines for Environmental Impact Assessment[73] and a Handbook for EIA[74] and considered against:

- An economic profile of the area;
- Tourism and recreation;
- Land-use and ownership; and
- Public attitudes to wind farms.

15.1.1 *Comparison with Extant Consent*

The Project Comparison document will consider the differences between the extant consent and the revised development. At this stage it is predicted that the reduced footprint of the Proposed Development has the potential to limit any additional adverse effects on land-use, and recreation and tourism, when compared to the extant consent.

It is also predicted that there is the potential for socio-economic benefits to increase due to changes in market conditions and the increase in MW output, when compared to the extant consent.

15.2 Relevant Legislation, Policy and Guidance

There is no specific legislation or guidance available on the methods that should be used to assess the socio-economic, recreation and tourism impacts of a proposed onshore wind farm development. The proposed method has however, been based on established best practice, including that used in the UK Government and industry reports on the sector. Effects will be considered based on the wider environmental impact guidance from guidelines for Environmental Impact Assessments[75] and a handbook for EIA[76].

The socio-economic and tourism chapter will take account of the relevant local and national policy objectives. The most relevant objectives for this are expected to be included in the following strategies:

- Scottish Borders Economic Strategy 2023 (2013)[77];
- Scottish Borders Council Local Development Plan[78];
- Scotland's Economic Strategy[79];
- Scotland's Energy Strategy[80];
- Tourism Scotland 2020[81]; and
- Scottish Borders Council: Tourism – Economic Impact and Business Opportunities (2017)[82].

[73] Institute of Environmental Management and Assessment (IEMA) (2004) *Guidelines for Environmental Impact Assessment* (IEMA)
[74] SNH (2003) *A Handbook for Environmental Impact Assessment, Appendix 5: Guide to Outdoor Access Assessment,* SNH.
[75] Institute of Environmental Management and Assessment. (2004). Guidelines for Environmental Impact Assessment.
[76] Scottish Natural Heritage. (2003). A Handbook for Environmental Impact Assessment, Appendix 5: Guide to Outdoor Access Assessment.
[77] The Scottish Borders Council (2013) Scottish Borders Economic Strategy 2023. [online] Available at: https://www.scotborders.gov.uk/downloads/file/456/economic_strategy (accessed 28/08/2019)
[78] The Scottish Borders Local Development Plan (2016). [online] Available at: https://www.scotborders.gov.uk/info/20051/plans_and_guidance/121/local_development_plan (accessed 28/08/2019)
[79] Scottish Government. (2015). Scotland's Economic Strategy.
[80] Scottish Government (2017). Scottish Energy Strategy: The Future of Energy In Scotland
[81] Scottish Tourism Alliance. (2012). Tourism Scotland 2020.
[82] Scottish Borders Council: Tourism – Economic Impact and Business Opportunities (2017). [online] Available at: https://scottishborders.moderngov.co.uk/documents/b10904/Tourism%20-%20Economic%20Impact%20and%20Business%20Opportunities%2031st-Jan-2017%2010.00%20Executive%20Committee.pdf?T=9 (accessed 28/08/2019)

The potential impact of the Proposed Development on socio-economics and tourism is closely related to the perception of wind farms by those visiting the area. A desk-based review considering the public perception studies will be undertaken as part of this assessment. This review will include, but not limited to, consideration of the following:

- DECC Public Attitudes Tracking Survey, published quarterly;
- RenewableUK 2018 Opinion Poll;
- Visit Scotland (2011) Insight Department Wind Farm Consumer Research Topic Paper;
- Scottish Executive, MORI (2003) Public Attitudes to Wind Farms: A survey of Local Residents in Scotland; and
- Scottish Renewables Forum and British Wind Energy Association MORI Scotland Survey (2002) Tourist Attitudes to Wind Farms.

Following a desk-based review, information from a number of public attitude surveys will be assessed to determine the likely public perception regarding the Proposed Development.

15.3 Socio-economics

15.3.1 *Baseline Conditions*

The Site is located approximately 5.5 km north-west of Peebles and 9 km south of Penicuik, as shown on **Figure 1**, within the Scottish Borders. The Site is within the Scottish Borders Council (SBC) administrative region, which has a population of 113,870 people according to the most recent census. This was a 6.65% rise from 2001[83].

Smaller villages and settlements including Eddleston, Romannobridge, and West Linton are located within 5 km of the Site Boundary and will be considered as part of the assessment. There are a number of singular residential properties located on and surrounding the main roads that border the Site. The assessment will consider effects arising from the Proposed Development on job creation and use of local services.

The employed population within in the Scottish Borders are predominantly within the industries of Public Administration, Education and Health (30% of the employed population), and in Distribution, Hotels and Restaurants[84] (21% of the employed population).

15.3.2 *Assessment Methodology*

In particular, this assessment will draw from two studies by BiGGAR Economics on the UK onshore wind energy sector, a report published RenewableUK and DECC in 2012 on the direct and wider economic benefits of the onshore wind sector to the UK Economy[85] and a subsequent update to this report published by RenewableUK in 2015[86]. These reports will provide the input assumptions if the data for the Proposed Development is not available.

The Proposed Development will result in opportunities for local and regional contractors both for construction and maintenance activities themselves and throughout the supply chain. The investment in the Proposed Development has the potential to generate a range

[83] Scottish Borders Area Profile, Census 2011 (2011). [online] Available at: https://www.scotlandscensus.gov.uk/documents/council_area_profiles/Scottish_Borders.pdf (accessed 28/08/2019)
[84] Scottish Borders Area Profile, Census 2011 (2011). [online] Available at: https://www.scotlandscensus.gov.uk/documents/council_area_profiles/Scottish_Borders.pdf (accessed 28/08/2019)
[85] RenewableUK (2012) Onshore Wind Direct and Wider Economic Impacts [Online] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/48359/5229-onshore-wind-direct--wider-economic-impacts.pdf (Accessed 09/05/2019)
[86] RenewableUK (2015) Onshore Wind: Economic Impacts in 2014 [Online] https://c.ymcdn.com/sites/www.renewableuk.com/resource/resmgr/publications/reports/onshore_economic_benefits_re.pdf (Accessed 09/05/2019)

of economic and social effects and opportunities for local businesses, most notably employment opportunities and local spending.

Potential economic effects can be divided into:

- Direct effects: for example, employment opportunities in the construction, operation and maintenance and decommissioning of the Proposed Development. The nature and scale of the economic effects would depend on the total cost and the sources of the materials and labour. Other direct effects include a community benefit fund and the payment of business rates payable to the local authority throughout the operational phase of the Proposed Development;
- Indirect effects: such as employment opportunities created down the supply chain by those companies providing services to the Proposed Development during construction, operation and decommissioning; and
- Induced effects: for instance employment created by the additional spend of wages into the local economy and the purchasing of basic materials, equipment and office space for staff.

The economic impact of the Proposed Development upon surrounding settlements will be assessed in terms of the level of employment and contract opportunities the Proposed Development could bring. These effects will be assessed for each phase of the Proposed Development: construction, operation and decommissioning.

15.4 Land Use, Recreation and Tourism

15.4.1 *Baseline Conditions*

The Site is located within a rural setting with recreation opportunity based around the natural environment such as hills, wildlife, lochs and rivers, with few formally recognised tourist attractions. There are also several cultural heritage features within the Site and in the vicinity of the Site.

The Site boundary broadly follows the edge of Cloich Forest which covers the Cloich Hills. The topography of the Site comprises the rolling Cloich Hills, including Peat Hill (466m AOD), Ewe Hill (462m AOD), White Rig (325m AOD), and Crailzie Hill (476m AOD). These hills are largely used for informal recreational purposes. Current land use on site is primarily coniferous plantation woodland, with only a small area of approximately 122 ha lying outwith this woodland.

There are a number of Core Paths (Core Path 150 and Core Path 174) and undesignated footpaths within the 5 km of the Site, which suggest this area is often used for recreational walking, and the potential effects of these being temporarily affected will be a key consideration as part of the assessment. The Cross Borders Drove Road is a designated Waymarked Trail located in the south of the Site, which is a Public Right of Way. The trail enters the Site in the west at approximately NGR 318926 646104 and exits the Site in the east at approximately NGR 321597 646128. Whilst this route is not a designated Core Path, consideration of this route as a key recreational receptor will be undertaken as part of the assessment.

In respect of recreation and access, consultations will take place to assess the effects to users of Public Rights of Ways, cycle routes, and bridleways. This will include consultations with the Council and organisations such as British Horse Society, Ramblers Association, Scotways, Sustrans, local tourism providers, and other relevant organisations.

Various existing surveys and assessments of socio-economic and visitor profiles, land use and ownership, and public attitudes to wind farms will be collated to provide background information against which to assess the potential for significant effects.

15.4.2 ***Assessment Methodology***

This assessment will consider the potential effect that the Development could have on tourism attractions and the associated local tourism industry, quality of land use, the experience of cultural heritage assets, routes, trails and local accommodation providers. It is considered unlikely that any significant socio-economic effects will occur as a result of the Development. Effects on any on-site or nearby land use, and tourism and recreation receptors will be considered in detail where direct effects are predicted. Direct effects include effects such as temporarily diverting a public right of way during the construction phase of the Development. Indirect effects on any tourism or recreation receptors or change to land use derive from visual effects that will be considered as part of the LVIA, and the findings of the LVIA will inform an assessment of the effect on the wider experience of the receptors under this topic heading within the ER.

15.5 Scope of Assessment

It is likely that significant, positive and beneficial effects on local employment and services will arise through the operational, and construction and decommissioning phases of the Development. No aspects of socio-economics will be scoped out.

The scope of the land use, recreation and tourism assessment will be established through consultation with the SBC. Aspects identified as not likely to be significant will be scoped out of any further assessment.

15.6 Questions for Consultees

- Do Consultees agree with the proposed method of assessment for impacts on Socio-Economics, Land-Use, Recreation and Tourism?
- Are Consultees aware if any additional sensitive economic activities in the area that would not be covered in the proposed method of assessment?
- Are Consultees aware of any additional cumulative schemes that should be taken
- Are Consultees aware of any key sensitive receptors that might be relevant to likely significant effects? and
- Are Consultees aware of any additional relevant consultees?

16 MISCELLANEOUS: CLIMATE CHANGE, HEALTH & SAFETY (INCLUDING MAJOR ACCIDENTS & DISTASTERS) AND SHADOW FLICKER

16.1 Introduction

This section sets out the proposed approach in respect of additional assessments that are required in order to provide a comprehensive assessment of the likely environmental impacts of the Proposed Development together with a summary of information that is currently available.

16.1.1 *Comparison with Extant Consent*

As the Proposed Development scoping layout remains within the Site Boundary, yet within a reduced footprint, the Proposed Development has the potential to limit any additional adverse effects on Climate Change and Health and Safety, when compared to the extant consent.

The effects of Shadow Flicker will require assessment due to the updated Scoping Layout.

16.2 Climate Change

The aim of the Climate Change Impact Assessment (CCIA) section is to determine how the Proposed Development is likely to interact with a changing climate and whether any significant effects could arise. CCIA is a new form of environmental assessment required by the amended EC Directive 2014/52/EU1, as transposed into UK law by the EIA Regulations.

As CCIA is a new category of assessment and currently only provisional guidelines exist to standardise the process in the UK. IEMA published 'Environmental Impact Assessment Guide to Climate Change Resilience and Adaption[87] in November 2015 with the intention of providing an updated and finalised version in 2017, once the Directive was transposed into UK law. At the time of writing, no update of to these guidelines has been published. Accordingly, the proposed CCIA methodology was developed in line with the 2015 IEMA guidance and IEMA's complementary report 'Assessing Greenhouse Gas Emissions and Evaluating their Significance'88 in order to establish a comprehensive assessment methodology. This methodology focusses on the following elements:

- Assessment of the Proposed Development's effects on climate change (calculation of carbon footprint based on best practice guidelines, e.g. Scottish Government Carbon Calculator Tool[89]) to include calculation of greenhouse gas emissions relating to construction, operation, decommissioning and the production of electricity;
- Assessment of the Proposed Development's vulnerabilities and resilience in the context of climate change by identifying appropriate climate change projections and climate change effects; and
- Assessment of the Proposed Development's effects upon identified environmental receptors in the context of the emerging baseline.

The most recent climate change projection iteration, UKCP18, has identified the following climatic trends as a result of climate change:

[87] IEMA (2015) Environmental Impact Assessment Guide to Climate Change Resilience and Adaption [Online] Available at: https://www.iema.net/assets/templates/documents/iema_guidance_documents_eia_climate_change_resilience_and_adaptation%20(1).pdf (Accessed 29/05/2018)
[88] IEMA (2017) Assessing Greenhouse Gas Emissions and Evaluating their Significance [Online] Available at: https://www.iaia.org/pdf/wab/EIA%20Guide_GHG%20Assessment%20and%20Significance_IEMA_16May17.pdf (Accessed 29/05/2018)
[89] Scottish Government (2018) Carbon Calculator Tool v1.4.0. [Online] Available at: https://informatics.sepa.org.uk/CarbonCalculator/index.jsp (Accessed 29/05/2018)

- Increase temperature;
- Changes in the frequency, intensity and distribution of rainfall events (e.g. an increase in the contribution to winter rainfall from heavy precipitation events and decreases in summer rainfall);
- Increased windstorms; and
- Sea level rise.

The Proposed Development will be inherently designed to reduce adverse climate change effects by offsetting the production of carbon dioxide through use of renewable sources for generating electricity. The current baseline with respect to greenhouse gas emissions from existing methods of electricity generation (including the operational turbines onsite) will be identified using existing data from the Government, operational sites, and experience of other similar developments. This information will provide the baseline information against which to assess the contribution of the Proposed Development to reducing greenhouse gas emissions and potential for significant effects.

Renewable energy is being promoted in Scotland as a means of reducing carbon emissions. Within the EIAR, a Section will provide details on the expected carbon savings which as predicted as a result of the operation of the Proposed Development.

16.3 Health and Safety, including Major Accidents and Disasters

The EIA Regulations state that an EIA must identify, describe and assess in an appropriate manner, the expected effects deriving from the vulnerability of the Development to risks, so far as relevant to the Development, of major accidents and natural disasters.

Relevant information available and obtained through risk assessments pursuant to legislation of the European Union such as Directive 2012/18/EU of the European Parliament90 on the control of major accident hazards involve dangerous substances. The Directive lays down rules for the prevention of major accidents which might result from certain industrial activities and the limitation of their consequences for human health and the environment. Directive 2012/18/EU requires the preparation of emergency plans and response measures which will be covered under equivalent documents relevant to the nature of the Development. Throughout all phases of the Development, cognisance should be made through the following guidance documents produced by Renewable UK:

- Wind Turbine Safety Rules Third Edition[91];
- Guidance & Supporting Procedures on the Application of Wind Turbine Safety Rules. Third Edition[92]; and
- Onshore Wind Health & Safety Guidelines[93].

Health and Safety during the construction and decommissioning phases of the Development will be subject to relevant legislation and best practice. This will involve site inductions, risk assessments, and method statements as implemented by the Construction Management Plan (CMP). Therefore, there is no further requirement for Health and Safety to be assessed within the EIA and is scoped out of further assessment.

[90] European Union (2012) Directive 2012/18/EU [Online] Available at: https://eur-lex.europa.eu/legalcontent/EN/TXT/?uri=CELEX:32012L0018 (Accessed 01/05/2019)

[91] Renewable UK (2015) Wind Turbine Safety Rules. Third Edition. [Online] Available at: https://c.ymcdn.com/sites/www.renewableuk.com/resource/resmgr/Docs/Health_&_Safety/WindTurbineSafetyRulesIssue3.pdf (Accessed 01/05/2019)

[92] Renewable UK (2015) Guidance & Supporting Procedures on the Application of Wind Turbine Safety Rules. Third Edition [Online] Available at: https://cdn.ymaws.com/www.renewableuk.com/resource/resmgr/docs/health_&_safety/WTSR_Guidance_2018.pdf (Accessed 01/05/2019)

[93] Renewable UK (2015) Onshore Wind Health and Safety Guidelines [Online] Available at: https://cdn.ymaws.com/www.renewableuk.com/resource/collection/AE19ECA8-5B2B-4AB5-96C7-ECF3F0462F75/OnshoreWind_HealthSafety_Guidelines.pdf (Accessed 01/05/2019)

The risk of a major accident could be increased by the probability of natural disasters associated with the location of the Development. This should be considered during the preparation of major accident scenarios.

The Development is not located within an area known for natural disasters such as hurricanes, tornadoes, volcanic eruptions, earthquakes or tsunamis. As the most probable of natural disasters to affect the Development, flood risk will be assessed within the hydrological assessment in the EIAR.

None of the identified climate change trends listed will affect the Development with the exception of increased windstorms. Risks associated with ice build-up, lightning strike and structural failure are removed or reduced through inbuilt turbine mechanisms in modern machines. Brake mechanisms installed on turbines allow them to be operated only under specific wind speeds and should severe windstorms be experienced then the turbines would be shut down. Although an unlikely event in the area, the brake mechanisms could also apply to a hurricane scenario.

The Development is not located within an area prone to such disasters and the likelihood of such an event is extremely rare. Therefore, it is concluded that no significant effects will arise due to health and safety including major accidents and natural disasters as a result of the Development, and this topic can be scoped out of the EIA.

16.4 Shadow Flicker

Reflectivity is the potential for the sun to 'glint' off structures which, in the case of wind turbines, can be an intermittent glint when the turbines are rotating. This effect can be minimised by selecting a matt coating for the wind turbines, designed to reduce the potential for reflection.

Under certain combinations of geographical position and time of day, the sun may pass behind the rotors of a wind turbine and cast a shadow over neighbouring properties. Shadow flicker is an effect that can occur when the shadow of a blade passes over a small opening (such as a window), briefly reducing the intensity of light within the room, and causing a flickering to be perceived. Shadow flicker effects can only occur inside buildings when the blade casts a shadow across an entire window opening.

Due to the lack of explicit guidance in Scotland, guidance within England is considered to be material for assessing shadow flicker effects. Guidance produced by the UK Government, 'Planning Practice Guidance for Renewable and Low Carbon Energy' 2013 states that "only properties within 130 degrees either side of north, relative to the turbines can be affected at these latitudes in the UK- turbines do not cast long shadows on their southern side." In addition, the Scottish Government's Online Planning Advice Note[94] on onshore wind provides information on Shadow Flicker. It states: "Where separation is provided between wind turbines and nearby dwellings (as a general rule 10 rotor diameters), "shadow flicker" should not be a problem."

However, SBC states in their Supplementary Guidance[95] that all shadow flicker assessments should be modelled to include "all residential property within 2 km of a wind turbine", as recent studies have shown that shadow flicker can be experienced at distances greater than 10 rotor diameters. Since the final layout and candidate turbine have yet to be selected, it is difficult to determine whether or not the Development will have a significant effect on the surrounding properties from shadow flicker.

[94] The Scottish Government (2008) Planning Advice Note 45: Spatial Frameworks and Supplementary Planning Guidance for Wind Farms [Online] Available at: http://www.gov.scot/resource/doc/244403/0068333.pdf (Accessed 29/05/2018)

[95] Scottish Borders Council (2018) Supplementary Guidance: Renewable Energy [Online] Available at: https://www.scotborders.gov.uk/downloads/file/2757/renewable_energy_supplementary_guidance

An assessment will be undertaken to determine whether or not there will be any impacts on surrounding properties and the results of the assessment will be included in the EIAR. This will examine all properties which lie within 2 km of each turbine. Resoft WindFarm, a computer modelling programme, will be used to model the potential effects at surrounding properties to quantify the potential effects.

It is proposed that the industry recognised limits are applied for the purposes of the assessment:

- Worst case scenario – 30 hours per year or 30 minutes per day; and
- Realistic scenario – 8 hours per year.

Should these limits be exceeded the Applicant would consider implementing mitigation measures such as screening or installing a sensor which can "turn off" the turbine in the event of conditions being aligned for effects to be experienced.

16.5 Scope of Assessment

16.5.1 ***Scoped In Effects***

The Carbon Calculator Tool will be used to determine how the Development affects climate change. Effects of climate change on environmental receptors identified in other EIAR topics will be considered in a future climate scenario, as predicted by UKCP18. The assessment of the Development's effects on climate change has been scoped into the EIA, given the associated carbon reduction properties of windfarms.

A shadow flicker assessment will be undertaken using Resoft Windfarm to determine whether or not there will be any impacts on surrounding properties. This will examine all properties which lie within 2 km of each turbine.

16.5.2 ***Scoped out Effects***

16.5.2.1 Vulnerability and Resilience to Climate Change

It is proposed that the Proposed Development's vulnerabilities and resilience to climate change can be scoped out of the EIA. None of the identified climate change trends could affect the Proposed Development with the exception of increased windstorms. Breaking mechanisms installed on turbines allow them to be operated only under specific wind speeds and should severe windstorms be experienced then the turbines would be shut down. In addition, given the elevated location of the Development, flooding will not pose a significant risk to the operation of the windfarm nor will the construction of a windfarm contribute to flooding elsewhere. Therefore, it is concluded that no significant effects will arise, as a result of the Development, and this topic can be scoped out.

16.5.2.2 Health and Safety, including Major Accidents and Disasters

Properly designed and maintained wind turbines are a safe technology. The site design and inbuilt buffers from sensitive receptors will minimise the risk to humans from the operation of the turbines. Risks associated with ice build-up and lightning strike are removed or reduced through inbuilt turbine mechanisms in modern machines, and as such can be scoped out at this stage. Health and Safety during construction and decommissioning phases of the Development will be subject to relevant legislation and best practice as included in the CMP. Therefore, there is no further requirement for Health and Safety to be assessed within the EIA and is scoped out of further assessment.

The Development is not located within an area prone to such disasters and the likelihood of such an event is extremely rare. Therefore, it is concluded that no significant effects will arise due to major accidents and natural disasters as a result of the Development, and this topic can be scoped out of the EIA.

16.6 Questions for Consultees

- Are Consultees content to scope out the Development's vulnerabilities and resilience to climate change?
- Do Consultees agree with the suggested approach regarding Health and Safety and to scope out further assessment?
- Are Consultees content to scope out Major Accidents and Disasters from further assessment?
- Are Consultees content with the proposed method of assessment?
- Should no properties fall within 2 km of the Development, are Consultees content that shadow flicker can be scoped out of the EIA?

APPENDIX A – LIST OF SCOPING CONSULTEES

The organisations shown below will be consulted through the ECU as part of the scoping process, although not all consultees will receive a complete copy of the Scoping Report.

Statutory Consultees

- The Scottish Borders Council
- SEPA
- SNH
- Historic Environment Scotland

Non Statutory Consultees

- BT
- British Horse Society
- Civil Aviation Authority - Airspace
- Crown Estate Scotland
- Defence Infrastructure Organisation
- Fisheries Management Scotland
- Forestry Commission
- John Muir Trust
- Joint Radio Company
- Marine Scotland
- Mountaineering Scotland
- NATS Safeguarding
- Nuclear Safety Directorate
- OFCOM
- RSPB Scotland
- Scottish Rights of Way and Access Society (ScotWays)
- Scottish Water
- Scottish Wild Land Group (SWLG)
- Scottish Wildlife Trust
- Telecommunication Providers as identified by OFCOM
- Transport Scotland
- Visit Scotland

Community Councils

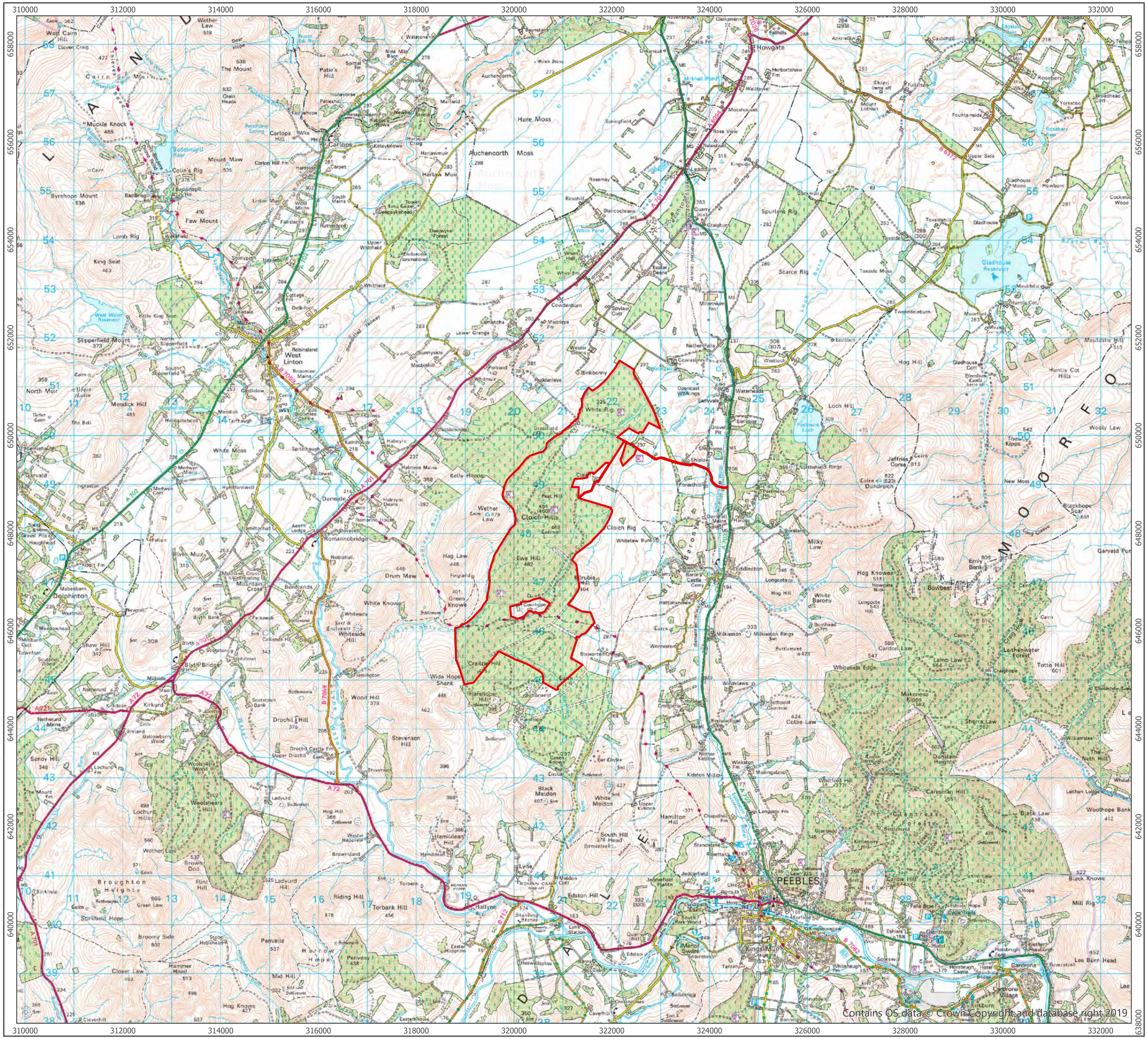
- Eddleston and District Community Council
- Royal Burgh Peebles and District
- Manor, Stobo & Lyne
- Lamancha Newlands and Kirkurd

If you would like any more information prior to responding to the Scoping Report, please contact Arcus using following contact details referencing "Cloich Forest Wind Farm":

- Email: Info@arcusconsulting.co.uk
- Telephone: 0141 221 9997

In addition to the specific comments at the end of each section, general comments from consultees are invited on:

- The proposed content of the EIAR;
- Assessment methods;
- Additional data sources; and
- Additional consultees.



P:\Projects\Environment\3439 Cloich WF\3439 Cloich WF.aprx\3439-REP-003 Fig01 Site Location

edf renewables

ARCUS

Site Boundary

1:75,000 Scale @ A3

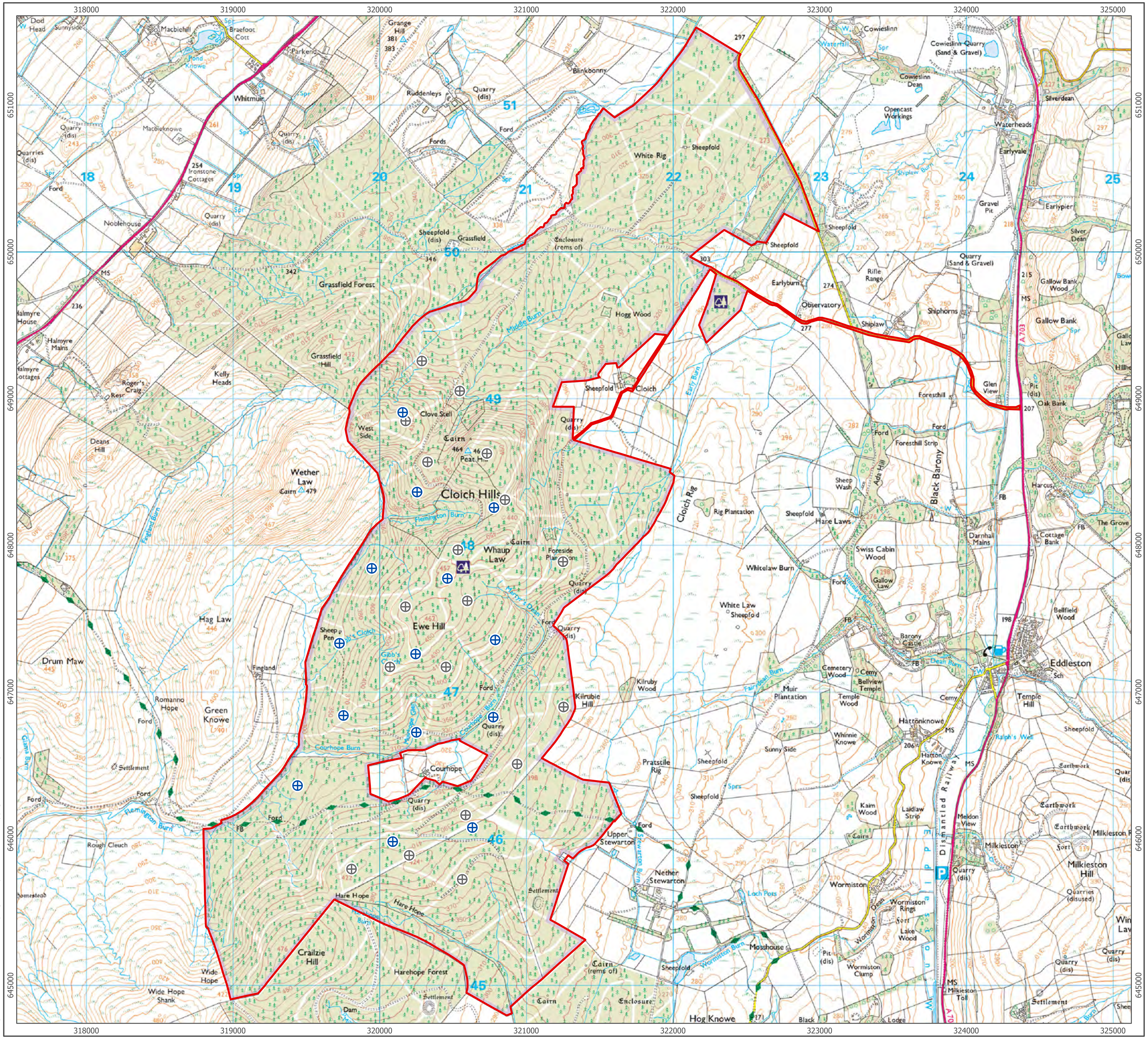
0 1 2 km

NORTH

Produced By: JO	Ref: 3439-REP-003
Checked By: SC	Date: 20/09/2019

Site Location
Figure 1

Cloich Wind Farm
Scoping Report



Site Boundary

Scoping Turbine Layout

Consented Turbine Location

1:25,000 Scale @ A3

0 0.5 1 km

NORTH

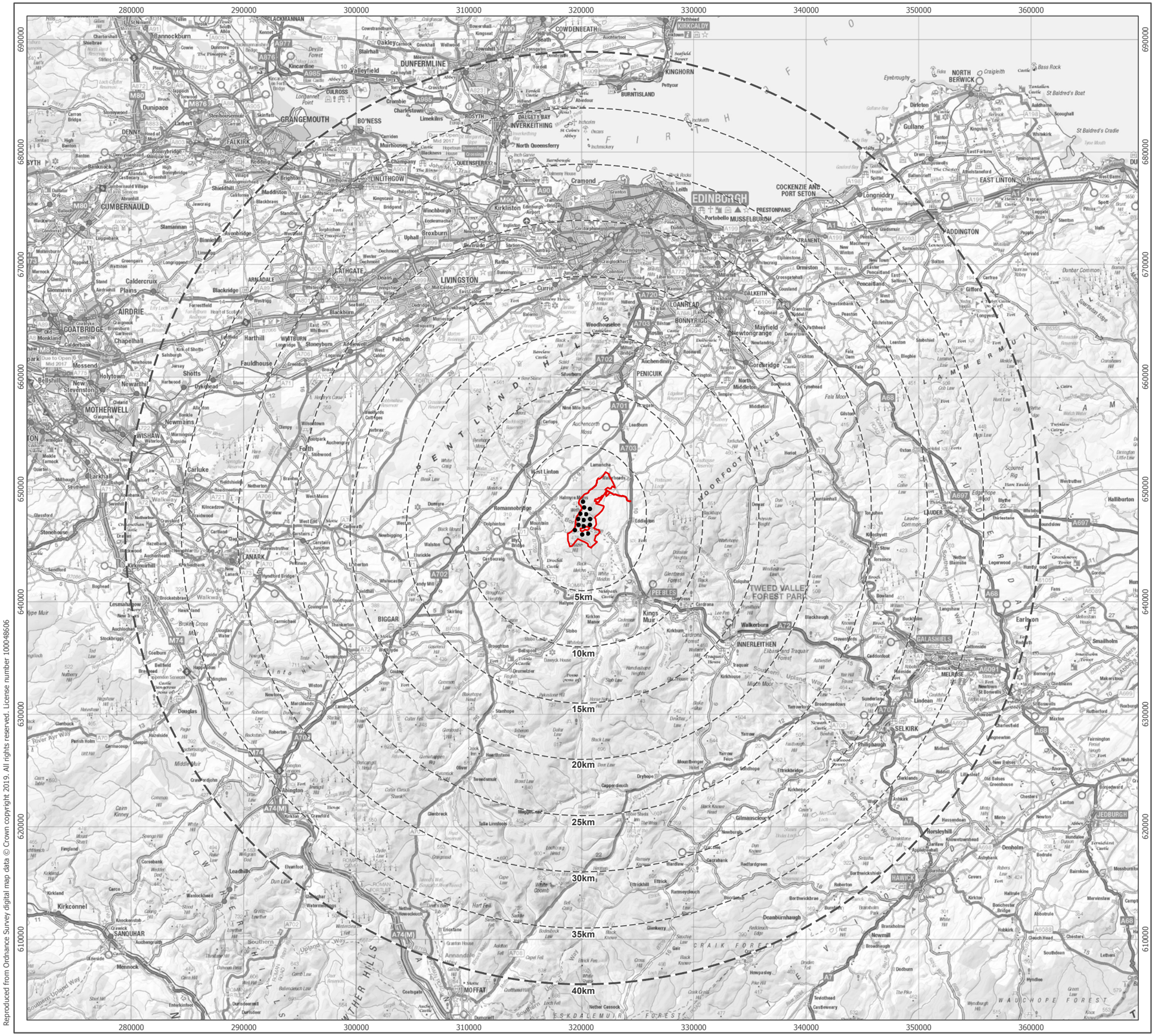
Produced By: JO	Ref: 3439-REP-006
Checked By: SC	Date: 03/10/2019

Comparison of Consented Layout and Scoping Layout

Figure 2

Cloich Wind Farm Scoping Report

P:\Projects\Environment\3439 Cloich WF\3439 Cloich WF.aprx\3439-REP-006 Fig02 Proposed Layout



S:\10800\10801 Cloich WF LVIA\GIS\PRO\Pro10801_WorkingMap\Pro10801_WorkingMap.aprx\FIG3_r2_10801_StudyArea_A3L

Site boundary

• Turbine location

5km intervals from outermost turbines

40km from outermost turbines

1:325,000 Scale @ A3

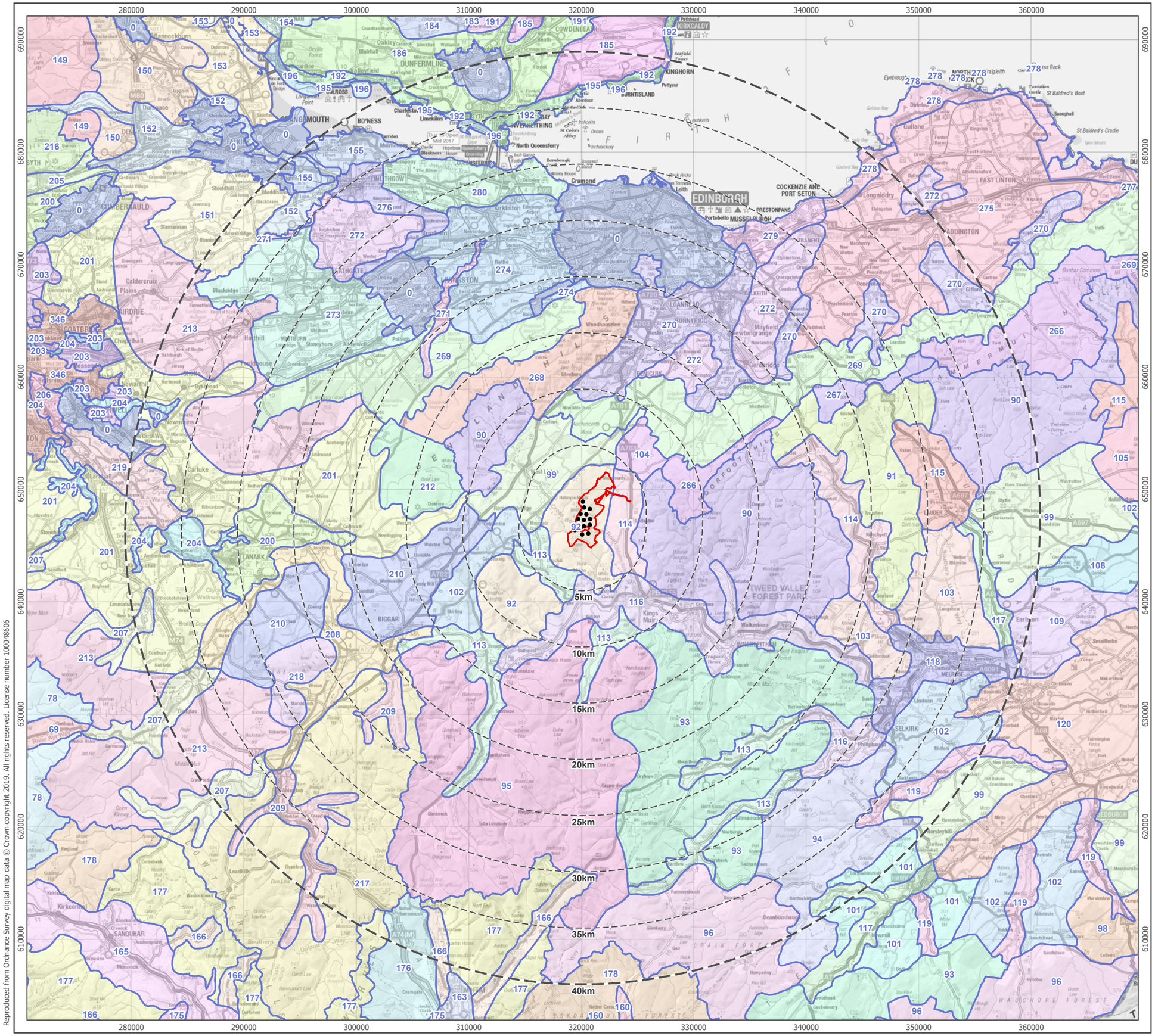
0 6.5 13 km

NORTH

Produced By: EL	Ref: 3439-REP/10801
Checked By: EH	Date: 04/10/2019

Landscape Study Area
Figure 3

Cloich Wind Farm
Scoping Report



For a full list of Landscape Character Area labels and name please refer to the relevant table of the report.
Data source: Scottish Natural Heritage

1:325,000 Scale @ A3

0 6.5 13 km

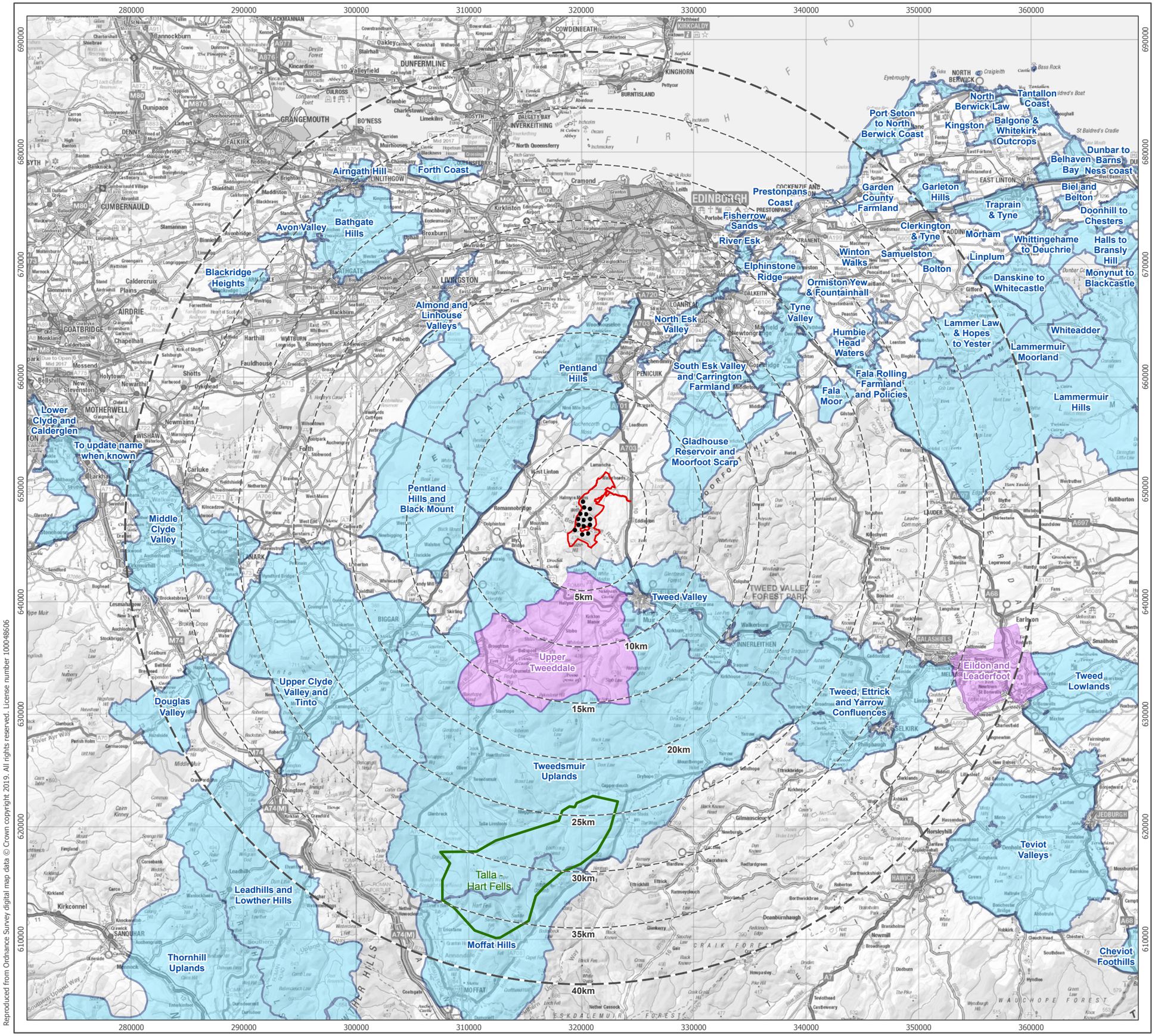
NORTH

Produced By: EL	Ref: 3439-REP/10801
Checked By: EH	Date: 03/10/2019

Landscape Character
Figure 4

Cloich Wind Farm
Scoping Report

S:\10800\10801 Cloich WF LVIA\GIS\PRO\Pro10801_WorkingMap\Pro10801_WorkingMap.aprx\FIG4_r2_10801_LCA_A3L



Reproduced from Ordnance Survey digital map data © Crown copyright 2019. All rights reserved. License number 100048606

S:\10800\10801 Cloich WF LVIA\GIS\PRO\Pro10801_WorkingMap\Pro10801_WorkingMap.aprx\FIG5_r2_10801_LSDesignations_A3L

- Site boundary
- Turbine location
- 5km intervals from outermost turbines
- 40km from outermost turbines
- National Scenic Area
- Local Landscape Designation
- Wild Land Area

Source: Scottish Government, Scottish Natural Heritage, Local Authorities

1:325,000 Scale @ A3

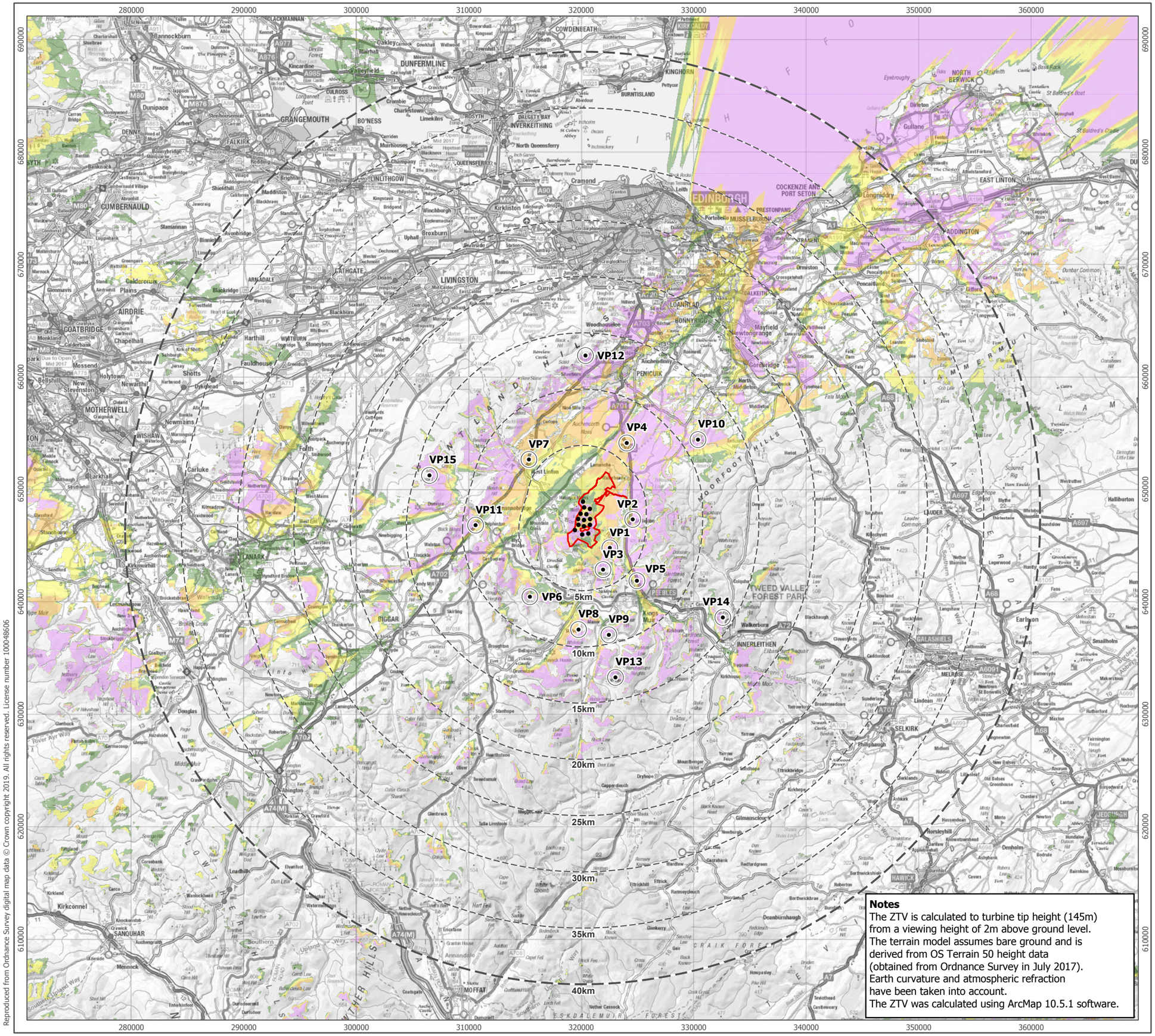
0 6.5 13 km

NORTH

Produced By: EL	Ref: 3439-REP/10801
Checked By: EH	Date: 04/10/2019

Landscape Designations
Figure 5

Cloich Wind Farm Scoping Report



Notes
The ZTV is calculated to turbine tip height (145m) from a viewing height of 2m above ground level.
The terrain model assumes bare ground and is derived from OS Terrain 50 height data (obtained from Ordnance Survey in July 2017).
Earth curvature and atmospheric refraction have been taken into account.
The ZTV was calculated using ArcMap 10.5.1 software.

- Site boundary
- Turbine location
- 5km intervals from outermost turbines
- 40km from outermost turbines
- Viewpoint Location

Theoretical turbine visibility

- 1-4 Turbines are visible
- 5-8 Turbines are visible
- 9-11 Turbines are visible
- 12-14 Turbines are visible

Viewpoint Locations

1: Cross Borders Drove
2: Core Path 154 near Eddleston
3: White Meldon
4: A703 Lay-by
5: A703 near Langside Farm (North of Peebles)
6: Path nearWester Happrew Burn
7: A702, approach to West Linton
8: John Buchan Way near Easter Dawyck
9: Cademuir Hill Fort
10: Gladhouse Reservoir
11: A702, Dolphinton
12: Carnethy Hill
13: Stob Law
14: Lee Pen
15: Bleak Law

1:325,000 Scale @ A3

0 6.5 13 km

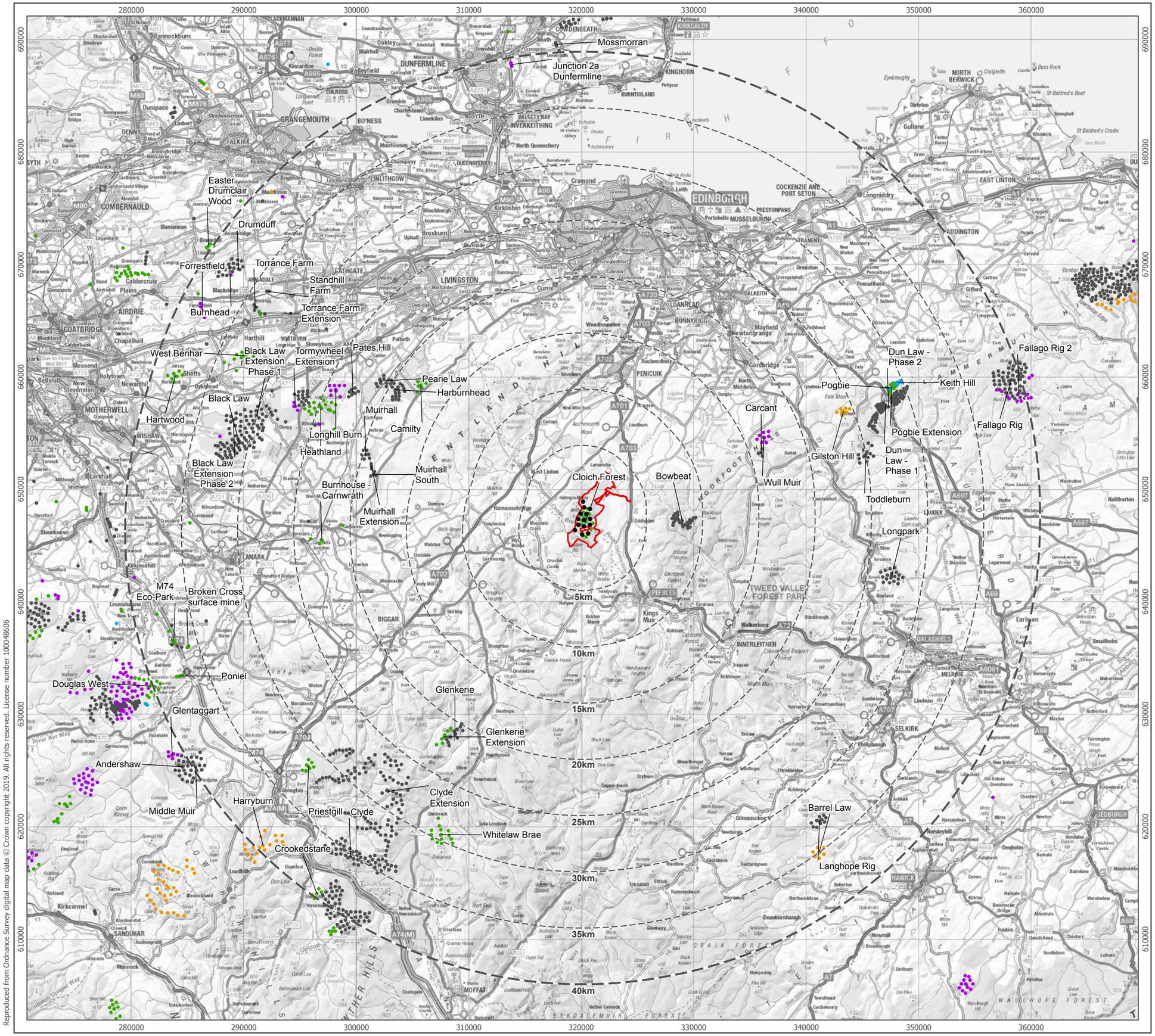
NORTH

Produced By: EL	Ref: 3439-REP/10801
Checked By: EH	Date: 04/10/2019

Viewpoint Location and Blade Tip ZTV Figure 6

Cloich Wind Farm Scoping Report

S:\10800\10801 Cloich WF LVIA\GIS\PRO\Pro10801_WorkingMap\Pro10801_WorkingMap.aprx\FIG6_r2_10801_ZTV_T145m_A3L



S:\10800\10801 Cloich WF LVIA\GIS\PRO\Pro10801_WorkingMap\Pro10801_WorkingMap.aprx\FIG7_r2_10801_WFDevelopments_A3L

- Site boundary
- Turbine location
- 5km intervals from outermost turbines
- 40km from outermost turbines

Cumulative wind farms (by status)

- Operational
- Under construction
- Consented
- Appeal/Public inquiry
- Application submitted

Cumulative wind farms based on information available to LUC on 04/09/2019

1:325,000 Scale @ A3

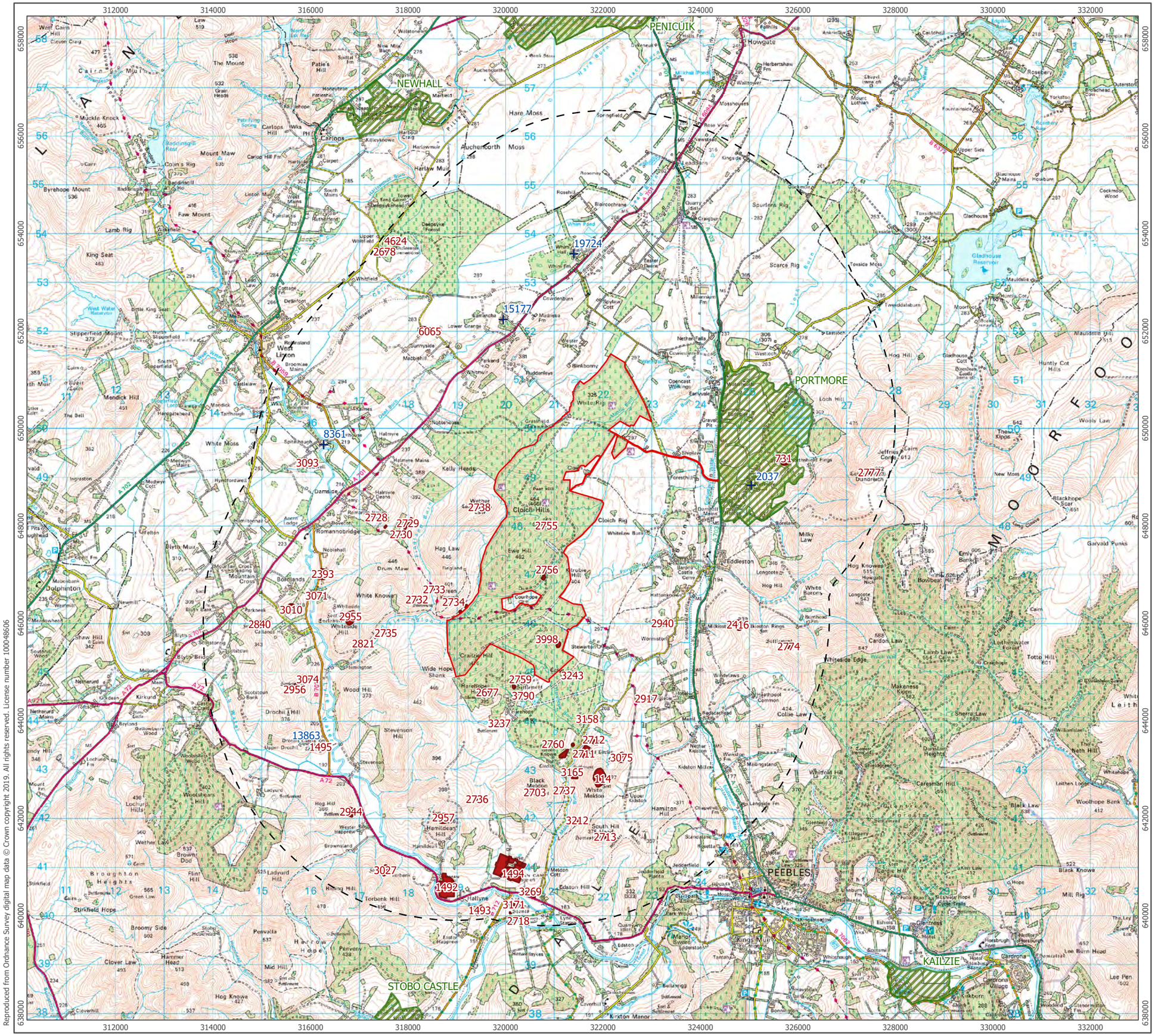
0 6.5 13 km

NORTH

Produced By: EL	Ref: 3439-REP/10801
Checked By: EH	Date: 04/10/2019

Cumulative Wind Farm Plan
Figure 7

Cloich Wind Farm Scoping Report



P:\Projects\Environment\3439 Cloich WF\3439 Cloich WF.aprx\3439-REP-004 Fig08 Cultural Heritage Locations

eDF renewables

ARCUS

- Site Boundary
- 5 km Study Area
- Scheduled Monuments selection
- \+ Category A Listed Building
- Gardens and Designed Landscapes

1:75,000 Scale @ A3

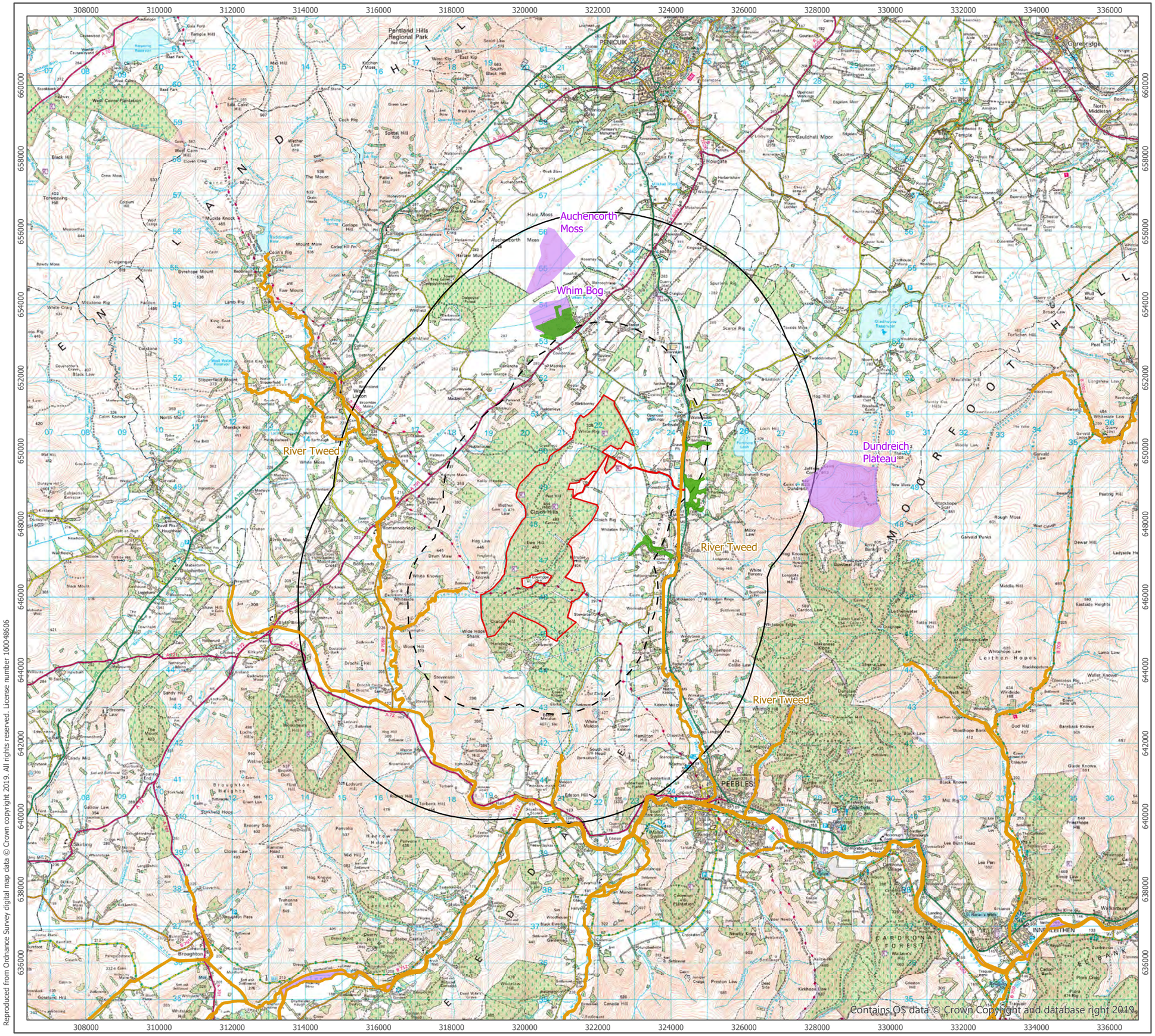
0 1.5 3 km

NORTH

Produced By: JO	Ref: 3439-REP-004
Checked By: SC	Date: 20/09/2019

Cultural Heritage Designations
Figure 8

Cloich Wind Farm
Scoping Report



P:\Projects\Environment\3439 Cloich WF\3439 Cloich WF.aprx\3439-REP-005 Fig09 Ecological Designations

eDF renewables

ARCUS

- Site Boundary
- 2 km Study Area
- 5 km Study Area
- Sites of Special Scientific Interest
- Special Areas of Conservation
- Ancient Woodland Inventory

1:100,000 Scale @ A3

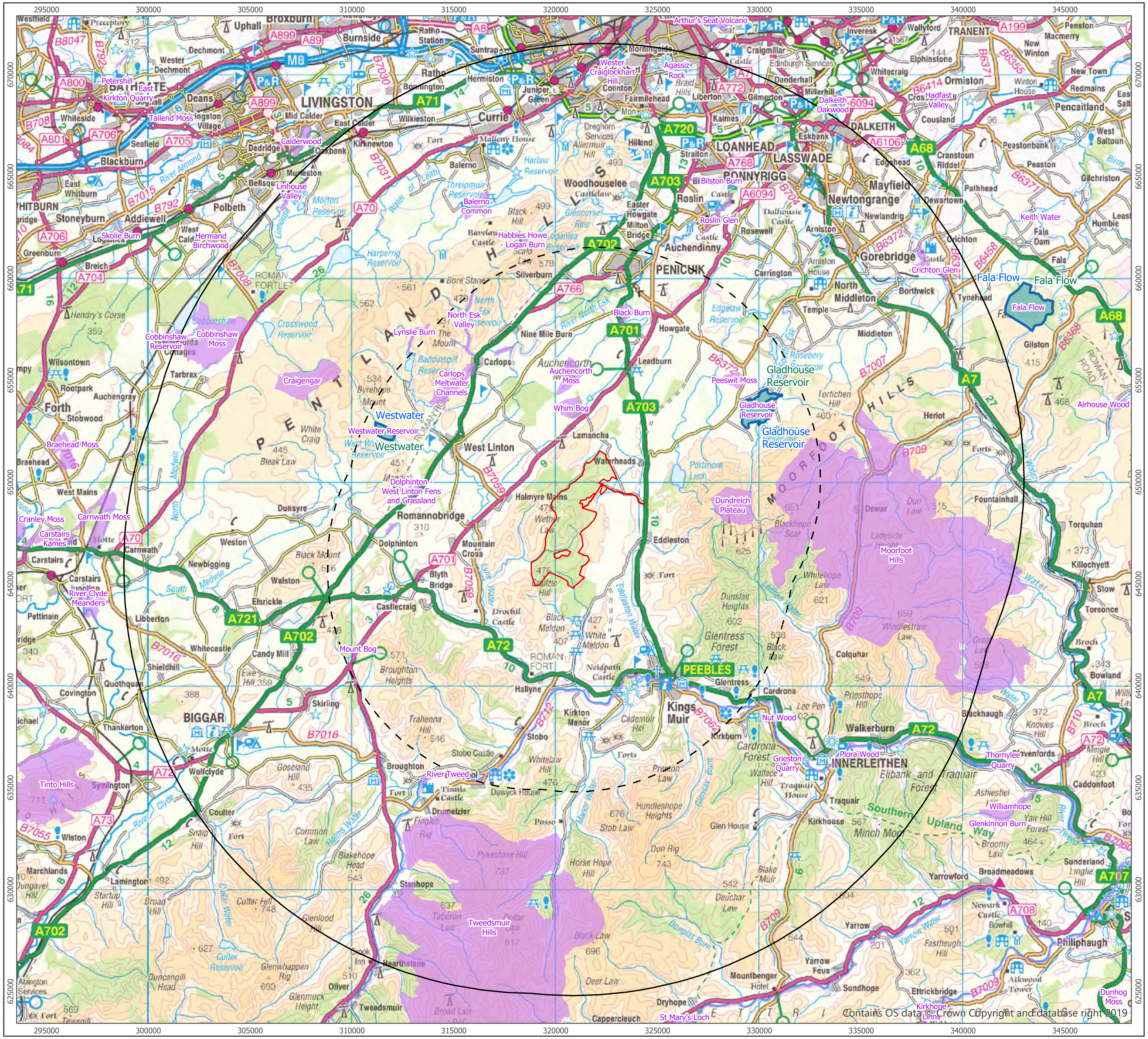
0 2.5 5 km

NORTH

Produced By: JO	Ref: 3439-REP-005
Checked By: SC	Date: 20/09/2019

Ecological Designations
Figure 9

Cloich Wind Farm
Scoping Report



P:\Projects\Environment\3439 Cloich WF\3439 Cloich WF.aprx\3439-REP-008 Fig10 Ornithological Designations

edf renewables

ARCUS

- Site Boundary
- 10 km Study Area
- 20 km Study Area
- Special Protection Areas
- Ramsar Sites
- Sites of Special Scientific Interest

1:180,000 Scale @ A3

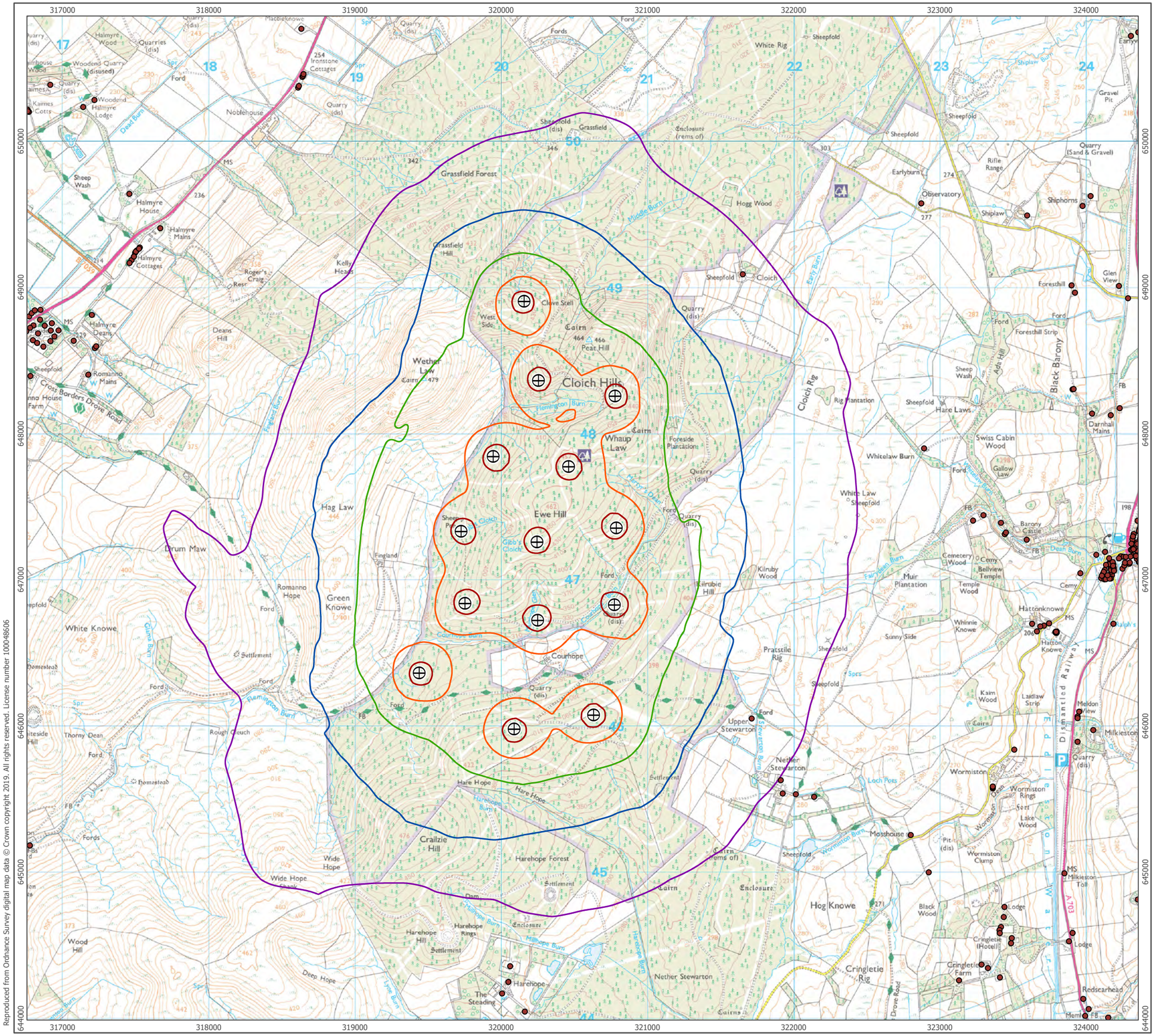
0 2.5 5 km

NORTH

Produced By: JO	Ref: 3439-REP-008
Checked By: SC	Date: 20/09/2019

Ornithological Designations
Figure 10

Cloich Wind Farm
Scoping Report



- Residential Properties
- Wind Turbines

Predicted Noise Level, LA90

- 35 dB
- 40 dB
- 45 dB
- 50 dB
- 55 dB

1:25,000 Scale @ A3

0 0.5 1 km

NORTH

Produced By: BA	Ref: 3439-REP-007
Checked By: AM	Date: 03/10/2019

Predicted Noise Levels Contour Plot
Figure 11

Cloich Wind Farm
Scoping Report

P:\Projects\Noise\3439 Cloich Wind Farm\Cloich Wind Farm.aprx\3439-REP-007 Fig10 Noise Contour Plot

CLOICH FOREST WIND FARM

VOLUME 3: TECHNICAL APPENDICES

TECHNICAL APPENDIX A4.2: SCOPING OPINION (DECEMBER 2019)

JUNE 2021

Prepared By:

Arcus Consultancy Services

7th Floor
144 West George Street
Glasgow
G2 2HG

T +44 (0)141 221 9997 l **E** info@arcusconsulting.co.uk
w www.arcusconsulting.co.uk

Registered in England & Wales No. 5644976

Scottish Government
Riaghaltas na h-Alba
gov.scot

The Scottish Government
Energy Consents Unit

Scoping Opinion On Behalf Of Scottish Ministers Under The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017

Cloich Forest Wind Farm
EDF Energy Renewables (EDF-ER)

18 December 2019

CONTENTS

1. Introduction

1.1 This scoping opinion is issued by the Scottish Government Energy Consents Unit on behalf of the Scottish Ministers to ARCUS Consultancy Services on behalf Cloich Wind Farm LLP, wholly owned by EDF Energy Renewables Limited a company incorporated under the Companies Acts with company number *0C353594* and having its registered office at Alexander House, 1 Mandarin Road, Rainton Bridge Business Park, Houghton Le Spring, Sunderland, England, DH4 5RA ("the Company") in response to a request dated 7 October 2019 for a scoping opinion under the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 in relation to the proposed Cloich Forest Wind Farm ("the proposed development"). The request was accompanied by a scoping report.

1.2 The proposed development would be located 5.5 km north west of Peebles within the Scottish Borders.

1.3 The proposed development is a wind farm consisting of up to 14 turbines and ancillary infrastructure**.** The proposed development may include battery storage adjacent to the switchgear building. The site is located approximately 5.5 North West of Peebles.

1.4 In addition to the wind turbines there will be ancillary infrastructure including:

- Creation of borrow pits
- Construction of a site entrance, temporary construction compound, track and hardstanding areas
- Excavation and construction of turbine foundations
- Construction of substation
- Excavation of cable trenches and laying of cables
- Battery Storage

1.5 The proposed development is solely within the planning authority of Scottish Borders Council.

1.6 Section 36 consent and deemed planning permission for the Cloich Forest Wind Farm was granted following a public inquiry on 8th July 2016. The Company is proposing to submit an application to the Scottish Government's Energy Consents Unit (ECU) under Section 36 of the Electricity Act 1989 to construct and operate a re-designed wind farm within the Cloich Forest in the Scottish Borders ('the Development'). Since the proposed re-design is expected to be different in terms of scale, turbine numbers and locations from those authorised by the existing consent, a new application will be submitted.

2. Consultation

2.1 Following the scoping opinion request a list of consultees was agreed between Arcus Consultancy Services (acting as the Company's agent) and the Energy Consents Unit. A consultation on the scoping report was undertaken by the Scottish Ministers and this commenced on 11 October 2019. The consultation closed on 29 November 2019. Extensions to this deadline were granted to Scottish Borders Council, Scottish Natural Heritage (SNH), Scottish Forestry, Scottish Rights of Way and Access Society (ScotWays), Eddleston and District Community Council and Manor, Stobo and Lyne Community Council. The Scottish Ministers also requested responses from their internal advisors Marine Scotland and Transport Scotland. A full list of consultees is set out at **Annex A.**

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

2.3 Unless stated to the contrary in this scoping opinion, Scottish Ministers expect the EIA report to include all matters raised in responses from the consultees and advisors.

2.4 No responses were received from: Scottish Forestry, British Horse Scoiety, Civil Aviation Authority, Crown Estate Scotland, Galloway Fisheries Trust, Mountaineering Scotland, RSPB Scotland, Scottish Wild Land Group, Scottish Wildlife Trust, Visit Scotland, Innerleithen and District Community Council, Arqive and OFCOM.

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

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

3. The Scoping Opinion

3.1 This scoping opinion has been adopted following consultation with Scottish Borders, within whose area the proposed development would be situated, Scottish Natural Heritage (SNH), Scottish Environment Protection Agency (SEPA) and Historic Environment Scotland (HES), all as statutory consultation bodies, and with other bodies which Scottish Ministers consider likely to have an interest in the proposed development by reason of their specific environmental responsibilities or local and regional competencies.

3.2 Scottish Ministers adopt this scoping opinion having taken into account the information provided by the applicant in its request dated 7 October 2019 in respect of the specific characteristics of the proposed development and responses received to the consultation undertaken. In providing this scoping opinion, the Scottish Ministers have had regard to current knowledge and methods of assessment; have taken into account the specific characteristics of the proposed development, the specific characteristics of that type of development and the environmental features likely to be affected.

3.3 A copy of this scoping opinion has been sent to Scottish Borders Council for publication on their website. It has also been published on the Scottish Government energy consents website at www.energyconsents.scot.

3.4 Scottish Ministers expect the EIA report which will accompany the application for the proposed development to consider in full all consultation responses attached in **Annex A**.

3.5 Scottish Ministers are satisfied with the scope of the EIA set out at Section 4 of the scoping report.

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

3.7 Scottish Water provided information on whether there are any drinking water protected areas or Scottish Water assets on which the development could have any significant effect. Scottish Ministers request that the company contacts Scottish Water (via EIA@scottishwater.co.uk) and makes further enquiries to confirm whether there any Scottish Water assets which may be affected by the development, and includes details in the EIA report of any relevant mitigation measures to be provided.

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

3.9 Scottish Ministers consider that where there is a demonstrable requirement for peat landslide hazard and risk assessment, the assessment should be undertaken as part of the EIA process to provide Ministers with a clear understanding of whether the risks are acceptable and capable of being controlled by mitigation measures. The Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments (Second Edition), published at http://www.gov.scot/Publications/2017/04/8868, should be followed in the preparation of the EIA report, which should contain such an assessment and details of mitigation measures.

3.10 The scoping report identified viewpoints at Table 5.2 to be assessed within the landscape and visual impact assessment. Scottish Borders Council recommends reinstating some viewpoints from the previous application (A6). SNH also comment on viewpoints and requests some clarification (A24). The final viewpoints have to be agreed with the Energy Consents Unit in consultation with the relevant Planning Authority and SNH.

3.11 The noise assessment should be carried out in line with relevant legislation and standards as detailed in section 10 of the scoping report. This should include details about the representative background noise survey locations agreed with the relevant Planning Authority. The noise assessment report should be formatted as per Table 6.1 of the IOA “A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise.”.

3.12 Ministers are aware that further engagement is required between parties regarding the refinement of the design of the proposed development regarding, among other things, surveys, management plans, peat, radio links, finalisation of viewpoints, cultural heritage, cumulative assessments and request that they are kept informed of relevant discussions.

4. Mitigation Measures

4.1 The Scottish Ministers are required to make a reasoned conclusion on the significant effects of the proposed development on the environment as identified in the environmental impact assessment. The mitigation measures suggested for any significant environmental impacts identified should be presented as a conclusion to each chapter. Applicants are also asked to provide a consolidated schedule of all mitigation measures proposed in the environmental assessment, provided in tabular form, where that mitigation is relied upon in relation to reported conclusions of likelihood or significance of impacts.

5. Conclusion

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

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

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

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

5.5 Applicants are encouraged to engage with officials at the Scottish Government's Energy Consents Unit at the pre-application stage and before proposals reach design freeze.

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

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

5.8 It should be noted that to facilitate uploading to the Energy Consents portal, the EIA report and its associated documentation should be divided into appropriately named separate files of sizes no more than 10 megabytes (MB). In addition, a separate disc containing the EIA report and its associated documentation in electronic format will be required.

Tony Young
Energy Consents Unit
18 December 2019

ANNEX A

Consultation

List of consultees

- Scottish Borders Council (A1 – A9)
- Historic Environment Scotland (A10 – A12)
- Scottish Environmental Protection Agency (A13 – A22)
- Scottish Natural Heritage (A23 – A25)
- Atkins (A26 – A27)
- British Telecommunications plc (A28)
- Defence Infrastructure Organisation (A29 – A30)
- Eddleston and District Community Council (A31 – A33)
- Edinburgh - BAA Aerodrome Safeguarding (A34)
- Fisheries Management Scotland (A35)
- Glasgow Prestwick Airport (A36)
- Highlands and Islands Airport Limited (A37)
- John Muir Trust (A38)
- Joint Radio Company Limited (A39 – A40)
- Lamancha, Newlands and Kirkurd Community Council (A41)
- Manor, Stobo and Lyne Community Council(A42 – A44)
- NATS Safeguarding (A47)
- Royal Burgh Peebles and District Community Council(A48)
- Scottish Rights of Way and Access Society (A49 – A54)
- Scottish Water (A55 – A58)
- Innverleithen and District*
- Galloway Fisheries Trust*
- Arqiva*
- British Horse Society*
- Civil Aviation Authority – Airspace*
- Crown Estate Scotland*
- Mountaineering Scotland*
- OFCOM*
- RSPB Scotland*
- Scottish Forestry*
- Scottish Wild Land Group*
- Scottish Wildlife Trust*
- Visit Scotland*

*No response was received.

Internal advice from areas of the Scottish Government was provided by officials from Marine Scotland (A45 – A46) and Transport Scotland (A59 – A61)

Dear Sir/Madam

THE ELECTRICITY ACT 1989 SECTION 36
THE ELECTRICITY WORKS (ENVIRONMENTAL IMPACT ASSESSMENT) (SCOTLAND) REGULATIONS 2017
SCOPING OPINION REQUEST FOR PROPOSED APPLICATION UNDER SECTION 36 FOR THE CLOICH WIND FARM REVISED SCHEME
OUR REF: 19/01489/SCO

I refer to your above consultation of 11 October 2019 and your email of the 29 October 2019 granting an extension of time until 15 November 2019. The following advice constitutes the formal scoping comments of Scottish Borders Council who will be a "relevant authority" consultee in the event of a Section 36 Application being submitted to the Scottish Government for determination.

Policy Context

The main Local Development Plan policy to be considered is Policy ED9: Renewable Energy Development, which states that, *'The Council will support proposals for both large scale and community scale renewable energy development including commercial wind farms, single or limited scale wind turbines, biomass, hydropower, biofuel technology, and solar power, where they can be accommodated without unacceptable significant adverse impact considerations'.* Renewable energy developments, including wind energy proposals, will be approved provided that there are no relevant unacceptable significant adverse impacts or effects that cannot be satisfactorily mitigated. Policy ED9 also states that, *'If there are judged to be relevant significant adverse or effects that cannot be satisfactorily mitigated, the development will only be approved if the Council is satisfied that the wider economic, environmental and other benefits of the proposal outweigh the potential damage arising from it'.*

Policy ED9 also lists a range of Development Management considerations which are taken from para 169 of Scottish Planning Policy. Consequently it is important that the Environmental Assessment refers to the various issues identified within the Scoping response in order that they are fully addressed as part of the subsequent planning application submission.

The Ironside Farrar (IF) Landscape Capacity and Cumulative Impact Study is a material planning consideration in the assessment of wind turbine proposals within the Scottish Borders. The role of the Ironside Farrar study is recognised within Policy ED9. It should be noted that the updated 2016 Study has informed the production of the Council's Supplementary Guidance (SG) on Renewable Energy, which has now been approved and adopted as part of the Local Development Plan. Any revised S36 application for Cloich will need to be supported by an EIA that references and assesses the scheme against the new SG and updated IF Study.

Comparison with approved scheme

Section 5.1.1 of the Scoping Report refers to a Project Comparison document and Section 1.2 provides more detail, the document intending to "highlight any differences in predicted effects". This document should include a range of visual material to demonstrate the differences, especially Viewpoint wirelines where predicted effects are likely to be greater than the consented scheme.

Traffic and Transport

The following advice is based substantially on the advice received from the **SBC Roads Planning Service** and only adapted to ensure it is delivered in an appropriate form:

They are content with the methodology proposed in the scoping report which will be used to consider the effects of vehicle movements to and from the site during the construction, operation and decommissioning phases of the development. More formal comments on the Environmental Impact Assessment will be provided once submitted as part of any detailed planning application.

Archaeology and Cultural Heritage

The following advice is based substantially on the advice received from the **SBC Archaeology Officer** and only adapted to ensure it is delivered in an appropriate form:

There are known historic and archaeological assets, and areas of archaeological potential within the proposed wind farm boundary. There are also potential impacts to the settings of heritage assets in the area, particularly to a prominent and important cluster of Scheduled Monuments located to the south and west of development area. The scoping request specifies a cultural heritage impact assessment will take place as part of the EIA that will analyse potential direct and indirect impacts.

Policies

Archaeological constraints on development are governed by national and local policies and reference to these should be made in any Environmental Assessment. The Scottish Government's policies governing planning and the historic environment include Planning Advice Note (PAN) 2 (2011), Historic Environment Scotland Policy Statement (HESPS; 2016) and Scottish Planning Policy (SPP; 2014). These sit alongside the Managing Change in the Historic Environment Guidance Notes series published by Historic Scotland. Of particular relevance is the guidance note on assessing Setting (2016). Scottish Borders Council's policy on archaeology constraints and mitigation are dealt with by Local Development Plan (2016) Policy EP8. Wind Energy development impacts to the historic environment must also conform to Policy ED9.

There continues to be potential for significant impacts to the conjoined settings of Scheduled Monuments as a result of the scheme. These require to be fully assessed in the EIA. Having reviewed the applicant's scoping response, there is general contentment with the proposed EIA report.

However, we are less accepting of the statement in 6.1.1 that 'The reduction in the number of turbines may reduce the indirect effect to heritage assets due to reduced visibility'. While this may indeed be the case, the increase in height of turbines is of concern particularly with respect to the settings of the large number of Scheduled Monuments (as highlighted in the scoping report's Table 6.1) to the south and west of the development. The Council objected to the original scheme on this basis and in particular with respect to the view from Cademuir Hill and its three Scheduled Monuments, through Meldon Valley marked by two prominent Scheduled Monuments on the White and Black Meldons, and the conjoined settings within this

view. The original scheme would have had a wind farm backdrop this view of the valley with turbines appearing to skyline over the Scheduled Monuments on the Meldons. While this was ultimately not accepted as a reason for refusal, it is worth noting here that both the original applicant and Reporter felt there was a moderate adverse impact on the setting of the Black and White Meldons. The Reporter also agreed with the Council that there would be adverse impacts of the historic landscape to the south and west of the development, ranging from low to moderate effects.

The increase in turbine heights, albeit with a potentially positive decrease in numbers, has the potential to increase effects on the integrity of settings for both individual monuments and the historic landscape. It is important that all monuments assessed in the original application are assessed again in light of the new scheme. Additional monuments may fall into theoretical visibility and these too should be assessed. In addition, we need a viewpoint from Macbeth's Castle in the Manor Valley as the forts, castles and later settlement/landscape features in the Manor, Meldon and Tweed valleys all form part of the same historic landscape where setting impacts are predicted.

In addition to the above, there have been substantial increases in the availability of LiDAR in the area. The Council holds >1m LiDAR for part of the site, and more is possibly available through the Scottish Government. We require this to be assessed as part of the EIA for the purpose of identifying unknown archaeological features in the development area, and assessing known assets better.

Ecology : Ornithology : Hydrology and Hydrogeology : Geology and Peat : Forestry

The following advice is based substantially on the advice received from the **SBC Ecology Officer** and only adapted to ensure it is delivered in an appropriate form:

Relevant Local Development Plan (LDP) Policies are: *EP1 International Nature Conservation Sites and Protected Species, EP2 National Nature Conservation Sites and Protected Species* and *EP3 Local Biodiversity*.

Largely satisfied with the proposed updated desk-top survey, updated surveys and updated Ecological Impact Assessment as set out in the Scoping report (*Cloich Forest Wind Farm, Scoping request, Arcus Consultancy Services, October 2019*), but have a number of comments to make as set out below:

<u>Section 7.3.1.3 Desk Study</u>
Further data may be available from Forest Land & Estates. Tweed Forum have also been leading the Eddleston water project and may have additional survey data: https://tweedforum.org/our-work/projects/the-eddleston-water-project/

<u>Section 7.4.3.1 Field surveys</u>
NVC surveys should also be carried out for priority habitats on the Scottish Biodiversity List (SBL).

<u>Section 7.4.3.2 Bats</u>
Can the applicant clarify how they reached the conclusion that the site is low risk? The surveys for the earlier application at this site (12/01283/S36) identified a low level of activity of predominantly soprano pipistrelle. Common pipistrelle and *Myotis sp.* were also recorded and very low activity levels of noctule and brown long-eared bat. In accordance with recent guidance[i] survey effort for a medium risk site may

be more appropriate [i].(habitat risk high, project size large, activity low, or low-moderate)

The recent guidance[i] recommends that at height surveys are carried out for sites in woodland or requiring key-holing. At height surveys were carried out for the earlier application. A justification has not been provided as to why at height surveys are not required. It is our opinion that surveys will be required.

Section 7.4.3.3 Otter
Guidance on the Council's otter survey requirements can be found at:
https://www.scotborders.gov.uk/downloads/file/2961/otters_technical_advice_note

The developers should ensure that survey effort should be consistent with that for a large, extensive development (large wind farm):

Section 7.4.3.9 Fisheries survey
This mentions that the EIA for the extant consent concluded that following mitigation and enhancement there is no likely significant effect and therefore an appropriate assessment is not required.

A recent EUCJ[ii] ruling means that mitigation cannot be taken into account when considering the likely significant effect of a proposal on a Natura site. Therefore, it can be assumed that there is a likely significant effect and an Appropriate Assessment will be required, taking into account standard, tried and tested forms of mitigation to address sediment run-off and pollution. The EIA should include the relevant information to inform the AA (in a separate section or report), such as details of mitigation proposed. We have not seen the scoping response of SNH.

Ornithology
Satisfied with the proposed updated surveys and updated impact assessment.

Forestry
Regarding Compensatory woodland replanting requirements, this will be required to be consistent with the Scottish Borders Woodland Strategy as informed by the Technical Advice Note (2012) https://www.scotborders.gov.uk/downloads/download/411/planning_guidance_woodland_strategy and LDP Policy EP13 *Trees, Woodlands and Hedgerows* . This should be included as part of a Forestry Chapter within the EIA. There are opportunities to deliver multiple benefits for biodiversity, natural flood management and water quality improvements through an appropriate woodland compensation scheme.

The earlier consent had included a commitment to offsite tree planting in the Eddleston Water to provide additional enhancements linked to the Eddleston Water project. Details of a Compensatory Replanting Scheme should be provided in the EIA. We would welcome opportunities to provide enhancements in the Eddleston Water catchments, as appropriate.

General Comments

Habitat Management Plan
A Habitat Management Plan will be required. Adopting good practice guidance[iii] the developers should incorporate measures that are required to deliver ecological enhancements as well as measures to avoid, reduce or compensate for negative ecological impacts.

Guidance on the Council's requirements is given in the Supplementary Planning Guidance for biodiversity https://www.scotborders.gov.uk/directory/14/supplementary_planning_guidance/category/28
The Council's requirements are set out in Sections 4.1 Environmental Impact assessment, 4.2 Ecological Impact Assessment and for species and habitats in Sections 4, 5 and 6 of the SPG.
The Environmental Impact Assessment should also include information on
• habitat corridors and links to local habitat network
• significance of ecological impacts
• avoidance, mitigation and compensation proposed
• residual significance of ecological impacts
• method statement to include details of how avoidance, mitigation and compensation are to be implemented and the long-term management of habitats and species created, enhanced or protected.
Any significant effects should be qualified with reference to an appropriate geographic scale and have regard to no net loss of biodiversity (Local Development Plan Policies EP1, EP2 and EP3 as informed by the Council's Supplementary Planning Guidance for biodiversity).

Private Water Supplies

Although no response has yet been received from the Council's Environmental Health Service, it is expected that they will require the applicant to demonstrate that this development will not affect private water supplies in the vicinity. In this regard, I also draw your attention to the third party objections forwarded to you with this Scoping consultation response

Landscape and Visual

The following advice is based substantially on the advice received from the **SBC Landscape Architect** and only adapted to ensure it is delivered in an appropriate form:

A windfarm consisting of 18no turbines up to a tip height of 115m was consented on appeal on 8th July 2016. The site is approximately 1,085 hectares of the Cloich Hills, much of which makes up Cloich Forest. It lies 5.5km north of Peebles and 2.5km west of Eddleston. It lies within 92: Plateau Outlier landscape type, as described in the recently published National Landscape Character Assessment for Scotland (SNH 2019) which supersedes the Borders Landscape Assessment.

Key Issues

- Methodology proposed to assess effects on landscape and visual receptors, and cumulative effects.
- Proposed list of assessment viewpoint locations.
- Cumulative assessment
- Additional landscape and visual receptors to be considered.

Assessment

- The methodology is acceptable and the list of guidance to be utilised is appropriate.
- The scoping report suggests 15no viewpoint locations which are located up to 15km from the outermost turbines. The previous application had 27

viewpoints and while this is a new application, there was merit and purpose in the original selection – it is suggested, in addition to the 15no listed in the scoping report reinstating a number of viewpoints previously selected, giving an all- round better representation of locations from which sensitive receptors might see the windfarm, as following;- 1-Cross Border Drove Road (West); 2- Old Post Road Core Path (to east of Observatory, residential receptor); 3- Minor road near Spylaw and Wester Deans ; 4- B7059 near Boghouse ; 5- Viewpoint on A701 (either near Mountain Cross or southern end of Romanno Bridge, where there is visibility); 6-Haswellsykes; 7– Glentress Forest (Makeness Kipps?); 8 - B7059 near Flemington access. I suggest these are reinstated because they were deemed to have a Moderate/Moderate to Substantial/ Substantial to Very Substantial level of effect (or are at locations where receptors face straight at the proposed development e.g. to the previous scheme. This would bring the viewpoint locations up to 23, which does not seem excessive for a windfarm of this size and scale.

- Focussing the cumulative assessment on a 20km study area is acceptable.
- It is assumed that the landscape and visual effects on the HES Inventory listed Portmore Designed Landscape will be thoroughly assessed. In the inventory it is described as of 'high' value as a Work of Art, with an 'outstanding' historical record of its development and has a scenic value with the mature woods and parks creating a setting for Portmore House while also enriches the valley landscape of the Eddleston Water.

Residential Visual Amenity

For those properties within 2km of any turbine where visibility will be gained from their windows or curtilages, it would be recommended that wirelines are accompanied by aerial and site photographs plus photomontages to enable the significance of effects to be assessed and conclusions demonstrated, especially for those properties identified as requiring a Stage 4 threshold assessment as per the Landscape Institute Technical Guidance Note on Residential Visual Assessment.

Socio-Economics, Land Use, Recreation and Tourism

Socio-economic impacts and tourism

Information on the positive and negative economic effects of the development (in addition to environmental/carbon offset benefits and impacts) would be welcome in order to achieve a rounded understanding of the positive and negative aspects of the development. This Authority would, particularly, wish to be assured that the specific impacts of this development would not have unacceptable effects on established local rural (particularly tourist) businesses. The intention to draw information from several sources on this matter is welcomed. It is also accepted that some comparison in impacts between the consented and proposed schemes would be helpful in focussing on the likely differences, positive or negative. Please note that financial benefits to local communities unrelated to the planning application, would not be accounted for.

Recreation

The following advice is based substantially on the advice received from the **SBC Access Officer** and only adapted to ensure it is delivered in an appropriate form:

General Access Rights

The Land Reform (Scotland) Act 2003 (LRA) introduced a right of responsible public access to most areas of land and inland water in Scotland. This gives everyone a right to take non-motorised access to walk, cycle and horse-ride over most land, by following the Scottish Outdoor Access Code.

Rights of Way are specifically protected by law under the *Countryside (Scotland) Act 1967* sec. 46

Anyone exercising their access rights must do so responsibly by following the Scottish Outdoor Access Code and land owners/managers have a reciprocal responsibility in respecting the interests of those exercising their rights.

Scottish Borders Council (SBC) has a statutory duty to uphold these rights.

Core Paths, Public Rights of Way and Promoted Paths

According to the records held by Scottish Borders Council, The Cross Borders Drove Road (one of Scotland's Great Trails) runs through the southern part of this area of land along a right of way from Flemington Burn NT187461 to Stewarton NT221458. This path also forms part of the unofficial Scottish National Trail. Another right of way links Noblehouse NT183314 with Shiplaw NT232494 and a there is a promoted path from Courhope through Cloich and on towards Shiplaw (see map below). There are also other rights of way and core paths in the local area from which the development will be clearly visible. Mapping of the wider path network across the Scottish Borders can be found at: www.scotborders.gov.uk/mapadvanced

Please note that SBC does not have a definitive record of every claimed right of way within its area. The Scottish Rights of Way and Access Society, community councils and local residents may have evidence of existence of claimed rights of way that have not yet been recorded by SBC.

Proximity to recreational routes

Wind turbines should be set back at a reasonable distance from rights of way and other potential recreational routes. In their 'Scottish Wind Farm Advice Note', the British Horse Society Scotland recommend a separation distance of **four times the overall height** should be the target for core paths and National Trails, as these are likely to be used by equestrians unfamiliar with turbines, and a distance of **three times overall height** from all other routes, including roads to maintain safe access for horses and riders.

Managing Public Access

With regards to managing access during and after construction, Developers should follow the guidance set out in the document 'Good Practice during Wind Farm Construction – Part 7 Recreation and Access'.
See: www.snh.gov.uk/docs/A1168678.pdf

Miscellaneous: Climate Change, Health & Safety (Including Major Accidents & Disasters) and Shadow Flicker

Shadow Flicker

The development's compatibility with current guidance, which refers to a 10 x rotor diameter range within 130 degrees due north, should be considered. The Council SG also requests assessment for residential properties within 2km of each turbine. I note that an assessment will be included in the ES of the forthcoming EIA covering these matters and would agree that if no properties lie within 2km, then shadow flicker can be scoped out.

Noise

The following advice is based substantially on the advice received from the **SBC Environmental Health Officer** and only adapted to ensure it is delivered in an appropriate form. It is general advice for commercial wind farms which has been forwarded to you recently for other large schemes. Any specific response on the Scoping Report for the Cloich project will be forwarded to you when received:

"The applicant should provide the following information to aid assessment of the proposed turbines. A noise impact assessment should be undertaken in accordance with ETSU-R-97 and having regard to the methods described in the Institute of Acoustics Good Practice Guide to the Application of ETSU-R-97.
The assessment should detail the following:
(a) Accurate twelve digit grid references for the turbines;
(b) Accurate twelve digit grid references for the noise sensitive receptors;
(c) Elevations of turbines and receptors;
(d) Details of any financial involvement at noise sensitive receptors;
(e) Sound power level details for the turbine, in its intended mode of operation. Broadband and Aweighted
octave band data required, together with uncertainty figures and any tonal penalty;
(f) Ground factor used;
(g) Atmospheric conditions for Aatm;
(h) Propagation height;
(i) Unless it can be shown that it would be possible to meet the simplified noise condition of 35 dB LA90 (10 min) at wind speeds up to 10m/s measured at 10m height, then a background noise survey will
require to be carried out.
(j) The cumulative noise effect from existing, consented or approved wind turbines. When considering the cumulative effect of other turbines regard should be had the consented noise levels detailed in the approval.
(k) Information regarding any valley effect. It will be necessary to demonstrate whether or not, a 3dB correction is required in respect of the valley significantly sloping ground effect.
If background surveys are carried out then the following details are required:
• Wind shear methodology
• Best fit curve polynomials for daytime and night time (there must be sufficient data collected across the range of wind speeds from 4m/s to 12m/s
• Location of monitoring positions
• Method to record rainfall (noise data affected by rainfall or extraneous noise sources e.g. dawn chorus, agricultural activities, aircraft etc. should be excluded).
• Equipment used including the type of wind shield fitted to the microphone (the preferred wind shield is a large diameter double layer item). A standard wind shield may not be suitable and it is recommended that the sound level meter manufacturer be consulted to confirm the suitability of any wind shield used.

When considering the cumulative impact of large and small wind turbines the preferred option is to use
the ETSU-R-97 guidance for large wind and the BWEA guidance for small wind and add the two together.
As mentioned in (j) above, when considering the cumulative effect of other turbines regard should be had the consented noise levels detailed in the approval.
The applicant should provide information on construction noise and how this will be mitigated."

Other Considerations

I note that a range of other topic chapters are to be provided within the ES which we may not have covered above however we welcome the inclusion of these considerations to address the potential impacts of the proposed development.

The Council have also received copies of responses to the Scoping Report from three members of the public. I attach these for your consideration as to whether to include any points they make in your Scoping Response. You will note they refer to a variety of topics including hydrology, private water supplies, noise, the basis for the EIA, resistance to reduction in viewpoint numbers and suggestions for new viewpoints etc.

I hope that these Scoping comments are of assistance to yourselves in providing your Scoping Response to the applicant,

---

[i] Bats and Onshore wind turbines: Survey, assessment and mitigation (January 2019) Scottish Natural Heritage, Natural England, Natural Resources Wales, RenewableUK, Scottish Power Renewables, Ecotricity Ltd, the University of Exeter and the Bat Conservation Trust (BCT)

[ii] People over Wind & Sweetman v Coillte Teoranta ECLI:EU:C:2018:244 12 April 2018 http://curia.europa.eu/juris/document/document.jsf?docid=200970&doclang=EN

HISTORIC ENVIRONMENT SCOTLAND | ÀRAINNEACHD EACHDRAIDHEIL ALBA

By email: econsents_admin@gov.scot

Tony Young
Energy Consents Unit
4th Floor, 5 Atlantic Quay
150 Broomielaw
Glasgow
G2 8LU

Longmore House
Salisbury Place
Edinburgh
EH9 1SH

Enquiry Line: 0131-668-8716
HMConsultations@hes.scot

Our case ID: 300039684
Your ref: ECU00001956

01 November 2019

Dear Mr Young

The Electricity Act 1989 Section 36
The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017
Scoping Opinion Request for Proposed Application under Section 36 for Cloich Forest Wind Farm, in the Planning Authority Area af Scottish Borders

Thank you for your consultation which we received on 11 October 2019 about the above scoping report. We have reviewed the details in terms of our historic environment interests. This covers world heritage sites, scheduled monuments and their settings, category A-listed buildings and their settings, inventory gardens and designed landscapes, inventory battlefields and historic marine protected areas (HMPAs).

The relevant local authority archaeological and cultural heritage advisors will also be able to offer advice on the scope of the cultural heritage assessment. This may include heritage assets not covered by our interests, such as unscheduled archaeology, and category B- and C-listed buildings.

Proposed Development
I understand that the proposed development comprises 14 wind turbines with maximum height to tip of 145m, located on land at Cloich Forest in the Scottish Borders. We are aware that there is a consented wind development for this location, consisting of 18 wind turbines with maximum height to tip of 115m.

Scope of assessment
We are broadly content with the scope of assessment as set out for our interests. We would advise caution with hard boundaries on search areas for heritage assets whose settings may be affected. We recommend that where assets are themselves outside the ZTV, consideration should still be given to impacts on views of these assets, where they make a contribution to cultural significance.

We have not identified any assets in this instance beyond ten kilometres that require assessment for our interests. However, we consider that with development of this type,

significant impacts can occur at greater distances. The ten kilometre search radius should therefore be agreed with the other relevant consultees for this topic. We also consider the definition of assets between five and ten kilometres that are to be considered to be too narrow and would refer the developer to our setting guidance for further considerations that may be relevant.

Methodology
The details of the assessment methodology provided are appropriate for our interests, although very limited in detail. We refer the developer to the EIA Handbook for best practice guidance on assessing impacts on cultural heritage. This includes a sample methodology, focusing on impacts on cultural significance.

Potentially significant effects
The scoping report has identified the assets covered by our planning remit which are most likely to be significantly affected. We have identified the scheduled hillforts of Black and White Meldon as being particularly sensitive to impacts from this development. We welcome the fact that a visualisation will be provided showing the view from the White Meldon.

It will be equally important to consider impact on views of these heritage assets. The assessment should consider impacts on views from the south, with particular reference to views from other assets which may have a relationship (either past or present) with the hillforts. This includes the fort on Cademuir Hill, which is itself a scheduled monument. There is also the potential for impacts on views from the south approaching the Meldons from the Meldon valley.

Detailed consideration should also be given to impacts on the category A listed Portmore House and its associated Inventory garden and designed landscape. Views of these assets from the east contribute to their current setting and have the potential to be impacted by the proposed development.

As there are scheduled monuments within the boundary, the turbines and their associated infrastructure have the potential to significantly affect both the site and setting of several heritage assets. Any direct impacts should be avoided through design and setting impacts will be a key consideration when finalising the layout of the development. This should be considered in the context of the current forestry and future proposed felling.

Supporting information
We recommend that further visualisations are provided for the cultural heritage assessment, particularly for the above heritage assets. We would be happy to agree locations for these through further consultation. Draft wirelines would allow us to provide

further advice on the level of impact and identify whether or not photomontages are required for our interests.

Mitigation
We note that for some of the scheduled monuments within the boundary, there may be the potential to clear forestry which currently obstructs views that may contribute to setting. We recommend that these options are explored and would be happy to comment on felling proposals at pre-application stage.

Historic Environment Policy for Scotland
Please note that on 1 May we adopted the new Historic Environment Policy for Scotland. This is a strategic policy document for the whole of the historic environment and is supported by a suite of further policy and guidance. All the documents are available on our website at: www.historicenvironment.scot/heps.

This new suite of policy replaces the Historic Environment Scotland Policy Statement and is a key consideration when making decisions that affect the historic environment.

Further information
Guidance about national policy can be found in our 'Managing Change in the Historic Environment' series available online at www.historicenvironment.scot/advice-and-support/planning-and-guidance/legislation-and-guidance/managing-change-in-the-historic-environment-guidance-notes. Technical advice is available on our Technical Conservation website at http://conservation.historic-scotland.gov.uk/.

We hope this is helpful. Please contact us if you have any questions about this response. The officer managing this case is Ruth Cameron, who can be contacted by phone on 0131 668 8657 or by email on ruth.cameron@hes.scot.

Yours sincerely

Historic Environment Scotland

SEPA
Scottish Environment Protection Agency
Buidheann Dìon Àrainneachd na h-Alba

Our Ref: PCS/168160
Your Ref: ECU00001956

Tony Young
Energy Consents Unit
Scottish Government

If telephoning ask for:
Stephanie Balman

By email only to: Econsents_Admin@gov.scot

30 October 2019

Dear Mr Young

The Electricity Act 1989 Section 36
The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017
Scoping Opinion Request for Proposed Application under Section 36 for Cloich Forest Wind Farm
Cloich Forest Wind Farm, west of Peebles, Scottish Borders

Thank you for consulting SEPA on the scoping opinion for the above development proposal by your email received on 11 October 2019.

Advice to the planning authority

We consider that the following key issues must be addressed in the Environmental Impact Assessment process. To **avoid delay and potential objection,** the information outlined below and in the attached appendix must be submitted in support of the application.

a) Map and assessment of all engineering activities in or impacting on the water environment including proposed buffers, details of any flood risk assessment and details of any related CAR applications.

b) Map and assessment of impacts upon Groundwater Dependent Terrestrial Ecosystems and buffers.

c) Map and assessment of impacts upon groundwater abstractions and buffers.

d) Peat depth survey and table detailing re-use proposals.

e) Map and table detailing forest removal.

f) Map and site layout of borrow pits.

g) Schedule of mitigation including pollution prevention measures.

h) Quarry or Borrow Pit Site Management Plan of pollution prevention measures.

i) Map of proposed waste water drainage layout.

continued…..

SEPA Edinburgh Office
Silvan House, 3rd Floor, 231 Corstorphine Road,
Edinburgh EH12 7AT.
www.sepa.org.uk • customer enquiries 03000 99 66 99

j) Map of proposed surface water drainage layout

k) Map of proposed water abstractions including details of the proposed operating regime.

l) Decommissioning statement.

Further details on these information requirements and the form in which they must be submitted can be found in the attached appendix. We also provide site specific comments in the following section which can help the developer focus the scope of the assessment.

1. Site specific comments

1.1 The Scoping Report (dated October 2019) lists that appropriate buffers will be applied to watercourses and drains during the design phase. Section 9.5.3 of the report states that a 50m buffer zone will be established for all turbine bases and ancillary structures/infrastructure around the watercourses on the site, where possible. The applicant should refer to Section 2 below for further details of the information which should be included within the Environmental Statement with respect to this. In addition, micrositing should not occur which would decrease this minimum buffer.

1.2 The layout, Figure 2 indicates that turbines 5, 9 and 10 are proposed in a significantly higher risk location combined with moderate slopes. We would recommended that these turbines and associated infrastructure are relocated away from these receptors. It would be urged that at this stage due consideration is given to the silt mitigation that will be required so that this can occur outside the buffer zones i.e. ensuing adequate space for mitigation is built into the layout design.

1.3 In addition, it is anticipated that further watercourse crossings may be needed, although the track layout is not yet clear. The design should minimise water crossings not only from a morphology point of view but also avoid areas that can become a pinch point for pollution risk.

1.4 It is important that accurate information is obtained on the Private Water Supplies actual supply location rather than just the location of the property or header tank. The applicant can formally request information on private water supplies from SEPA via DataRequests@sepa.org.uk . Please note that SEPA does not have records for low scale supplies (less than 10m3/day) as they fall under General Binding Rule 2. Scottish Borders Council should also be contacted regarding this.

1.5 Given the scale of the development it is likely that a Construction Site Licence will be needed. See Section 2.3 below for further details.

Regulatory advice for the applicant

Regulatory requirements

2.1 Authorisation is required under The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR) to carry out engineering works in or in the vicinity of inland surface waters (other than groundwater) or wetlands. Inland water means all standing or flowing water on the surface of the land (e.g. rivers, lochs, canals, reservoirs).

continued…..

2.2 Management of surplus peat or soils may require an exemption under The Waste Management Licensing (Scotland) Regulations 2011. Proposed crushing or screening will require a permit under The Pollution Prevention and Control (Scotland) Regulations 2012. Consider if other environmental licences may be required for any installations or processes.

2.3 A Controlled Activities Regulations (CAR) construction site licence will be required for management of surface water run-off from a construction site, including access tracks, which:

- is more than 4 hectares,
- is in excess of 5km, or
- includes an area of more than 1 hectare or length of more than 500m on ground with a slope in excess of 25˚

See SEPA's Sector Specific Guidance: Construction Sites (WAT-SG-75) for details. Site design may be affected by pollution prevention requirements and hence we strongly encourage the applicant to engage in pre-CAR application discussions with a member of the regulatory services team in your local SEPA office.

2.4 Below these thresholds you will need to comply with CAR General Binding Rule 10 which requires, amongst other things, that all reasonable steps must be taken to ensure that the discharge does not result in pollution of the water environment. The detail of how this is achieved may be required through a planning condition.

2.5 Details of regulatory requirements and good practice advice for the applicant can be found on the Regulations section of our website. If you are unable to find the advice you need for a specific regulatory matter, please contact a member of the regulatory services team in your local SEPA office at:

Burnbrae, Mossilee Road, Galashiels, TD1 1NF, Tel: 01896 754797

If you have any queries relating to this letter, please contact me by telephone on 0131 449 7296 or e-mail at planning.se@sepa.org.uk.

Yours sincerely

Stephanie Balman
Planning Officer
Planning Service

Disclaimer
This advice is given without prejudice to any decision made on elements of the proposal regulated by us, as such a decision may take into account factors not considered at this time. We prefer all the technical information required for any SEPA consents to be submitted at the same time as the planning or similar application. However, we consider it to be at the applicant's commercial risk if any significant changes required during the regulatory stage necessitate a further planning application or similar application and/or neighbour notification or advertising. We have relied on the accuracy and completeness of the information supplied to us in providing the above advice and can take no responsibility for incorrect data or interpretation, or omissions, in such information. If we have not referred to a particular issue in our response, it should not be assumed that there is no impact associated with that issue. For planning applications if you did not specifically request advice on flood risk, then advice will not have been provided on this issue. Further information on our consultation arrangements generally can be found on our website planning pages.

Appendix 1: Detailed scoping requirements

This appendix sets out our scoping information requirements. There may be opportunities to scope out some of the issues below depending on the site. Evidence must be provided in the submission to support why an issue is not relevant for this site in order **to avoid delay and potential objection**.

If there is a delay between scoping and the submission of the application then please refer to our website for our latest information requirements as they are regularly updated; current best practice must be followed.

We would welcome the opportunity to comment on the draft submission. As we can process files of a maximum size of only 25MB the submission must be divided into appropriately named sections of less than 25MB each.

1. Site layout

1.1 All maps must be based on an adequate scale with which to assess the information. This could range from OS 1: 10,000 to a more detailed scale in more sensitive locations. Each of the maps below must detail all proposed upgraded, temporary and permanent site infrastructure. This includes all tracks, excavations, buildings, borrow pits, pipelines, cabling, site compounds, laydown areas, storage areas and any other built elements. Existing built infrastructure must be re-used or upgraded wherever possible. The layout should be designed to minimise the extent of new works on previously undisturbed ground. For example, a layout which makes use of lots of spurs or loops is unlikely to be acceptable. Cabling must be laid in ground already disturbed such as verges. A comparison of the environmental effects of alternative locations of infrastructure elements, such as tracks, may be required.

2. Engineering activities which may have adverse effects on the water environment

2.1 The site layout must be designed to avoid impacts upon the water environment. Where activities such as watercourse crossings, watercourse diversions or other engineering activities in or impacting on the water environment cannot be avoided then the submission must include justification of this and a map showing:

a) All proposed temporary or permanent infrastructure overlain with all lochs and watercourses.

b) A minimum buffer of 50m around each loch or watercourse. If this minimum buffer cannot be achieved each breach must be numbered on a plan with an associated photograph of the location, dimensions of the loch or watercourse and drawings of what is proposed in terms of engineering works.

c) Detailed layout of all proposed mitigation including all cut off drains, location, number and size of settlement ponds.

2.2 If water abstractions or dewatering are proposed, a table of volumes and timings of groundwater abstractions and related mitigation measures must be provided.

2.3 Further advice and our best practice guidance are available within the water engineering

section of our website. Guidance on the design of water crossings can be found in our Construction of River Crossings Good Practice Guide.

2.4 Refer to Appendix 2 of our Standing Advice for advice on flood risk. Watercourse crossings must be designed to accommodate the 0.5% Annual Exceedance Probability (AEP) flows, or information provided to justify smaller structures. If it is thought that the development could result in an increased risk of flooding to a nearby receptor then a Flood Risk Assessment must be submitted in support of the planning application. Our Technical flood risk guidance for stakeholders outlines the information we require to be submitted as part of a Flood Risk Assessment. Please also refer to Controlled Activities Regulations (CAR) Flood Risk Standing Advice for Engineering, Discharge and Impoundment Activities.

3. Disturbance and re-use of excavated peat and other carbon rich soils

3.1 Scottish Planning Policy states (Paragraph 205) that "Where peat and other carbon rich soils are present, applicants must assess the likely effects of development on carbon dioxide (CO_2) emissions. Where peatland is drained or otherwise disturbed, there is liable to be a release of CO_2 to the atmosphere. Developments must aim to minimise this release."

3.2 The planning submission must a) demonstrate how the layout has been designed to minimise disturbance of peat and consequential release of CO_2 and b) outline the preventative/mitigation measures to avoid significant drying or oxidation of peat through, for example, the construction of access tracks, drainage channels, cable trenches, or the storage and re-use of excavated peat. There is often less environmental impact from localised temporary storage and reuse rather than movement to large central peat storage areas.

3.3 The submission must include:

a) A detailed map of peat depths (this must be to full depth and follow the survey requirement of the Scottish Government's Guidance on Developments on Peatland - Peatland Survey (2017)) with all the built elements (including peat storage areas) overlain to demonstrate how the development avoids areas of deep peat and other sensitive receptors such as Groundwater Dependent Terrestrial Ecosystems.

b) A table which details the quantities of acrotelmic, catotelmic and amorphous peat which will be excavated for each element and where it will be re-used during reinstatement. Details of the proposed widths and depths of peat to be re-used and how it will be kept wet permanently must be included.

3.4 To avoid delay and potential objection proposals must be in accordance with Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and Minimisation of Waste and our Developments on Peat and Off-Site uses of Waste Peat.

3.5 Dependent upon the volumes of peat likely to be encountered and the scale of the development, applicants must consider whether a full Peat Management Plan (as detailed in the above guidance) is required or whether the above information would be best submitted as part of the schedule of mitigation.

3.6 Please note we do not validate carbon balance assessments except where requested to

by Scottish Government in exceptional circumstances. Our advice on the minimisation of peat disturbance and peatland restoration may need to be taken into account when you consider such assessments.

4. Disruption to Groundwater Dependent Terrestrial Ecosystems (GWDTE)

4.1 GWDTE are protected under the Water Framework Directive and therefore the layout and design of the development must avoid impact on such areas. The following information must be included in the submission:

a) A map demonstrating that all GWDTE are outwith a 100m radius of all excavations shallower than 1m and outwith 250m of all excavations deeper than 1m and proposed groundwater abstractions. If micro-siting is to be considered as a mitigation measure the distance of survey needs to be extended by the proposed maximum extent of micro-siting. The survey needs to extend beyond the site boundary where the distances require it.

b) If the minimum buffers above cannot be achieved, a detailed site specific qualitative and/or quantitative risk assessment will be required. We are likely to seek conditions securing appropriate mitigation for all GWDTE affected.

4.2 Please refer to Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems for further advice and the minimum information we require to be submitted.

5. Existing groundwater abstractions

5.1 Excavations and other construction works can disrupt groundwater flow and impact on existing groundwater abstractions. The submission must include:

a) A map demonstrating that all existing groundwater abstractions are outwith a 100m radius of all excavations shallower than 1m and outwith 250m of all excavations deeper than 1m and proposed groundwater abstractions. If micro-siting is to be considered as a mitigation measure the distance of survey needs to be extended by the proposed maximum extent of micro-siting. The survey needs to extend beyond the site boundary where the distances require it.

b) If the minimum buffers above cannot be achieved, a detailed site specific qualitative and/or quantitative risk assessment will be required. We are likely to seek conditions securing appropriate mitigation for all existing groundwater abstractions affected.

5.2 Please refer to Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems for further advice on the minimum information we require to be submitted.

6. Forest removal and forest waste

6.1 Key holing must be used wherever possible as large scale felling can result in large amounts of waste material and in a peak release of nutrients which can affect local water quality. The supporting information should refer to the current Forest Plan if one exists and measures should comply with the Plan where possible.

6.2 Clear felling may be acceptable only in cases where planting took place on deep peat and it is proposed through a Habitat Management Plan to reinstate peat-forming habitats. The submission must include:

a) A map demarcating the areas to be subject to different felling techniques.

b) Photography of general timber condition in each of these areas.

c) A table of approximate volumes of timber which will be removed from site and volumes, sizes of chips or brash and depths that will be re-used on site.

d) A plan showing how and where any timber residues will be re-used for ecological benefit within that area, supported by a Habitat Management Plan. Further guidance on this can be found in Use of Trees Cleared to Facilitate Development on Afforested Land – Joint Guidance from SEPA, SNH and FCS.

7. Borrow pits

7.1 Scottish Planning Policy states (Paragraph 243) that "Borrow pits should only be permitted if there are significant environmental or economic benefits compared to obtaining material from local quarries, they are time-limited; tied to a particular project and appropriate reclamation measures are in place." The submission must provide sufficient information to address this policy statement.

7.2 In accordance with Paragraphs 52 to 57 of Planning Advice Note 50 Controlling the Environmental Effects of Surface Mineral Workings (PAN 50) a Site Management Plan should be submitted in support of any application. The following information should also be submitted for each borrow pit:

a) A map showing the location, size, depths and dimensions.

b) A map showing any stocks of rock, overburden, soils and temporary and permanent infrastructure including tracks, buildings, oil storage, pipes and drainage, overlain with all lochs and watercourses to a distance of 250 metres. You need to demonstrate that a site specific proportionate buffer can be achieved. On this map, a site-specific buffer must be drawn around each loch or watercourse proportionate to the depth of excavations and at least 10m from access tracks. If this minimum buffer cannot be achieved each breach must be numbered on a plan with an associated photograph of the location, dimensions of the loch or watercourse, drawings of what is proposed in terms of engineering works.

c) You need to provide a justification for the proposed location of borrow pits and evidence of the suitability of the material to be excavated for the proposed use, including any risk of pollution caused by degradation of the rock.

d) A ground investigation report giving existing seasonally highest water table including sections showing the maximum area, depth and profile of working in relation to the water table.

e) A site map showing cut-off drains, silt management devices and settlement lagoons to manage surface water and dewatering discharge. Cut-off drains must be installed to maximise diversion of water from entering quarry works.

f) A site map showing proposed water abstractions with details of the volumes and timings of abstractions.

g) A site map showing the location of pollution prevention measures such as spill kits, oil interceptors, drainage associated with welfare facilities, recycling and bin storage and vehicle washing areas. The drawing notes should include a commitment to check these daily.

h) A site map showing where soils and overburden will be stored including details of the heights and dimensions of each store, how long the material will be stored for and how soils will be kept fit for restoration purposes. Where the development will result in the disturbance of peat or other carbon rich soils then the submission must also include a detailed map of peat depths (this must be to full depth and follow the survey requirement of the Scottish Government's Guidance on Developments on Peatland - Peatland Survey (2017)) with all the built elements and excavation areas overlain so it can clearly be seen how the development minimises disturbance of peat and the consequential release of CO_2.

i) Sections and plans detailing how restoration will be progressed including the phasing, profiles, depths and types of material to be used.

j) Details of how the rock will be processed in order to produce a grade of rock that will not cause siltation problems during its end use on tracks, trenches and other hardstanding.

8. Pollution prevention and environmental management

8.1 One of our key interests in relation to developments is pollution prevention measures during the periods of construction, operation, maintenance, demolition and restoration. A schedule of mitigation supported by the above site specific maps and plans must be submitted. These must include reference to best practice pollution prevention and construction techniques (for example, limiting the maximum area to be stripped of soils at any one time) and regulatory requirements. They should set out the daily responsibilities of ECOWs, how site inspections will be recorded and acted upon and proposals for a planning monitoring enforcement officer. Please refer to Guidance for Pollution Prevention (GPPs).

9. Life extension, repowering and decommissioning

9.1 Proposals for life extension, repowering and/or decommissioning must demonstrate accordance with SEPA Guidance on the life extension and decommissioning of onshore wind farms. Table 1 of the guidance provides a hierarchical framework of environmental impact based upon the principles of sustainable resource use, effective mitigation of environmental risk (including climate change) and optimisation of long term ecological restoration. The submission must demonstrate how the hierarchy of environmental impact has been applied, within the context of latest knowledge and best practice, including justification for not selecting lower impact options when life extension is not proposed.

9.2 The submission needs to demonstrate that there will be no discarding of materials that are likely to be classified as waste as any such proposals would be unacceptable under waste management licensing. Further guidance on this may be found in the document Is it waste - Understanding the definition of waste.

Scottish Natural Heritage
Dualchas Nàdair na h-Alba
nature.scot

Tony Young
Energy Consents Unit
5 Atlantic Quay
150 Broomielaw
Glasgow
G2 8LU

Econsents_Admin@gov.scot

Date: 21st November 2019
Our ref: A3116858

Dear Mr Young

THE ELECTRICITY ACT 1989 SECTION 36 THE ELECTRICITY WORKS (ENVIRONMENTAL IMPACT ASSESSMENT) (SCOTLAND) REGULATIONS 2017 SCOPING OPINION REQUEST FOR PROPOSED CLOICH WIND FARM

Thank you for consulting Scottish Natural Heritage on this proposal.

1. Summary

An application for eighteen 132m turbines was submitted in 2012. SNH objected to this application due to the likely significant adverse impacts on the Upper Tweeddale National Scenic Area (NSA). To mitigate these impacts, the turbine height was reduced to 115m and the turbine layout was redesigned. SNH removed its objection to due to the mitigation put in place and the revised development was consented.

We advise that increasing the height of the turbines to 145m is likely undo the mitigation put in place by the consented scheme and re-introduce significant adverse impacts on the qualities of the Upper Tweeddale National Scenic Area. We advise that if this is the case **SNH will object to this proposal.**

2. Appraisal

Landscape and Visual effects

It is likely that the increased height of the turbines in the current proposal, despite being fewer in number, will exacerbate some if not all of the effects noted previously and consequently these should be covered in the assessment.

Related to the Special Qualities of this NSA other key issues to consider are:

- The appreciation of distinctive landforms within and immediately adjacent to the NSA (e.g. the Meldons) and how the proposed turbines could visually compete with and detract from their setting and importance;
- The scenic composition of views from within the NSA – e.g. from lower level areas such as the intimate valleys of the Meldon Burn and its fringes – from where views of turbines could detract from people's experience of remoteness, tranquillity and overall landscape quality;
- For a site of this landscape sensitivity and location we would strongly advise that close attention is paid to the wind farm's design and visual coherence, forest removal and ancillary infrastructure.

Our advice is any revision to the consented turbine layout should not undo the design mitigation put in place by the consented layout.

With regards to the LVIA methodology and viewpoints an assessment of the NSA Special Qualities should be carried out using draft guidance *Assessing the impacts on Special Landscape Qualities – Working Draft 11-09 November 2018.*

We request that the following VPs are included:

- One of the hill tops in the Moorfoots to show both Cloich and Bowbeat.
- From the B7007 on the northern edge of the Moorfoots – possibly at NT08633890 a location with panoramic views before road turns into the interior of the hills.
- From the A701 to the west of the site.
- A viewpoint along the minor road on the north western slopes of the Moorfoots connecting Gladhouse reservoir to the A703 - where the wind farm would be seen in straight ahead views. Possibly somewhere to the west of Westloch at NT14124759 or NT20324686. This could be in addition to or instead of VP 10 at Gladhouse reservoir.

It would have been helpful if the ZTV in the scoping report also showed the boundary of the NSA and we advise that ZTVs included in the LVIA should do so.

We note that the selection of viewpoints differs from that in the earlier LVIA. We would welcome clarification that the current selection better represents the range of receptors whilst at the same time clearly indicating the design and layout of the wind farm in wider and local views. We suggest that wirelines are included from the original viewpoints.

Ecology and Ornithology

We are content with the habitat and species surveys set out in the Ecology section of the scoping report.

With regards to ornithology, the 2017 guidance requires that a minimum two years of surveys should be undertaken. We note there were surveys undertaken in 2012 and while they can provide some context they are, as set out in the guidance, now too old to inform the impact assessment. We therefore advise surveys should continue until an additional year is gathered. We are happy with the program of surveys that was used in 2019 and for this to be used again in 2020.

3. Concluding remarks

Our pre-application advice for wind farms, which is available on our website from the link below[1], provides further details and a checklist of what should be included in the EIA.

[1] https://www.nature.scot/sites/default/files/2018-02/SNH%20General%20pre-application%20and%20scoping%20advice%20%20to%20developers%20of%20onshore%20wind%20farms.pdf

If you have any questions in relation to any of the above, please do not hesitate to contact me.

Yours sincerely

Matt Burnett
Renewable Energy Casework Adviser
Scottish Natural Heritage
[redacted]

Young T (Tony)

From: Windfarms <windfarms@atkinsglobal.com>
Sent: 05 November 2019 05:05
To: Flaherty D (Debbie); Econsents Admin
Subject: WF33224 - Cloich Forest Wind farm , near Peebles , Scottish Borders, Scotland, United Kingdom, T1-T14 - NT 20255 48362

Dear Sirs,

I am responding to an email of 31-10-2019, regarding the above named proposed development.

The above application has now been examined in relation to UHF Radio Scanning Telemetry communications used by our Client in that region and we are happy to inform you that we have **NO OBJECTION** to your proposal.

Please note that this is **not** in relation to any Microwave Links operated by Scottish Water

Atkins Limited is responsible for providing Wind Farm/Turbine support services to TAUWI.

Atkins Limited is responsible for providing Wind Farm/Turbine support services to the Telecommunications Association of the UK Water Industry. Web: www.tauwi.co.uk
Windfarm Support
ATKINS
The official engineering design services provider
for the London 2012 Olympic and Paralympic Games
Web: www.atkinsglobal.com/communications

From: Debbie.Flaherty@gov.scot <Debbie.Flaherty@gov.scot>
Sent: 31 October 2019 16:17
To: Windfarms <windfarms@atkinsglobal.com>
Cc: Joyce.Melrose@gov.scot
Subject: Cloich Forest Wind farm , near Peebles , Scottish Borders

Dear Sirs

Please see attached email response from Atkins Global dated 11 October 2019. Please now find attached grid references as requested.

I hope this is helpful and please respond to Econsents_Admin@gov.scot

Regards

Debbie Flaherty | Consents Manager | Energy Consents Unit
The Scottish Government, 5 Atlantic Quay, 150 Broomielaw, Glasgow G2 8LU
0131 244 1258 | debbie.flaherty@gov.scot
To view our current casework please visit www.energyconsents.scot
Working pattern: Mon – Fri (Mon , Wed, Thur - AM only)

any part of this e-mail is not permitted. If you are not the intended recipient please destroy the email, remove any copies from your system and inform the sender immediately by return. Communications with the Scottish Government may be monitored or recorded in order to secure the effective operation of the system and for other lawful purposes. The views or opinions contained within this e-mail may not necessarily reflect those of the Scottish Government.
****

Melrose J (Joyce)

From: [redacted] on behalf of radionetworkprotection@bt.com
Sent: 21 October 2019 15:59
To: Econsents Admin; Flaherty D (Debbie)
Subject: RE: Cloich Forest Wind Farm, west of Peebles, Scottish Borders - Scoping Consultation
Attachments: 3439-REP-006 Fig02 Proposed Layout.pdf

OUR REF; WID11076

Dear Sir/Madam

Thank you for your email dated 11/10/2019.

We have studied this Windfarm proposal with respect to EMC and related problems to BT point-to-point microwave radio links.

The conclusion is that, the Project indicated should not cause interference to BT's current and presently planned radio network.

Kind Regards,
Paul Atkinson
Fibre and Network Delivery
Radio Frequency Allocation & Network Protection (BNJ112)
Openreach
Tel: 0113 8074481
[redacted]
Web: www.openreach.co.uk
PLEASE ALWAYS RESPOND TO radionetworkprotection@bt.com

Defence Infrastructure Organisation

Teena Oulaghan
Safeguarding Manager
Ministry of Defence
Safeguarding Department
Kingston Road
Sutton Coldfield
West Midlands B75 7RL
United Kingdom

Telephone [MOD]: 07970170934

E-mail: teena.oulaghan100@mod.gov.uk

Your Reference: N/A

Our Reference: DIO13930

Tony Young
Energy Consent Unit,
Scottish Government,
4th Floor,
5 Atlantic Quay,
150 Broomielaw,
Glasgow
G2 8LU

31 October 2019

Dear Tony,

Proposal: SCOPING OPINION REQUEST FOR PROPOSED APPLICATION UNDER SECTION 36 FOR CLOICH FOREST WIND FARM, IN THE PLANNING AUTHORITY AREA OF SCOTTISH BORDERS

Thank you for consulting the Ministry of Defence (MOD) on the Scoping Opinion Request in respect of the Cloich Forest Wind Farm Proposal received in this office on 7th October 2019.

The MOD has assessed the application using the grid references detailed in Annex A below for 14 turbines, a maximum of 145 metres to blade tip, and has identified the following:

Air Traffic Control (ATC) Radar

The turbines will be 65.8 km from, detectable by, and will cause unacceptable interference to the ATC radar used by Spadeadam Deadwater Fell.

Wind turbines have been shown to have detrimental effects on the performance of Primary Surveillance Radars. These effects include the desensitisation of radar in the vicinity of the turbines, and the creation of "unwanted" aircraft returns which air traffic controllers must treat as aircraft returns. The desensitisation of radar could result in aircraft not being detected by the radar and therefore not presented to air traffic controllers. Controllers use the radar to separate and sequence both military and civilian aircraft, and in busy uncontrolled airspace radar is the only sure way to do this safely. Maintaining situational awareness of all aircraft movements within the airspace is crucial to achieving a safe and efficient air traffic service, and the integrity of radar data is central to this process. The creation of "unwanted" returns displayed on the radar leads to increased workload for both controllers and aircrews and may have a significant operational impact. Furthermore, real aircraft returns can be obscured by a turbine's radar return, making the tracking of both conflicting unknown aircraft and the controllers' own traffic much more difficult.

MOD therefore has concerns with the revised development at Cloich Forest Wind Farm.

Eskdalemuir Seismological Recording Station

The proposed development falls within the statutory safeguarding area surrounding Eskdalemuir Seismological Recording Station. Scientific research has established that wind turbines of current design generate noise emissions that cause seismic vibrations which can interfere with the effective operation of the array. In order to ensure the United Kingdom can continue to implement its obligations in maintaining the Comprehensive Nuclear Test Ban Treaty, a noise budget has been allocated to regulate the development of wind turbines within a 50km radius of the array. The budget has been set at 0.336nm rms.

The noise budget required for this revised proposal exceeds the amount of budget previously allocated to the Cloich Forest Wind Farm application. Therefore, the MOD has concerns with this proposal as it will exceed the allocated budget.

If the developer can overcome the issues stated above, the MOD will request that the perimeter turbines be fitted with MOD accredited 25 candela omni-directional red lighting or infrared lighting with an optimised flash pattern of 60 flashes per minute of 200ms to 500ms duration at the highest practicable point.

MOD Safeguarding wishes to be consulted and notified about the progress of planning applications and submissions relating to this proposal to verify that it will not adversely affect defence interests.

I hope this adequately explains our position on the matter. Further information about the effects of wind turbines on MOD interests can be obtained from the following website:

***MOD*: {** HYPERLINK "https://www.gov.uk/government/publications/wind-farms-ministry-of-defence-safeguarding" \o "https://www.gov.uk/government/publications/wind-farms-ministry-of-defence-safeguarding" **}**

Yours sincerely
Redacted

Teena Oulaghan
Safeguarding Manager

Annex A

Turbine	Easting	Northing
1	320,255	648,362
2	320,779	648,256
3	319,946	647,842
4	320,462	647,773
5	319,726	647,331
6	320,245	647,258
7	320,788	647,354
8	319,753	646,839
9	320,250	646,724
10	320,774	646,827
11	319,440	646,361
12	320,089	645,979
13	320,632	646,075
14	320,157	648,905

A31

EDDLESTON & DISTRICT COMMUNITY COUNCIL

Energy Consents Unit
Scottish Government
Econsents_Admin@gov.scot

Friday 15 November 2019

RESPONSE TO **SCOPING OPINION REQUEST FOR PROPOSED APPLICATION UNDER SECTION 36 FOR CLOICH FOREST WIND FARM, IN THE PLANNING AUTHORITY AREA OF SCOTTISH BORDERS**

In discussion with representatives of EDF, EDCC has been made aware that the general disposition of the proposed development shown in the Scoping Request is "indicative." This makes specific comment on placement equally "indicative." However, EDCC does have a number of comments to make on the generality and methodology of the Scoping Request.

General:

EDF Renewables' Scoping Request is based on the flawed premise that their proposed scheme should be viewed in the context of whether any additional likely significant environmental effects are anticipated. This flies in the face of the Scottish Government's clear guidelines (published 20th May 2019) on variation to a consented development, namely that, "The variation process is not intended as a way of authorising any change in a developer's plans that would result in development that is likely to be fundamentally or substantially different in terms of scale and/or nature from what is authorised by the existing consent. Where proposed modifications are fundamental or substantial, it is likely that a completely new section 36 application will need to be submitted."

EDCC considers that a proposal to erect turbines which are 26% taller than the already large consented turbines, and with a 60% increase in blade swept area, and in different locations, is both "fundamental and substantial" and therefore contravenes the Scottish Government guidelines. And while EDF argues that the planning for a wind farm at this location has been established in principle, that was for a particular scheme, a different scheme, designed some 7 years ago. Attempting to predict what effects there might notionally be if 2012 environmental conditions are replicated with significantly taller turbines runs the real risk of leading to a hit-and-miss prediction of the impacts due to the variables involved. This new application must not, therefore, be viewed against the consented scheme as a baseline, but, "a completely new Section 36 application will need to be submitted."

Private Water Supplies (PWS) Hydrology and Hydrogeology:

This remains a major issue. The Scoping Request suggests that '*the reduced footprint of the proposed development from the extant consent has the potential to reduce effects of chemical pollution, sedimentation, impediment to flow, acidification of watercourses, runoff and flood risk when compared to the extant consent*'. This is wrong. Larger turbines require larger bases, pads, tree felling and access tracks. While the EDF Scoping Request's turbine positions are "indicative" it fails to take into account that the issue of PWS protection at Cloich is not new, and was identified as a major issue at the time of the previous application by PfR, when some 40 properties (not the 9 mentioned in the EDF Scoping Request), their inhabitants and livestock, were identified as being dependent on PWS. As a result, Ministerial Approval imposed a specific condition to be fulfilled prior to any work being commenced. This condition (Condition 20) states:

"There shall be no commencement of development unless a method statement has been submitted to and approved in writing by the planning authority, detailing all mitigation measures to be delivered to secure the quality, quantity and continuity of water supplies to properties which are served by private water supplies at the date of this consent and which may be affected by the development….The approved method statement shall accord with SEPA guidance note 31 and shall thereafter be implemented in full.
Reason: to maintain a secure and adequate quality water supply to all properties with private water supplies which may be affected by the development."

The new proposal, with turbines some 26% taller than those currently consented must involve increased disturbance to ground conditions and therefore increased risk to PWS. It is difficult to believe that EDF have grasped the problems of PWS when they propose to address PWS issues by "update information through consultation with relevant statutory consultees and contact with residents to obtain further information." (9.3.6), or to rely on a "site walkover, consultation, desk studies and data requests" (9.4) – especially when 5 of the 14 proposed turbines in their "indicative" positions are actually on mapped water courses. EDF must address Condition 20 in full, following the guidance laid down by SEPA 31, of which the most crucial sentence is: "It is critical that it is the actual source of the abstraction and not the property that it supplies that is identified"

i.e. EDF must identify, to the satisfaction of SEPA and of Local Government the source and pathway of each and every property's water supply, into the borehole or holding tank from which each property draws its water. This is the only way to ensure that the development is designed and constructed to give full protection to PWS. Only by doing this analysis will EDF be sure that turbines and ancillary infrastructure are sited and constructed in such a way that PWS are fully protected. Contingency plans and mitigation of the loss of PWS are not enough; prevention of loss is required as an integral part of the scheme design.

The Scoping Request, by seeking to build on the earlier consent, seeks to avoid the more recent and supportive work of SEPA, SNH and other Governmental and environmental bodies on the need to preserve the environment of peat mosses and the enormous quantities of carbon stored safely in peat soil. Cloich is home to a number of peat mosses which for the good of our environment must be left undisturbed.

Noise

The Scoping Request indicates that EDF plan to use extant consent noise levels as a baseline. Yet EDCC understands from EDF that the ETSU guidelines have changed to acknowledge valley effect – which is pertinent in this case, as a number of properties are in a topographical bowl which amplifies sound. The original submission for Cloich, proposed by EDF as a baseline, was based on what was perceived as flawed monitoring of then current noise levels. Those noise levels breached the then extant ETSU guidelines at one property (Upper Stewarton) and were at best marginal in several others. Past and future changes to the sound environment at Cloich since the first analysis in 2012, including the loss of trees, past or planned, with associated loss of their blanking effect, have been, and will continue to be significant. It is therefore incumbent on EDF to undertake a full and accurate noise assessment to ensure that impacts on residents are fully understood.

Landscape and Visual, Recreation and Tourism

EDF have elected to reduce the number of viewpoints they intend to produce, which is questionable given the proposed increased height and prominence of the larger turbines, and the potential impact on the visual and recreational environment. While EDF make much in the Scoping Request of the likelihood of a change in turbine siting, there is little point in producing viewpoints until precise locations have been determined to

replace the "indicative" locations - which in turn will depend upon other factors, including PWS and noise. Those viewpoints should include those residential receptors most directly affected together with other visual receptors, such as walkers, riders and cyclists whose use of these paths and trails increases year on year and separation distances between turbines and known paths for users must adhere to the relevant guidelines. What is clear is that the nationally recognised Cross Borders Drove Road and the Scottish National Trail will both suffer major impact from the proposed scheme, and that the proposed increased height will offer greater visibility from the adjacent National Scenic Area, and from Eddleston and from major transport routes. It is therefore incorrect to conclude that with respect to cultural heritage '*there is expected to be a limited change to direct effects on known features, with a possible reduction to previously assessed effects due to the reduced number of turbines and associated footprint*' and that '*no change is anticipated to the previously assessed effects on unknown features.*' It would also be incorrect to conclude that with respect to land use, socio economics, recreation and tourism '*there is anticipated to be a reduction in the overall footprint for the windfarm and the wind farm would not give rise to changes to land use, recreation or tourism activities.'*

This is a new development with significantly larger turbines, in different locations yet to be determined. It is not acceptable for the applicant to '*remove from the scope of the EIA those environmental effects where no significant effects were previously identified.'* The environmental impacts of the proposed new scheme must be fully scoped and considered as part of a new and full EIA.

Summary:

The Scoping Request is remarkably light on a number of relevant details. The proposal by the Applicant to use the existing consent as a baseline is not supported by the facts. The proposed development differs fundamentally and substantially from the original consent, and therefore a completely new Section 36 application will be required, in accordance with Scottish Government guidelines.

Yours sincerely

Redacted

on behalf of Eddleston & District Community Council
planning@eddlestoncc.org.uk

Melrose J (Joyce)

From: Safe Guarding <safeguarding@edinburghairport.com>
Sent: 04 November 2019 14:25
To: Econsents Admin
Cc: Safe Guarding
Subject: ECU00001956

Good afternoon,

In respect of the above, I can confirm the location of this development falls out with our Aerodrome Safeguarding zone therefore we have no objection/comment on this proposal.

With best regards,
Claire

Claire Brown | Safeguarding & Compliance Officer

Edinburgh Airport
Where Scotland meets the world

Edge | Empower | Expertise | Energy | Execute | External focus

Edinburgh Airport Limited
Airside Operations
Fire Station
Edinburgh
EH12 9DN Scotland

t: +44 (0)131 344 3359 f: 0131 333 4751 [redacted]
w: edinburghairport.com t: twitter.com/edi_airport

Melrose J (Joyce)

From: Brian Davidson <brian@fms.scot>
Sent: 25 October 2019 09:11
To: Econsents Admin
Cc: Fay Hieatt
Subject: RE: Cloich Forest Wind Farm, west of Peebles, Scottish Borders - Scoping Consultation

Dear Tony,

Thank you for your correspondence concerning the proposed Cloich windfarm, by Peebles.

Fisheries Management Scotland (FMS) represents the network of 41 Scottish District Salmon Fishery Boards (DSFBs) including the River Tweed Commission (RTC), who have a statutory responsibility to protect and improve salmon and sea trout fisheries and the 26 fishery trusts who provide a research, educational and monitoring role for all freshwater fish.

FMS act as a convenient central point for Scottish Government and developers to seek views on local developments. However, as we do not have the appropriate local knowledge, or the technical expertise to respond to specific projects, we are only able to provide a general response with regard to the potential risk of such developments to fish, their habitats and any dependent fisheries. Accordingly, our remit is confined mainly to alerting the relevant local DSFB/Trust to any proposal.

The proposed development falls within the district of the River Tweed Commission, and the catchments relating to the Tweed Foundation. It is important that the proposals are conducted in full consultation with these organisations (For your reference, please see link to FMS member DSFBs and Trusts below). We have also copied this response to these organisations.

Due to the potential for such developments to impact on migratory fish species and the fisheries they support, FMS have developed, in conjunction with Marine Scotland Science, advice for DSFBs and Trusts in dealing with planning applications. We would strongly recommend that these guidelines are fully considered throughout the planning, construction and monitoring phases of the proposed development.

- LINK TO ADVICE ON TERRESTRIAL WINDFARMS
- LINK TO DSFB CONTACT DETAILS
- LINK TO FISHERY TRUST CONTACT DETAILS

Regards,

Brian

Brian Davidson | Dir Communications & Administration
Fisheries Management Scotland
11 Rutland Square, Edinburgh, EH1 2AS
Tel: 0131 221 6567 | [redacted]
www.fms.scot

Melrose J (Joyce)

From: Steve Thomson <sthomson@glasgowprestwick.com>
Sent: 01 November 2019 13:07
To: Econsents Admin; Young T (Tony)
Cc: Safeguarding
Subject: RE: Cloich Forest Wind Farm, west of Peebles, Scottish Borders - Scoping Consultation

Debbie/Tony

Our LOS analysis confirms that proposed development is terrain shielded from our primary radar.

Consequently Glasgow Prestwick Airport Ltd raises no aviation objections to this proposed development.

Kind Regards

Steve Thomson

Glasgow Prestwick Airport

Glasgow Prestwick Airport Ltd.
Aviation House
Prestwick
KA9 2PL
Scotland
United Kingdom

Steve Thomson
Manager Air Traffic Services
Glasgow Prestwick Airport Ltd.

T: (+44) 01292 511055
M:(+44) 07990 551141

sthomson@glasgowprestwick.com
www.glasgowprestwick.com

Melrose J (Joyce)

From: Safeguarding <Safeguarding@hial.co.uk>
Sent: 24 October 2019 11:31
To: Econsents Admin
Subject: RE: Cloich Forest Wind Farm, west of Peebles, Scottish Borders - Scoping Consultation

Your Ref: ECU00001956
Our Ref: 2019/0130/DND

Dear Sir/Madam,

PROPOSAL: SCOPING OPINION REQUEST FOR PROPOSED APPLICATION UNDER SECTION 36 FOR CLOICH FOREST WIND FARM, IN THE PLANNING AUTHORITY AREA OF SCOTTISH BORDERS
LOCATION: 5.5 km north-west of Peebles, within the Scottish Borders

With reference to the above proposed development, it is confirmed that our calculations show that, at the given position and height, this development would not infringe the safeguarding surfaces for Dundee Airport.

Therefore, Dundee Airport Limited has no objections to the proposal.

Regards,

Safeguarding Team
on behalf of Dundee Airport Limited
c/o Highlands and Islands Airports Limited
Head Office, Inverness Airport, Inverness IV2 7JB
☏ [redacted]
✉ safeguarding@hial.co.uk 🌎 www.hial.co.uk

Melrose J (Joyce) A38

From: Hebe Carus [redacted]
Sent: 15 October 2019 10:30
To: Econsents Admin
Cc: Hebe Carus
Subject: FW: Cloich Forest Wind Farm, west of Peebles, Scottish Borders - Scoping Consultation

The John Muir Trust does not intend making comment at the scoping stage, but will assess if and when an application is lodged and make comment as necessary.

Hebe Carus
Policy Officer

John Muir Trust
Tower House, Station Road, Pitlochry, PH16 5AN
[redacted]

Please note my normal working days are Monday to Thursday

Melrose J (Joyce)

From: JRC Windfarm Coordinations <windfarms@jrc.co.uk>
Sent: 23 October 2019 13:11
To: Econsents Admin
Subject: Cloich Forest Wind farm , west of Peebles, Scottish Borders - Scoping Consultation (WF947420) [WF468857]

Dear econsents_admin,

A Windfarms Team member has replied to your coordination request, reference **WF468857** with the following response:

Dear Sir/Madam,

***Site Name**:*

Cloich Forest Wind Farm (Oct 2019)

***Turbine at NGR**:*

T1 - 320255 648362
T2 - 320779 648256
T3 - 319946 647842
T4 - 320462 647773
T5 - 319726 647258
T6 - 320245 647258
T7 - 320788 647354
T8 - 319753 646839
T9 - 320250 646724
T10 - 320774 646827
T11 - 319440 646361
T12 - 320089 645979
T13 - 320632 646075
T14 - 320157 648905

***Hub Height**: 70m **Rotor Radius**: 45m*

*This proposal ***cleared*** with respect to radio link infrastructure operated by:*

Scottish Power and Scotia Gas Networks

JRC analyses proposals for wind farms on behalf of the UK Fuel & Power Industry. This is to assess their potential to interfere with radio systems operated by utility companies in support of their regulatory operational requirements.

In the case of this proposed wind energy development, JRC does not foresee any potential problems based on known interference scenarios and the data you have provided. However, if any details of the wind farm change, particularly the disposition or scale of any turbine(s), it will be necessary to re-evaluate the proposal. Please note that due to the large number of adjacent radio links in this vicinity, which have been

taken into account, clearance is given specifically for a location within the declared grid reference (quoted above).

In making this judgement, JRC has used its best endeavours with the available data, although we recognise that there may be effects which are as yet unknown or inadequately predicted. JRC cannot therefore be held liable if subsequently problems arise that we have not predicted.

It should be noted that this clearance pertains only to the date of its issue. As the use of the spectrum is dynamic, the use of the band is changing on an ongoing basis and consequently, you are advised to seek re-coordination prior to submitting a planning application, as this will negate the possibility of an objection being raised at that time as a consequence of any links assigned between your enquiry and the finalisation of your project.

JRC offers a range of radio planning and analysis services. If you require any assistance, please contact us by phone or email.

Regards

Wind Farm Team

The Joint Radio Company Limited
Delta House
175-177 Borough High Street
LONDON
SE1 1HR
United Kingdom

Office: 020 7706 5199

JRC Ltd. is a Joint Venture between the Energy Networks Association (on behalf of the UK Energy Industries) and National Grid.
Registered in England & Wales: 2990041
http://www.jrc.co.uk/about-us

JRC is working towards GDPR compliance. We maintain your personal contact details in accordance with GDPR requirements for the purpose of "Legitimate Interest" for communication with you. However you have the right to be removed from our contact database. If you would like to be removed, please contact anita.lad@jrc.co.uk.

We hope this response has sufficiently answered your query.
If not, please **do not send another email** as you will go back to the end of the mail queue, which is not what you or we need. Instead, **reply to this email keeping the subject line intact or login to your account** for access to your coordination requests and responses.

https://breeze.jrc.co.uk/tickets/view.php?auth=o1xkmcaaaemiqaaajQ6MeLo9k607kQ%3D%3D

Melrose J (Joyce)

From: Redacted
Sent: 18 November 2019 15:33
To: Econsents Admin; Community Council
Subject: Cloich Forest Wind Farm - Comments from Lamancha, Newlands and Kirkurd Community Council

Dear Sirs

From the perspective of the Lamancha, Newlands and Kirkurd Community Council, the main issue to be considered is the landscape and visual impact of the proposed windfarm, noting that the proposed turbine tip height is now 145 metres, compared with a previously consented height of 115 metres. (There are of course other important issues such as the impact on private water supplies and noise, but we will leave it neighbouring Community Councils to comment in detail on these.)

With respect to the Proposed Assessment Viewpoints identified in Table 5.2, we consider that more should be done to reflect the impact on users of the Cross Borders Drove Road. This core path is being used increasingly by both local walkers, cyclists and horse riders as well as visitors from elsewhere in the Lothian/Borders region and long-distance walkers (it forms part of Scotland's National Trail, between Cape Wrath and Kirk Yetholm). Accordingly, we propose that there is an additional Assessment Viewpoint taking account of the impact on walkers travelling in a south easterly direction from Romanno towards Cloich, e.g. at GR 318600 646150.

In addition there is another important viewpoint on Grange Hill, just above the village of Lamancha, at GR 320150 651450, that should be used as a Proposed Assessment Viewpoint.

Yours faithfully

Redacted

Manor, Stobo & Lyne Community Council

Cloich Forest Wind Farm: Comments on Scoping Report

1. Discussion with EDF

   A small group representing three Community Councils – Eddleston; Lamancha, Newlands & Kirkurd; and Manor Stobo & Lyne – plus some local residents met with the EDF Project Manager and others representing EDF in the second week of November. We discussed many of the issues covered in these comments at that meeting. In particular, we emphasised that the Environmental Assessment should not assume that matters had been adequately covered by the EA prepared for the original Cloich Wind Farm proposal. The main issues are highlighted below, but the broader point is that the original EA was extremely weak on visual impact, water supplies and noise. Hence, we suggested that the developers should proceed as if this were an entirely new proposal, especially with respect to these issues.

   The discussion at that meeting and the Scoping Report itself were discussed at a recent meeting of the Community Council, so the comments below reflect the agreed position of the Community Council with respect to the ground that should be covered in the EA for the new proposal.

   This comment also covers the concerns that have been expressed by Borders Online Ltd, which operates a community wireless broadband network, about possible interference with existing radio links that are critical to its service.

2. Landscape impact and viewpoints

   Manor Lyne & Stobo CC is particularly concerned about the impact of the proposed wind farm as viewed from the National Scenic Area which is barely 2 km from the edge of the development sight. With turbines that are substantially larger than those originally proposed, the view from White/Black Meldon will be interrupted by turbines to a much greater extent. Thus, a careful assessment of the visual impact is essential and should be supported by properly prepared photo-montages. The original montages were shown to be quite inadequate at the planning inquiry.

   We are concerned about the limited number and location of the viewpoints that are proposed in the Scoping Report. In particular, we believe that there should be additional viewpoints at/on:

   (a) The Old Drove Road to the South-West of the development site, where the route skirts the edge of the site and of Cloich Forest.

   (b) To the West of the development site near to the Vodafone mobile phone mast on the ridge above Lamancha, as many people walk there regularly.

   (c) To the North of the development site near to at least one of the settlements at Wester Deans, Spylaw and Cowieslinn. All of these are linked by the road that runs from Whim to

Shiplaw, so that a viewpoint on this road – perhaps close to the 90° bend at the Cowieslinn junction – might be the best option.

3. Water supplies

There is a large amount of concern about the potential impact of the development on private water supplies served by springs that originate in the Cloich Hills. This issue was a major issue when the original Cloich wind farm proposal was considered. The consent included a condition requiring further investigation which has never been followed up. The new proposal will involve more disturbance to hydrology and ground conditions in order to accommodate larger turbines, so that the threat is significantly greater. Investigations necessary to establish a baseline and remedies in the event of impacts on private water supplies are, thus, even more urgent. It is essential that this work should be done in advance of a final decision on the application being made.

The statement of proposed work in Section 9.3.6 of the Scoping Report is completely inadequate. There are many more private water supplies at risk than are acknowledged in the Scoping Report. At the original inquiry it became clear that 40-50 properties were at risk from the impact of the original proposal, most of which had not been identified nor properly investigated. Not only is this a matter of the potential impact on residents in houses around the site but also the reliance of large numbers of livestock on such water supplies – and, of course, the associated farm businesses.

With ample warning and a substantially larger amount of ground works proposed, it would be entirely unreasonable if the new EA does not (a) fully investigate the potential impact on private water supplies, (b) specify what steps will be taken to mitigate any potential impacts, and (c) clarify the measures that will be implemented if, notwithstanding (b), the wind farm does in fact compromise the quantity or quality of water from private water supplies.

4. Noise

Again, the Scoping Report is casual to the extent of sloppiness about the potential impact of noise. It was established for the previous consent that ETSU noise limits cannot be met at Upper Stewarton with smaller turbines, while the situation of properties at Nether Stewarton was marginal at best. At that time the owners of Upper Stewarton used it only rarely and were reluctant to object because of that. However, it is a property that has been occupied full time in the past and may be again in the future. In addition, the cottage called Whitelawburn Cottage was not occupied at the time of the original assessment but it is occupied now. It is a well-established principle that noise and other conditions should protect both current and future residents, so the EIA should include a full noise assessment for these properties.

5. Radio interference

The consultants appear to be unaware that the turbines, especially larger ones, may interfere with key links in the community wireless broadband network that has been operated and extended by Borders Online Ltd in this area since 2014. This network is much more important to

local residents than the networks operated by most of the proposed consultees. Arcus should ensure that they have detailed discussions with Borders Online before finalising the proposed siting for the turbines. We accept that it is usually possible to minimise interference by appropriate siting of turbines, but it is essential that this matter is addressed at an early stage before designing the turbine layout that is proposed

6. Turbine layout

While it is rare for consultees to question the design decisions made by developers, it is important to point out that the proposed turbine layout is utterly daft. The physics of wind flows has been studied in detail because of concerns about the impact of turbines on the wind flow for neighbouring turbines. These interactions give rise to what are called wake and blockage effects. These are sufficiently important that Orsted (formerly Dong Energy) has recently lost nearly 10% of its market value when it admitted publicly that it will not be able to meet its target output levels for large offshore wind farms because the impact of wake and blockage effects was larger than they had forecast.

The standard advice based on modelling and experimentation is that the distance between turbines should be at least 8 times the blade diameter. For the proposed candidate turbine this would be at least 950 meters. Notwithstanding this advice, the proposed layout shows turbines that are less than 600 meters apart in the direction of the prevailing winds and little more than 500 meters in other directions.

This is not just bad engineering design but a grotesque misuse of the site. The loss in output due to wake and other effects is likely to be about 15% - i.e. the current layout will produce no more output than a better designed layout with 11 or 12 turbines.

While matters of technical design are usually left to developers, this is a critical issue in land use planning. It makes no sense to accept a layout that is so inefficient that its visual and other impacts are far larger than those of a better conceived and implemented project.

Redacted

Redacted Manor Stobo & Lyne Community Council

21st November 2019

marinescotland

Scottish Government
Riaghaltas na h-Alba
gov.scot

T: +44 (0)131 2442900
[redacted]

A45

Ms Debbie Flaherty
Energy Consents Unit
Scottish Government
5 Atlantic Quay
150 Broomielaw
Glasgow
G2 8LU

Our ref: FL/1-7

October 23rd 2019

Dear Debbie,

CLOICH FOREST WIND FARM, SCOTTISH BORDERS

Thank you for seeking advice from Marine Scotland Science (MSS) on the scoping report for the proposed Cloich Forest wind farm in relation to freshwater and diadromous fish and fisheries.

MSS advises that the developer consults our generic scoping guidelines (https://www2.gov.scot/Topics/marine/Salmon-Trout-Coarse/Freshwater/Research/onshoreren) paying particular attention to the following:

- that the River Tweed is an SAC with salmon being a qualifying feature for this designation status;
- the advice to carry out site characterisation surveys of watercourses potentially impacted as a result of the proposed development, as outlined in our scoping guidelines, and following our guidance relating to survey/monitoring (as also outlined in the above web site) notably in our recommendation regarding fully quantitative electrofishing surveys;
- the advice to consider the potential cumulative impacts on the water quality and fish populations associated with adjacent developments (operational and consented);
- the advice to consider the potential impacts on the water quality and fish populations associated with any proposed felling operations; and

- the advice to contact the Tweed District Salmon Fishery Board and the Tweed Foundation, if not already done so, for further information on local fish populations.

Kind regards,

Dr Emily E. Bridcut

Freshwater Fisheries Laboratory, Faskally, Pitlochry, Perthshire
PH16 5LB,
www.gov.scot/marinescotland

Melrose J (Joyce)

From: NATS Safeguarding <NATSSafeguarding@nats.co.uk>
Sent: 15 October 2019 11:41
To: Econsents Admin
Cc: NATS Safeguarding
Subject: RE: Cloich Forest Wind Farm, west of Peebles, Scottish Borders - Scoping Consultation (SG10504)

Dear Tony

The proposed development has been examined from a technical safeguarding aspect and does not conflict with our safeguarding criteria. Accordingly, NATS (En Route) Public Limited Company ("NERL") has no safeguarding objection to the proposal.

However, please be aware that this response applies specifically to the above consultation and only reflects the position of NATS (that is responsible for the management of en route air traffic) based on the information supplied at the time of this application. This letter does not provide any indication of the position of any other party, whether they be an airport, airspace user or otherwise. It remains your responsibility to ensure that all the appropriate consultees are properly consulted.

If any changes are proposed to the information supplied to NATS in regard to this application which become the basis of a revised, amended or further application for approval, then as a statutory consultee NERL requires that it be further consulted on any such changes prior to any planning permission or any consent being granted.

Yours faithfully

NATS Safeguarding

E: natssafeguarding@nats.co.uk

4000 Parkway, Whiteley,
Fareham, Hants PO15 7FL
www.nats.co.uk

Community Council of the Royal Burgh of Peebles & District

27 October 2019

Tony Young | Senior Case Officer | Energy Consents Unit Scottish Government |

Cc Ian Watson
Community Liaison Manager
Cloich Forrest Windfarm
EDF Renewables

Cloich Forrest Windfarm – EDF Renewables

Being in receipt of your e-mail dated 11 October requesting comment by 01 November and subsequently the email dated 23 October from Iain Watson on behalf of EDF renewables we would comment as follows.

Historically, we, the Community Council objected to the development based on its impact on the visual amenity in relation to Peebles, i.e. the development will be visible to residents and visitors from significant parts of the town and thus impact upon the feel of the of the area. This is particularly the case as Peebles is nestled in unspoilt countryside. Of equal concern was that the visitor "gateway" impression will be severely impacted as the development will dominate the horizon for those travelling down from Edinburgh and will also visible all the way from just south of Leadburn.

Naturally, our position is unchanged in this respect, but we do recognise that approval was granted and consequently a development will take place. We welcome the proposed reduction in the number of masts. However, there is concern as to the increase in unit size and the potential for a corresponding greater impact. Beyond this we cannot comment at present until we have had an opportunity to review the details demonstrated in the proposed public exhibition and consider the findings of the environmental impact statement.

Yours sincerely

Redacted

Planning Convener

Redacted

ScotWays
Upholding public access

Econsents_Admin@gov.scot

Tony Young
Senior Case Officer
Energy Consents Unit
The Scottish Government

29/11/2019

Dear Mr Young,

ELECTRICITY ACT 1989 SECTION 36
THE ELECTRICITY WORKS (ENVIRONMENTAL IMPACT ASSESSMENT) (SCOTLAND) REGULATIONS 2017
SCOPING OPINION REQUEST FOR PROPOSED APPLICATION UNDER SECTION 36 FOR CLOICH FOREST WIND FARM, IN THE PLANNING AUTHORITY AREA OF SCOTTISH BORDERS

Thank you for the opportunity to comment at scoping on the approach to be taken by EDF for a re-working of the turbine layout for the consented Cloich Forest Wind Farm. Thanks also for allowing a delay on our reply, as we are hard pressed at present over other consultations. ScotWays was an objector to the earlier scheme, so we are aware of the sensitivities and the need for care in any re-design.

You ask for a response in your preferred format with site specific comments or observations at the beginning of our response with general observations to follow.

Site specific comments

Baseline
The National Catalogue of Rights of Way shows rights of way BT6, BT10, BT40 and BT41 appear to be affected by the area outlined in red on *Site Location Figure 1*. BT40 is recorded as an equestrian right of way. A map is enclosed showing the rights of way highlighted in bold. As there is no definitive record of rights of way in Scotland, there may be other routes that meet the criteria to be rights of way but have not been recorded as they have not yet come to our notice.

The *Heritage Paths* project promotes two routes affected by the proposed application: the *Cross Borders Drove Road* and the *Post Road through the Meldons.* The *Cross Borders Drove Road,* which uses BT40, is also promoted by the *Tweed Trails* initiative as part of a long distance equestrian route, and has been designated by Scottish Natural Heritage as one of *Scotland's Great Trails*. These historic routes have been highlighted in green on the enclosed map.

Additionally, our popular book *Scottish Hill Tracks* describes routes which utilise this network of recorded rights of way and other routes. For ease of reference these are highlighted in pink on the enclosed map.

You will no doubt be aware that there may now be general access rights over any area of land under the terms of the Land Reform (Scotland) Act 2003. If they have not already done so we would strongly recommend that the applicant consults the Core Paths Plan, prepared by Scottish Borders Council's access team as part of their duties under this Act.

Turbine layout

We would like to comment briefly on the generalities of the new draft turbine layout. In plan view, the revised proposal has a broadly similar footprint to the consented scheme, although the turbines are larger, being 30m taller at blade tip height, and the estimated number of turbines - at 14 - is smaller by four. In looking more closely at the revised layout, the turbines are more regularly spaced with greater distance between them, no doubt for the efficiency needs of their larger size. One significant change is that the layout is now more directed to the western side of the Cloich ridge. To a lesser extent, the current version of the layout also retreats from the north, but most of the highest positioned turbines are to be found at the north and south ends of the layout, these being turbines 1, 2, 4 and 14 to the north, and at the southern end, 12 and 13. Where it is possible to make comparison with nearby turbines on the consented scheme, the new locations all exceed at top height what they are to replace, even though the highest topographic sites used in the consented scheme have been avoided. We note also that the diameter of the rotor sweep for the new turbines is larger in proportion to the turbine tower, and this may prove to be a factor in causing adverse visual impact.

Although we understand that there is very little guidance regarding the siting of turbines in relation to established paths and rights of way, we would like to draw your attention to the following:

Extract from the Welsh Assembly Government's Technical Advice Note on Renewable Energy (TAN 8)

Proximity to Highways and Railways

2.25 It is advisable to set back all wind turbines a minimum distance, equivalent to the height of the blade tip, from the edge of any public highway (road or other public right of way) or railway line.

As right of way BT40 is recorded as an equestrian right of way we would strongly recommend consulting the British Horse Society Scotland as their guidance regarding separation distance may differ from that set out above.

Our remaining site specific comments fall under two main headings: the landscape implications and the implications for public enjoyment of open-air recreation.

Landscape issues

We judge that the use of taller turbines, along with larger blade sweeps will cause greater visual impact than the consented proposal, both locally and at a distance. It is not easy to assess in detail the extent of this added impact by comparison of the visual impact maps for the consented and the draft revised schemes. There are differences in the detail of layout, and the four categories of turbines used in depiction of visibility on these maps are not quite in accord one with the other. The assessment of change in visual impacts needs wire-line diagrams to assist comparison, and this needs a sufficient number of the same viewpoints as used in the first application.

We expect the main landscape issues to be as follows:

- The hill ridge of Cloich, on which the forest has been planted, is quite modest in height as a site for large turbines on its limited area of higher ground. That was the case argued by a number of respondents to the first application. Earlier capacity assessment done for the Council suggested that this site might be appropriate for some modest wind development, but below the scale that was consented. We expect that the turbines located at the north and south ends of the new layout will be dominant features.

- Cloich is also isolated in its local setting, standing apart from and overlooked by both the Pentlands to the west and the Moorfoots to the east, with the impacts on the Pentlands being the more important, given its Regional Park status. Cloich is also flanked by busy public roads from which the relatively close views need assessment.

- Immediately to the south lies the Upper Tweeddale National Scenic Area. The suite of National Scenic Areas is strong in its selection of high mountainous areas of north and northwest Scotland, but it is equally weak on valued settings that focus more on the cultural amenity of designed landscapes on low-ground. However, this NSA is more than low ground, it being a choice that places the well-managed low ground within its upland setting. The scoping document statements about the NSA refer to identifying effects on its special qualities. But it is the integrity of the designation that has to be respected.

In a wider strategic sense, the consented Cloich scheme is a significant intrusion into a part of the Borders that is relatively free from wind power development, and where the quality of the setting is endorsed by having NSA designation - a distinctive choice that represents the best of the Tweed basin. The statutory basis for decisions on landscape comes from the Electricity Act requirement on care for landscape by developers. This is backed in Scotland by the obligations on all public bodies for the protection of natural beauty and amenity in the Countryside Act 1967, carried forward into the 1991 Natural

Heritage (Scotland) Act, as amended, and which also underpins the role and purposes of the relevant national agency - SNH.

Recreation and Tourism

Open-air recreation is seen in the scoping statement as an economic issue, which is often the case in EA statements. While local dependent businesses might agree, the reality is that this is not how the participants in outdoor activities approach their recreation: their interest lies in the enjoyment of fine outdoor settings, where they are the customers for the qualities of these places and their recreational value. This upper sector of the Tweed catchment is a setting with high recreational value, which is based on the scenic quality of the area; on its adjacency and accessibility to the Edinburgh conurbation for day trips; by the range of recreational opportunities; and by the quality of the support facilities for enjoyment of the outdoors.

These important issues are backed by a high volume of recreational activity in the ambit of Peebles, some of it being the more active pursuits, say the provisions for mountain biking by the Forestry Commission in its adjacent Borders Forest Park. But much of the attraction is for more conventional outdoor pursuits, using the good provision of path networks, forest walks, and the local viewpoint hills. On the higher hills to the south there is attractive terrain for enjoying the ascent onto remoter settings, and there is the long-distance Cross Borders Drove Road which runs through the development site at the Courhope passage over the Cloich Hills, and with more large turbines in place along this crossing. It is important to not further affect the underlying quality of what people come to enjoy - its fine scenic setting.

Some General Comments

The proposals set out in the Scoping Report are for a perhaps constrained EIS, but following the main elements of the conventional approach, and given that there is an existing consent. We are content broadly to go along with this approach, although our interests do not extend to the full content of the EIS and other interests may not agree. There are three further issues, as follows:

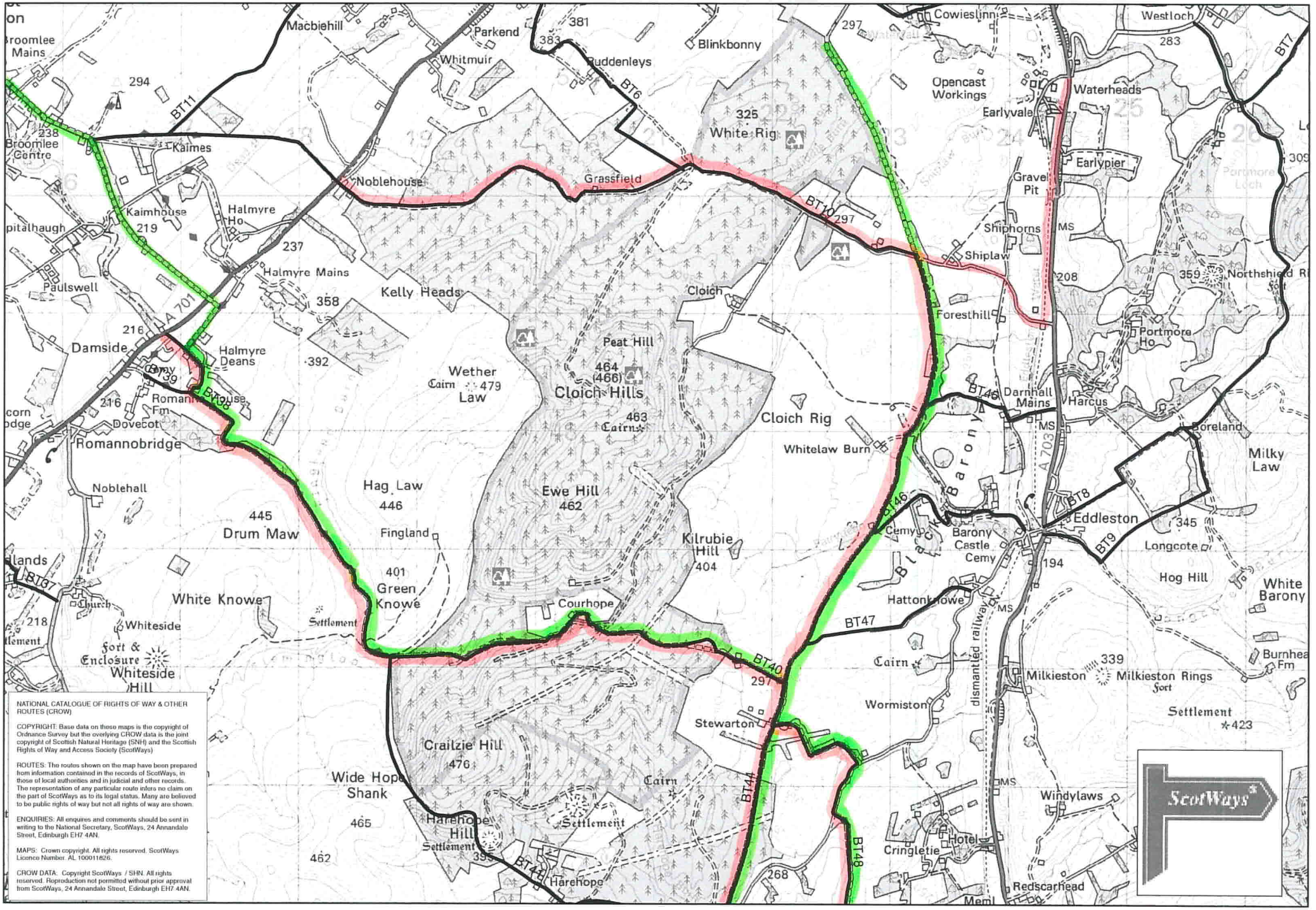
- First, the proposal to set aside issues judged to be unimportant or previously resolved has to be clear in what is intended, and such judgements should also to be open to challenge.
- We comment above on the need for some consistency of viewpoints for the new proposals with those used for the consented scheme, this to allow for fair comparison on impacts using the more detailed visual evidence to be provided in the full EIS. Assuming that the principal parties agree, we are content that these bodies take the lead in the identification of a balanced selection of viewpoints, matching those used in the original assessment, and with such additions as are thought necessary.
- We do not recognise the LVIA as providing a satisfactory approach to care for the interests of people involved in active open-air recreation.

The applicant appears, from some statements in the scoping document, to be taking a stance that their proposal will not be unduly problematic. We cannot agree, on the basis of the sensitivities attached to this case, as indicated above, and given the national landscape significance of this part of the Tweed catchment.

I hope the information above is useful to you. Please do not hesitate to contact me if you need more detail or have any further queries.

Yours sincerely,

Lynda L Grant
Access Officer



NATIONAL CATALOGUE OF RIGHTS OF WAY & OTHER ROUTES (CROW)

COPYRIGHT: Base data on these maps is the copyright of Ordnance Survey but the overlying CROW data is the joint copyright of Scottish Natural Heritage (SNH) and the Scottish Rights of Way and Access Society (ScotWays)

ROUTES: The routes shown on the map have been prepared from information contained in the records of ScotWays, in those of local authorities and in judicial and other records. The representation of any particular route infers no claim on the part of ScotWays as to its legal status. Many are believed to be public rights of way but not all rights of way are shown.

ENQUIRIES: All enquires and comments should be sent in writing to the National Secretary, ScotWays, 24 Annandale Street, Edinburgh EH7 4AN.

ScotWays

A54

15th October 2019

Scottish Government
5 Atlantic Quay, 150 Broomielaw
Glasgow
G2 8LU

Development Operations
The Bridge
Buchanan Gate Business Park
Cumbernauld Road
Stepps
Glasgow
G33 6FB

Development Operations
Freephone Number - 0800 3890379
E-Mail - DevelopmentOperations@scottishwater.co.uk
www.scottishwater.co.uk

Dear Mr Tony Young

EH45 Scottish Borders Wind Farm Cloich
PLANNING APPLICATION NUMBER: ECU00001956
OUR REFERENCE: 783846
PROPOSAL: Wind Farm

Please quote our reference in all future correspondence

Scottish Water has no objection to this planning application; however, the applicant should be aware that this does not confirm that the proposed development can currently be serviced and would advise the following:

Water

- Unfortunately, according to our records there is no public Scottish Water, Water infrastructure within the vicinity of this proposed development therefore we would advise applicant to investigate private options.

Foul

- Unfortunately, according to our records there is no public Scottish Water, Waste Water infrastructure within the vicinity of this proposed development therefore we would advise applicant to investigate private treatment options.

Drinking Water Protected Areas

A review of our records indicates that there are no Scottish Water drinking water catchments or water abstraction sources, which are designated as Drinking Water Protected Areas under the Water Framework Directive, in the area that may be affected by the proposed activity.

Surface Water

For reasons of sustainability and to protect our customers from potential future sewer flooding, Scottish Water will **not** accept any surface water connections into our combined sewer system.

There may be limited exceptional circumstances where we would allow such a connection for brownfield sites only, however this will require significant justification taking account of various factors including legal, physical, and technical challenges. However it may still be deemed that a combined connection will not be accepted. Greenfield sites will not be considered and a connection to the combined network will be refused.

In order to avoid costs and delays where a surface water discharge to our combined sewer system is proposed, the developer should contact Scottish Water at the earliest opportunity with strong evidence to support the intended drainage plan prior to making a connection request. We will assess this evidence in a robust manner and provide a decision that reflects the best option from environmental and customer perspectives.

General notes:

- **Scottish Water asset plans can be obtained from our appointed asset plan providers:**

  Site Investigation Services (UK) Ltd
  Tel: 0333 123 1223
  Email: sw@sisplan.co.uk
  www.sisplan.co.uk

- Scottish Water's current minimum level of service for water pressure is 1.0 bar or 10m head at the customer's boundary internal outlet. Any property which cannot be adequately serviced from the available pressure may require private pumping arrangements to be installed, subject to compliance with Water Byelaws. If the developer wishes to enquire about Scottish Water's procedure for checking the water pressure in the area then they should write to the Customer Connections department at the above address.

- If the connection to the public sewer and/or water main requires to be laid through land out-with public ownership, the developer must provide evidence of formal approval from the affected landowner(s) by way of a deed of servitude.

- Scottish Water may only vest new water or waste water infrastructure which is to be laid through land out with public ownership where a Deed of Servitude has been obtained in our favour by the developer.

- The developer should also be aware that Scottish Water requires land title to the area of land where a pumping station and/or SUDS proposed to vest in Scottish Water is constructed.

- **Please find all of our application forms on our website at the following link https://www.scottishwater.co.uk/business/connections/connecting-your-property/new-development-process-and-applications-forms**

Next Steps:

- **Single Property/Less than 10 dwellings**

For developments of less than 10 domestic dwellings (or non-domestic equivalent) we will require a formal technical application to be submitted directly to Scottish Water or via the chosen Licensed Provider if non domestic, once full planning permission has been granted. Please note in some instances we will require a Pre-Development Enquiry Form to be submitted (for example rural location which are deemed to have a significant impact on our infrastructure) however we will make you aware of this if required.

- **10 or more domestic dwellings:**

  For developments of 10 or more domestic dwellings (or non-domestic equivalent) we require a Pre-Development Enquiry (PDE) Form to be submitted directly to Scottish Water prior to any formal Technical Application being submitted. This will allow us to fully appraise the proposals.

  Where it is confirmed through the PDE process that mitigation works are necessary to support a development, the cost of these works is to be met by the developer, which Scottish Water can contribute towards through Reasonable Cost Contribution regulations.

- **Non Domestic/Commercial Property:**
  Since the introduction of the Water Services (Scotland) Act 2005 in April 2008 the water industry in Scotland has opened up to market competition for non-domestic customers. All Non-domestic Household customers now require a Licensed Provider to act on their behalf for new water and waste water connections. Further details can be obtained at www.scotlandontap.gov.uk

- **Trade Effluent Discharge from Non Dom Property:**
  Certain discharges from non-domestic premises may constitute a trade effluent in terms of the Sewerage (Scotland) Act 1968. Trade effluent arises from activities including; manufacturing, production and engineering; vehicle, plant and equipment washing, waste and leachate management. It covers both large and small premises, including activities such as car washing and launderettes. Activities not covered include hotels, caravan sites or restaurants.
  If you are in any doubt as to whether or not the discharge from your premises is likely to be considered to be trade effluent, please contact us on 0800 778 0778 or email TEQ@scottishwater.co.uk using the subject "Is this Trade Effluent?". Discharges that are deemed to be trade effluent need to apply separately for permission to discharge to the sewerage system. The forms and application guidance notes can be found using the following link https://www.scottishwater.co.uk/business/our-services/compliance/trade-effluent/trade-effluent-documents/trade-effluent-notice-form-h
  Trade effluent must never be discharged into surface water drainage systems as these are solely for draining rainfall run off.
  For food services establishments, Scottish Water recommends a suitably sized grease trap is fitted within the food preparation areas so the development complies with Standard 3.7 a) of the Building Standards Technical Handbook and for best management and housekeeping practices to be followed which prevent food waste, fat oil and grease from being disposed into sinks and drains.
  The Waste (Scotland) Regulations which require all non-rural food businesses, producing more than 50kg of food waste per week, to segregate that waste for separate collection. The regulations also ban the use of food waste disposal units that dispose of food waste to the public sewer. Further information can be found at www.resourceefficientscotland.com

If the applicant requires any further assistance or information, please contact our Development Operations Central Support Team on 0800 389 0379 or at planningconsultations@scottishwater.co.uk.

Yours sincerely

Pamela Strachan
Planning Consultations Administrator

Development Management and Strategic Road Safety
Roads Directorate

Buchanan House, 58 Port Dundas Road, Glasgow G4 0HF
Direct Line: 0141 272 7379, Fax: 0141 272 7350
gerard.mcphillips@transport.gov.scot

TRANSPORT SCOTLAND
CÒMHDHAIL ALBA

A59

Your ref:
ECU00001956

Our ref:
TS00538

Date:
22/10/2019

Tony Young
Energy Consents Unit
The Scottish Government
5 Atlantic Quay
150 Broomielaw
Glasgow
G2 8LU

Econsents_Admin@gov.scot

Dear Sirs,

ELECTRICITY ACT 1989

THE ELECTRICITY (APPLICATIONS FOR CONSENT) REGULATIONS 2017

SCOPING OPINION REQUEST FOR PROPOSED APPLICATION UNDER SECTION 36 FOR CLOICH FOREST WIND FARM, IN THE PLANNING AUTHORITY AREA OF SCOTTISH BORDERS

With reference to your recent correspondence on the above development, we acknowledge receipt of the EIA Scoping Report (SR) prepared by Arcus Consultancy Services Ltd in support of the above development.

This information has been passed to SYSTRA Limited for review in their capacity as Term Consultants to Transport Scotland – Roads Directorate. Based on the review undertaken, we would provide the following comments.

Planning History

Section 36 consent and deemed planning permission for Cloich Forest Wind Farm was granted following a Public Local Inquiry (PLI) on 8th July 2016. The consented wind farm comprised 18 turbines with a blade tip height of 115m and a rotor diameter of 90m. Site access was proposed to be taken from the A703.

It is noted that the Applicant is proposing to submit a new application for a re-designed development which is expected to be different in terms of scale, turbine numbers and locations from the existing consent.

Proposed Development

The revised design comprises up to 14 turbines with a blade tip height of 145m and a rotor diameter of 117m. The application site is located approximately 5.5km north-west of Peebles with the nearest trunk road being the A702(T) located approximately 7km to the west.

Access to the site continues to be proposed from the A703. As this forms part of the local road network, Transport Scotland has no comment to make on the access point itself.

Abnormal Loads Assessment

While the number of turbines has been reduced from the Extant Consent, we note that their size has increased from 115m to 145m. Transport Scotland will, therefore, require to be satisfied that the larger turbine components can negotiate the selected abnormal loads route, and that their transportation will not have any detrimental effect on structures within the trunk road route path.

The SR indicates that an Abnormal Load Route Assessment (ALRA) will be undertaken for the revised turbine specification, and that this will be used to inform and define the route to site. It will also indicate any road improvement works which are required to permit delivery.

We note that the SR states that this will include Swept Path Analysis "where required". Transport Scotland would request that a detailed review of the chosen route be undertaken, from the port of delivery through to the proposed site access point, and would request that details be provided with regard to any required works to the trunk road network including any changes to street furniture or structures. We would request that the ALRA be submitted with the EIA Report as a technical appendix.

Assessment of Environmental Impacts

The SR states that the potential environmental impacts associated with construction traffic will be considered and assessed where appropriate (i.e. where Institute of Environmental Management and Assessment Guidelines for further assessment are breached). We note that an assessment of effects on road safety, driver delay, pedestrian amenity, severance, noise and vibration will be undertaken as appropriate. Transport Scotland is satisfied with this approach, and would add that potential trunk road related environmental impacts will require to be considered and assessed where appropriate.

We would also state that where significant changes in traffic are not noted for any link, no further assessment needs to be undertaken. Where environmental impacts have been fully investigated but found to be of little or no significance, it is sufficient to validate that part of the assessment by stating in the report:

- The work that has been undertaken e.g. Transportation/ Noise / Air Quality Assessments etc;
- What this has shown i.e. what impact if any has been identified; and
- Why it is not significant.

It is not necessary to include all the information gathered during the assessment of these impacts although this information should be available if requested.

I trust that the above is satisfactory and should you wish to discuss any issues raised in greater detail, please do not hesitate to contact Alan DeVenny at SYSTRA's Glasgow Office on 0141 343 9636.

Yours faithfully
Redacted

Gerard McPhillips

Transport Scotland
Roads Directorate

cc Alan DeVenny – SYSTRA Ltd.

CLOICH FOREST WIND FARM

VOLUME 3: TECHNICAL APPENDICES

TECHNICAL APPENDIX A4.3:
ECU LETTER RESPONIDNG TO TIP HEIGHT INCREASE

JUNE 2021

Prepared By:

Arcus Consultancy Services

7th Floor
144 West George Street
Glasgow
G2 2HG

T +44 (0)141 221 9997 l **E** info@arcusconsulting.co.uk
w www.arcusconsulting.co.uk

Registered in England & Wales No. 5644976

Energy and Climate Change Directorate
Energy Division

T: 0131-242-1258
[redacted]

The Scottish Government
Riaghaltas na h-Alba

Fiona MacGregor
Arcus Consultancy Services Ltd
7th Floor,
114 West George Street
Glasgow
G2 2HG

17 February 2020

Dear Fiona

Cloich Forest Wind farm – Amendment to turbine tip height

Thank you for your letter dated 20 January 2019 informing Energy Consents Unit that your design for Cloich Forest wind farm has progressed to now include consideration of turbines of up to 149.9m to blade tip within the envelope to be assessed as part of the windfarm design. ECU have viewed the plans and note the increase in tip height.

As you are aware Part IIII of the Electricity Works (Environmental Impact Assess)(Scotland) Regulations 2017 provides for a voluntary scoping process, by which applicants may seek an opinion from the Ministers to determine the content and extent of matters to be covered in an environmental impact assessment and reported in the EIA Report which accompanies an application for consent. It should seek to identify the key issues to be considered in the assessment, identify those matters which can be scoped out or not addressed in detail and agree appropriate assessment methodologies. I note Scottish Ministers scoping opinion was issued on 18 December 2019. The scoping opinion is non-binding and does not preclude the Ministers as the consenting authority or any consultees from raising additional issues at a later date in the process.

I agree with your view that Environmental Impact assessment is an iterative process. The primary purpose of EIA scoping is to determine the environmental topics that are to be considered in an EIA. It is normal for project characteristics to change between scoping and application and various layout iterations should be presented within the final EIA Report depicting the various alternatives that have been considered, prior to the final layout being determined.

ECU note your intention not to re-scope but re-consult directly with relevant consultees on the revised design. Energy Consents agree with this approach.

May I request that any further responses received from consultees are forwarded to ECU for my attention.

Your letter of 20 January 2020 and this response will be published to our energy consents website at www.energyconsents.scot

Yours sincerely

Redacted

Debbie Flaherty
Energy Consents
For and on behalf of the Scottish Ministers
A member of the staff of the Scottish Government

CLOICH FOREST WIND FARM

VOLUME 3: TECHNICAL APPENDICES

TECHNICAL APPENDIX A4.4: TIP HEIGHT INCREASE CONSULTATION EXERCISE RESPONSES (JANUARY / FEBRUARY 2020)

JUNE 2021

Prepared By:

Arcus Consultancy Services

7th Floor
144 West George Street
Glasgow
G2 2HG

T +44 (0)141 221 9997 l **E** info@arcusconsulting.co.uk
w www.arcusconsulting.co.uk

Registered in England & Wales No. 5644976

[redacted]

From: Windfarms [redacted]
Sent: 24 January 2020 10:49
To: Fraser Clarke [redacted]
Cc: Fiona MacGregor [redacted] Ross MacKenzie [redacted]
Subject: WF33263 - Cloich Forest Wind Farm (ECU reference: ECU00001956) 5.5 kilometers (km) north-west of Pebbles, (Greenside, Lyne, The Scottish Borders, Scotland) T1 - T12 - NT 19661 45836

Dear Sirs,

I am responding to an email of 20-01-2020, regarding the above named proposed development.

The above application has now been examined in relation to UHF Radio Scanning Telemetry communications used by our Client in that region and we are happy to inform you that we have **NO OBJECTION** to your proposal.

Please note that this is **not** in relation to any Microwave Links operated by Scottish Water

Atkins Limited is responsible for providing Wind Farm/Turbine support services to TAUWI.

Atkins Limited is responsible for providing Wind Farm/Turbine support services
to the Telecommunications Association of the UK Water Industry. Web: www.tauwi.co.uk
Windfarm Support
ATKINS
The official engineering design services provider
for the London 2012 Olympic and Paralympic Games
Web: www.atkinsglobal.com/communications

[redacted]

From: [redacted]
Sent: 28 January 2020 16:22
To: Fraser Clarke
Cc: Fiona MacGregor; Ross MacKenzie
Subject: Fw: Cloich Forest Wind Farm - Amendment to Turbine Tip Height

---

From: Jackson,PD,Paul,TNS961 R on behalf of radionetworkprotection G
Sent: 28 January 2020 16:15
To: Fraser Clarke
Cc: Fiona MacGregor; Ross MacKenzie
Subject: RE: Cloich Forest Wind Farm - Amendment to Turbine Tip Height

OUR REF; WID11143 (Previous WID11076)

Dear Sir/Madam

Thank you for your email dated 20/01/2020.

We have studied this Windfarm proposal with respect to EMC and related problems to BT point-to-point microwave radio links.

The conclusion is that, the Project indicated should not cause interference to BT's current and presently planned radio network.

Paul Jackson
[redacted]

[redacted]

From: [redacted]
Sent: 28 January 2020 15:49
To: Fraser Clarke; Fiona MacGregor
Cc: Ross MacKenzie; [redacted]; Debbie Flaherty; [redacted]
Subject: Re: Cloich Forest Wind Farm

Good afternoon,
Following your e-mail of Monday 20 January, and the subsequent correspondence between Mr Christopher Walsh and Debbie Flaherty of the Energy Cosents Unit (for which please see the following e-mail chain) you will be aware that we do not expect a response from ECU on the question of seeking a full resubmission of a scoping request until after the provisional date for a consultation exercise in Eddleston on 18 or 19 February, 2020; that, you will appreciate, would render any such exercise meaningless. I therefore ask, on behalf of Eddleston and District Community Council (EDCC), that you now defer the consutation exercise until such time as we, the Community Council, local consultees and Scottish Borders Council have a response from ECU, and have had sufficient time to digest and understand that information, and its impact on the proposed development, and to promulgate it within our Community.
I also understand that your arrangement for that consultation was made with Eddleston Village Hall; that is a distinct organisation (and one which has no remit in planning matters) from EDCC, and I therefore request that any bid for a re-arranged date involve EDCC; EDCC will be content to help make local arrangements here on a mutually agreeable date.
Sincerely,
James Taylor
Chair, EDCC

[redacted]

From: Safe Guarding [redacted]
Sent: 29 January 2020 09:32
To: Fraser Clarke; Safe Guarding
Cc: Fiona MacGregor; Ross MacKenzie
Subject: RE: Cloich Forest Wind Farm - Amendment to Turbine Tip Height

Good morning Fraser,

Please be advised that this increase in height (from 145m-149.9m) has been assessed and does not conflicting with our aerodrome safeguarding criteria.

We therefore have no objection to this proposal.

Best regards,
Claire

Claire Brown | Safeguarding & Compliance Officer

Edinburgh Airport
Where Scotland meets the world

Edge | Empower | Expertise | Energy | Execute | External focus

Edinburgh Airport Limited
[redacted]

Fraser Clarke

From: Safeguarding [redacted]
Sent: 30 January 2020 14:47
To: Fraser Clarke; Safeguarding
Cc: Fiona MacGregor; Ross MacKenzie
Subject: RE: Cloich Forest Wind Farm - Amendment to Turbine Tip Height

Follow Up Flag: Follow up
Flag Status: Flagged

Good afternoon Fraser,

Thank you for your e-mail. I can confirm that this does not impact on our previous response and HIAL would not have any objections to this proposal.

Regards,

Safeguarding Team
Highlands and Islands Airports Limited
[redacted]

[redacted]

From: JRC Windfarm Coordinations [redacted]
Sent: 21 January 2020 10:17
To: Fraser Clarke
Subject: Cloich Forest Wind Farm - Amendment to Turbine Tip Height [WF122836]

Dear Fraser,

A Windfarms Team member has replied to your coordination request, reference **WF122836** with the following response:

Dear Sir/Madam,

***Site Name**:*

Cloich Forest Wind Farm (Jan 2020)

***Turbine at NGR**:*

Turbine	Easting	Northing
1	319661	645836
2	320150	645699
3	320525	646149
4	320951	646499
5	321212	646990
6	319956	647196
7	320464	647428
8	320322	647869
9	320914	648106
10	320826	648598
11	320264	648438
12	320227	648886

***Hub Height**: 100m **Rotor Radius**: 50m (we round up to nearest m)*

*This proposal ***cleared*** with respect to radio link infrastructure operated by:*

Scottish Power and Scotia Gas Networks

JRC analyses proposals for wind farms on behalf of the UK Fuel & Power Industry. This is to assess their potential to interfere with radio systems operated by utility companies in support of their regulatory operational requirements.

In the case of this proposed wind energy development, JRC does not foresee any potential problems based on known interference scenarios and the data you have provided. However, if any details of the wind farm change, particularly the disposition or scale of any turbine(s), it will be necessary to re-evaluate the proposal. Please note that due to the large number of adjacent radio links in this vicinity, which have been taken into account, clearance is given specifically for a location within the declared grid reference (quoted above).

In making this judgement, JRC has used its best endeavours with the available data, although we recognise that there may be effects which are as yet unknown or inadequately predicted. JRC cannot therefore be held liable if subsequently problems arise that we have not predicted.

It should be noted that this clearance pertains only to the date of its issue. As the use of the spectrum is dynamic, the use of the band is changing on an ongoing basis and consequently, you are advised to seek re-coordination prior to submitting a planning application, as this will negate the possibility of an objection being raised at that time as a consequence of any links assigned between your enquiry and the finalisation of your project.

JRC offers a range of radio planning and analysis services. If you require any assistance, please contact us by phone or email.

Regards

Wind Farm Team

[redacted]

We hope this response has sufficiently answered your query.
If not, please **do not send another email** as you will go back to the end of the mail queue, which is not what you or we need. Instead, **reply to this email keeping the subject line intact or login to your account** for access to your coordination requests and responses.

https://breeze.jrc.co.uk/tickets/view.php?auth=o1xomeaaab4jaaaakoXsxDXuwQu8yQ%3D%3D

Defence Infrastructure Organisation

Teena Oulaghan
[redacted]

Telephone [MOD]: [redacted]

E-mail: [redacted]

Your Reference: N/A

Our Reference: 13930

Fraser Clarke
Arcus Consulting

06 February 2020

Dear Fraser,

Proposal: Revised design of approved development (July 2016)- developer reassessing from 14 turbines at 145m to 12 turbines at 149.9m to blade tip

Thank you for consulting the Ministry of Defence (MOD) on the developers revised design of approved development in respect of the Cloich Forest Wind Farm proposal received in this office on 20th January 2020.

The MOD has assessed the application using the grid references detailed in Annex A below for 12 turbines, at a maximum height of 149.90 metres to blade tip, and has identified the following:

Air Traffic Control (ATC) Radar
The turbines will be 65.8 km from, detectable by, and will cause unacceptable interference to the ATC radar used by Spadeadam (Deadwater Fell).

Wind turbines have been shown to have detrimental effects on the performance of Primary Surveillance Radars. These effects include the desensitisation of radar in the vicinity of the turbines, and the creation of "unwanted" aircraft returns which air traffic controllers must treat as aircraft returns. The desensitisation of radar could result in aircraft not being detected by the radar and therefore not presented to air traffic controllers. Controllers use the radar to separate and sequence both military and civilian aircraft, and in busy uncontrolled airspace radar is the only sure way to do this safely. Maintaining situational awareness of all aircraft movements within the airspace is crucial to achieving a safe and efficient air traffic service, and the integrity of radar data is central to this process. The creation of "unwanted" returns displayed on the radar leads to increased workload for both controllers and aircrews and may have a significant operational impact. Furthermore, real aircraft returns can be obscured by a turbine's radar return, making the tracking of both conflicting unknown aircraft and the controllers' own traffic much more difficult.

MOD therefore has concerns with the revised development at Cloich Forest Wind Farm.

Eskdalemuir Seismological Recording Station

The proposed development falls within the statutory safeguarding area surrounding Eskdalemuir Seismological Recording Station. Scientific research has established that wind turbines of current design generate noise emissions that cause seismic vibrations which can interfere with the effective operation of the array. In order to ensure the United Kingdom can continue to implement its obligations in maintaining the Comprehensive Nuclear Test Ban Treaty, a noise budget has been allocated to regulate the development of wind turbines within a 50km radius of the array. The budget has been set at 0.336nm rms.

The noise budget required for this revised proposal exceeds the amount of budget previously allocated to the Cloich Forest Wind Farm application.

Therefore, the MOD has concerns with this proposal as it will exceed the allocated budget.

If the developer can overcome the issues stated above, the MOD will request that the perimeter turbines be fitted with MOD accredited 25 candela omni-directional red lighting or infrared lighting with an optimised flash pattern of 60 flashes per minute of 200ms to 500ms duration at the highest practicable point.

MOD Safeguarding wishes to be consulted and notified about the progress of planning applications and submissions relating to this proposal to verify that it will not adversely affect defence interests.

I hope this adequately explains our position on the matter. Further information about the effects of wind turbines on MOD interests can be obtained from the following website:

***MOD*:** https://www.gov.uk/government/publications/wind-farms-ministry-of-defence-safeguarding

Yours sincerely

Teena Oulaghan
Safeguarding Manager

Annex A

Turbine	Easting	Northing
1	319,661	645,836
2	320,150	645,699
3	320,525	646,149
4	320,951	646,499
5	321,212	646,990
6	319,956	647,196
7	320,464	647,428
8	320,322	647,869
9	320,914	648,106
10	320,826	648,598
11	320,264	648,438
12	320,227	648,886

[redacted]

From: NATS Safeguarding [redacted]
Sent: 21 January 2020 14:08
To: Fraser Clarke
Cc: NATS Safeguarding; Fiona MacGregor; Ross MacKenzie
Subject: RE: Cloich Forest Wind Farm - Amendment to Turbine Tip Height (SG10504)

Dear Fraser

The proposed development has been examined from a technical safeguarding aspect and does not conflict with our safeguarding criteria. Accordingly, NATS (En Route) Public Limited Company ("NERL") has no safeguarding objection to the proposal.

However, please be aware that this response applies specifically to the above consultation and only reflects the position of NATS (that is responsible for the management of en route air traffic) based on the information supplied at the time of this application. This letter does not provide any indication of the position of any other party, whether they be an airport, airspace user or otherwise. It remains your responsibility to ensure that all the appropriate consultees are properly consulted.

If any changes are proposed to the information supplied to NATS in regard to this application which become the basis of a revised, amended or further application for approval, then as a statutory consultee NERL requires that it be further consulted on any such changes prior to any planning permission or any consent being granted.

Yours faithfully

NATS

NATS Safeguarding

E: [redacted]

[redacted]

[redacted]

From: Spectrum Licensing [redacted]
Sent: 29 January 2020 14:24
To: Fraser Clarke
Subject: Ofcom case : 00845392 - Cloich Forest Wind Farm - Amendment to Turbine Tip Height [ref:_00D58H42o._5004lyfqjq:ref]
Attachments: 3439 Cloich Wind Farm - Amendment to Turbine Tip Height - OFCOM_pdf.html; 3439 Cloich Wind Farm - Enclosed Figures - Reduced_pdf.html

Classification: CONFIDENTIAL

Good Afternoon,

RE: Cloich Forest Wind Farm
REF: N/A

Thank you for contacting Ofcom. The windfarm process as originally developed was aimed at putting a windfarm developer and potentially impacted fixed link licensees in contact with each other. ?Beyond this Ofcom did / does not have any further involvement or enter into the co-ordination / planning discussions between the concerned parties. The same applies now that the fixed link licence information in the Ofcom managed and co-ordinated bands is provided via the Spectrum Information System. i.e. Ofcom does not enter into the discussions between windfarm and fixed link operators. ?

It should also be noted that while Ofcom provides information via the Spectrum Information System there are a number of bands that are now awarded on a block basis i.e. these bands are managed and assigned by the licensees themselves and the individual link information is not published on the SIS. Further information on these bands and the licensees details can be found here https://www.ofcom.org.uk/manage-your-licence/radiocommunication-licences/mobile-wireless-broadband/above-5ghz

If you have any further queries please do not hesitate to contact the Spectrum Licensing Team on [redacted] or via email at [redacted]

Kind regards,

Jack Dickinson

[redacted]

[redacted]

[redacted]

From: Steve Thomson [redacted]
Sent: 07 February 2020 08:07
To: Fraser Clarke
Cc: Fiona MacGregor; Ross MacKenzie; Safeguarding
Subject: RE: Cloich Forest Wind Farm - Amendment to Turbine Tip Height

Fraser

Our LOS analysis at an increased tip height of 149.9m still confirms that proposed development is terrain shielded from our primary radar.

Consequently Glasgow Prestwick Airport Ltd raises no aviation objections to this proposed development.

Kind Regards

Steve Thomson

Glasgow Prestwick Airport

Glasgow Prestwick Airport Ltd.
[redacted]

Steve Thomson
[redacted]

[redacted]

From: Miller, Craig [redacted]
Sent: 17 February 2020 16:54
To: Fraser Clarke
Subject: RE: Cloich Forest Wind Farm - Amendment to Turbine Tip Height

Fraser

I refer to your email detailing an amended layout, reduced number of turbines and higher tip heights from that submitted to the ECU for Scoping. I have been waiting to see the ECU response to you regarding the revision since the Scoping Scheme and now note they have written to you.

I have sought the views of colleagues who would be involved in advising on the Council response to any revised S36 application and they have stated the following:

Landscape Architect – "I have nothing further to add to my original scoping response. There is clearly a difference in turbine locations (as well as a reduction of two in number of turbines proposed and an increase in height of 5m) The ZTV shows an increased visual impact on north edge of Upper Tweeddale NSA as well as other (limited) increases elsewhere. The differences and consequent visual effects should be addressed in the LVIA – the area of additional visibility may correspond to a Core Path route, in an area popular for walking."

Roads Planning – "As confirmed by Arcus Consulting, there is to be no change to the assessment methodologies, therefore I have no further comments to make at this stage on the Scoping Request."

Environmental Health – Generic advice was initially sent with our Scoping response to the ECU but Environmental Health have now responded to state the following:

"Environmental Health expects that an EIA which is likely to follow this scoping process will include a full noise impact assessment and address the applicant's strategy to ensure the quality, quantity and continuity of nearby private water supplies is not negatively impacted. Review and comments will be provided on these matters when such information is received."

Heritage Officer – "I have reviewed the Scoping Opinion response provided by Dr Bowles on 13/11/2019 in response to the original scheme. I understand that the scheme in now proposed to be further altered with higher turbines, some reduction in numbers and an altered layout. At this stage of the process, I stand by the original response by Dr Bowles - effectively all the variables possible are been changed; height, numbers and location! I have extracted from the scoping response a key statement which remains very relevant:

The increase in turbine heights, albeit with a potentially positive decrease in numbers, has the potential to increase effects on the integrity of settings for both individual monuments and the historic landscape. It is important that all monuments assessed in the original application are assessed again in light of the new scheme. Additional monuments may fall into theoretical visibility and these too should be assessed. In addition, I feel we need a viewpoint from Macbeth's Castle in the Manor Valley as the forts, castles and later settlement/landscape features in the Manor, Meldon and Tweed valleys all form part of the same historic landscape where setting impacts are predicted."

Access Officer – no additional comments.

Ecology Officer – response to follow.

I note a number of changes in the layout which, when combined with the tip height increases, may necessitate consideration of additional viewpoints being provided with your S36 submission. Some of these have already been referred to by the Council Landscape Architect in her previous Scoping Response , such as at Haswellsykes and

Glentress. Looking at the Comparative ZTV, I would certainly recommend consideration of Viewpoints to cover the additional areas of visibility (if not already included as viewpoints or referred to by the Landscape Architect) at Kirkton Manor, the Stobo road junction with the A72, the Manor Valley, Traquair House, Bonnington Road in Peebles, Dawyck and the Meldons Road SW of Eddleston.

It is clear that the turbine positions and overall layout have changed since the original S36 Scoping submission. In part, the footprint has become more compact especially to the west, but it has increased turbines to the south and increased the gap around Courhope. From a number of viewpoints, this may lead to an impression of two groups of turbines rather than one, but this would be highlighted in the Viewpoints for consideration. Turbines 1-5 might, for example, be viewed distinctly in the landscape compared to the northern turbines. I also note that whilst the turbines are more compactly positioned in general, Turbines 5, 7 and 10 seem to be closer to hill summits on higher contours, compared to both the original consent and your Scoping submission. Given the increase in tip height, this may increase both visibility and the significance of the effects on the landscape and visual receptors.

I trust you will find these comments of assistance in preparing your Environmental Statement,

Regards

Craig

Craig Miller
[redacted]

Web | Twitter | Facebook | Flickr | YouTube

How are you playing #yourpart to help us keep the Borders thriving?

[redacted]

From: Miller, Craig [redacted]
Sent: 25 February 2020 08:54
To: Fraser Clarke
Subject: FW: Cloich Forest Wind Farm - Amendment to Turbine Tip Height 19/01489/SCO

Fraser

The missing response from the Ecology Officer – see below,

Regards

Craig

Craig Miller
[redacted]

Web | Twitter | Facebook | Flickr | YouTube

How are you playing #yourpart to help us keep the Borders thriving?

From: Tharme, Andy
Sent: 24 February 2020 16:46
To: Miller, Craig [redacted]
Subject: RE: Cloich Forest Wind Farm - Amendment to Turbine Tip Height 19/01489/SCO

Craig

My earlier response (14th November 2019) still applies. The revised turbine parameters will be required to be included in the Collision Risk Modelling for birds.

Regards

Andy

CLOICH FOREST WIND FARM

VOLUME 3: TECHNICAL APPENDICES

TECHNICAL APPENDIX A4.5: GATECHECK REPORT (AUGUST 2020)

JUNE 2021

Prepared By:

Arcus Consultancy Services

7th Floor
144 West George Street
Glasgow
G2 2HG

T +44 (0)141 221 9997 l **E** info@arcusconsulting.co.uk
w www.arcusconsulting.co.uk

Registered in England & Wales No. 5644976

CLOICH FOREST WIND FARM
GATECHECK REPORT

SEPTEMBER 2020

Prepared By:

Arcus Consultancy Services

7th Floor
144 West George Street
Glasgow
G2 2HG

T +44 (0)141 221 9997 l **E** info@arcusconsulting.co.uk
w www.arcusconsulting.co.uk

Registered in England & Wales No. 5644976

TABLE OF CONTENTS

1 INTRODUCTION

This Gatecheck Report (the Report) has been prepared by Arcus Consultancy Services Ltd (Arcus) on behalf of EDF Renewables (the Applicant). The Applicant is proposing to submit an application to the Scottish Government's Energy Consents Unit (ECU) under Section 36 of the Electricity Act 1989[1] to construct and operate a wind farm (the Development) within the Scottish Borders on land at Cloich Forest, located approximately 5.5 kilometres (km) northwest of Peebles and approximately 2.5 km west of Eddleston (the Site).

The Report sets out the information required by the ECU to undertake a gatecheck for the Development in compliance with the gatechecking procedure[2] as outlined by the ECU.

The purpose of this Report is to describe how the design of the Development has evolved since the pre-scoping stage. Highlighting influencing factors on the design either as a response to environmental constraints identified during the Environmental Impact Assessment (EIA) process or through consultation feedback from statutory or non-statutory consultees.

The Report sets out the following in line with the ECU gatechecking procedure:

- Description of the design evolution, highlighting key iterations;
- Interactions with statutory and non-statutory consultees during the EIA process, with a focus on the scoping comments and how these have been addressed;
- Description of community engagement undertaken to date; and
- Details of the forthcoming application including a timeframe for submission, advertisement requirements and proposed locations for the application to be publicly viewed.

[1] UK Government, 1989, Electricity Act 1989 [Online] Available at: http://www.legislation.gov.uk/ukpga/1989/29/contents (Accessed 27/08/2020)
[2] Gate-checking process for section 36 and section 37 applications [Online] Available at: https://www.gov.scot/policies/energy-infrastructure/energy-consents/ (Accessed 27/08/2020)

2 DESIGN OF THE DEVELOPMENT

2.1 The Site and Surrounding Area

The Site is centred on NGR 320514 647492 and covers an area of 1,085 hectares (ha); the extents and location are shown on Figure 1. The Site is entirely located within the administrative boundary of Scottish Borders Council ('the Council').

The Site predominantly comprises of commercial coniferous plantation at varying degrees of maturity, including areas of clear felling.

The topography of the Site and immediate vicinity is complex, with elevation ranging from approximately 280 metres (m) Above Ordnance Datum (AOD) in the north-east part of the Site to approximately 476 m AOD at the peak of Crailzie Hill in the south. Vegetation across the Site largely consists of forestry and open moorland. The Site encompasses the rolling Cloich Hills, including Peat Hill (466 m AOD), Ewe Hill (462 m AOD), White Rig (325 m AOD), and Crailzie Hill (476 m AOD). The hills are dissected by a number of watercourses, including Middle Burn, Flemington Burn, Martyr's Dean, Corehope Burn and Harehope Burn. Those watercourses that flow southwest feed into the Flemington Burn on the west of the Site and eventually feeds into the River Tweed. Those watercourses that flow down to the northeast of the Site feed into Middle Burn and Shiplaw Burn which feeds into Eddlestone Water and eventually the River Tweed.

No public roads are located within the Site, although there are number of existing good quality forest roads. The A701 runs to the west of the Site and the A703 runs to the east of the Site.

There are a number of residential properties surrounding the Site, with several located within 1 km.

Section 36 consent and deemed planning permission for Cloich Forest Wind Farm was granted following a Public Local Inquiry (PLI) on 8th July 2016 for 18 wind turbines with a tip height of 115m.

2.2 Design Evolution

The EIA is the key driver for the wind farm's design, providing information that guides its development. In identifying environmental sensitivities and constraints at the Site, they can be avoided in later versions of the wind farm layout. This iterative design process means that during EIA layouts change frequently; led by environmental considerations and validated by engineering reviews for turbine performance and constructability. The final layout that will be submitted for S36 consent and assessed in the EIA report will be the culmination of this process where many of the environmental constraints and sensitivities of the Site will be avoided.

The following sections provide a summary of the key stages in this process at Cloich Forest.

2.2.1 Consented Layout – July 2016: 18 Turbines x 115 m Tip Height

Section 36 consent and deemed planning permission for Cloich Forest Wind Farm was granted following a Public Local Inquiry (PLI) on 8th July 2016 by the Scottish Ministers, under reference number WIN-140-1 (Consented Development). The PLI held for Cloich was conjoined with an appeal for Hag Law Wind Farm which was proposed on land adjacent to Cloich Forest. The consent is subject to 27 conditions.

The EIA undertaken for the Consented Development and the discussion provided in the PLI Report set out a thorough understanding of the environmental issues relating to the Site and enabled the scope of the forthcoming EIA for the Development to be focussed on topics that are likely to experience significant effects.

The Consented Layout is presented on Figure 2.

2.2.2 Scoping Layout – October 2019: Up to 14 Turbines x 145 m Tip Height

Since the time of the submission of the planning application in October 2012 and the submission of Supplementary Environmental Information in January 2014, there have been changes in government financial support for renewables, prompting the Applicant to review the consented development. The need to produce a lower cost renewable electricity has led to wind turbines becoming taller, where substantial improvements in yield are achieved by using longer turbine blades.

The Scoping layout for the Development provided an update to the consented layout, to reflect larger turbine geometry and market requirements. The turbine tip height and general dimensions were increased to reflect current trends in wind turbine technology. Early stage landscape and visual work carried out by OPEN in 2018 considered a number of layouts and turbine sizes. The Reporters' Report [3]provides useful information as to the most sensitive landscape and visual receptors, and how the wind farm will affect these. In some cases, reference is made to locations where the lack of visibility of the wind farm has been important in their decision. The report also refers to locations where the appearance of the wind farm could be improved. The Scoping layout provided a balance between turbine size and spacing from key viewpoints including viewpoints in the National Scenic Area. As a result of increasing turbine height and general dimensions, the number of turbines was reduced by four turbines. A large turbine spacing was employed to allow flexibility in turbine choice and to allow for revision following subsequent wind data analysis. The following key known constraints where adhered to:

- Suitable separation distances between turbines based upon anticipated rotor diameters and prevailing wind direction, in order to reduce wake loss and issues associated with wind turbulence;
- 50 m buffer to known watercourses and waterbodies to reduce the likelihood of impacts as a result of pollution events, principally during construction;
- 160 m buffer to core paths;
- 160 m buffer of cultural heritage assets;
- 800 m buffer of Residential Properties;
- 500 m buffer of sensitive ornithological receptors;
- Areas of slope in excess of 14%;
- 250 m buffer of telecommunication links;
- 200 m buffer to public roads; and
- 100 m blade over-sail buffer on the site boundary.

The Scoping Layout is presented on Figure 3.

2.2.3 Design Iteration – January 2020: 12 Turbines x 149.9 m Tip Height

Following the Scoping process, and as part of the ongoing design process together with discussions with turbine manufacturers, the Applicant incorporated consideration of turbines up to 149.9 m to blade tip within the envelope to be assessed as part of the wind farm design to allow for greater flexibility in turbine choice.

A second round of consultation was carried out to allow consultees to comment on whether an increased tip height of 149.9 m would alter the scope of the assessment. Due to the larger rotor diameters, a layout consisting of 12 turbines was developed this is shown on Figure 4. The technical site constraints are restrictive and dictate the turbine positions to a large degree. The constraints limit the scope to move turbines around on-site with the majority of changes in the design arising from alteration to turbine numbers rather than

[3] Cloich Forest Wind Farm, Report to Scottish Ministers, February 2016: Available at: https://www.dpea.scotland.gov.uk/Document.aspx?id=349383

large scale movements of turbine positions. Consultee comments as a result of this further consultation exercise are presented in Appendix B.

This layout was presented at the 1st round Public Exhibitions in February 2020; more information on the 1st round public exhibitions is contained within Section 3.3.

2.2.4 Draft Design – March 2020: 12 Turbines x 149.9 m Tip Height

The draft layout consisted of 12 turbines at a height of 149.9 m; the layout incorporates rotor spacing requirements for a larger rotor diameter than the Scoping Layout, made possible by the 5 m increase in turbine height. A number of iterations took place between the Design Iteration Layout and this draft layout, taking into account the constraints identified during ongoing environmental surveys, with a specific focus on landscape and visual effects. Comments from consultees in relation to private water supplies and landscape and visual effects were key elements of the overarching design strategy at this stage.

The draft design layout also includes the initial design for the ancillary infrastructure relating to the Development including internal tracks, hardstanding areas and a construction compound. The Site is currently managed as a commercial forest plantation with substantial forestry tracks in place. The wind farm design has sought to minimise its footprint by making use of these existing tracks wherever possible.

The following environmental factors have been key drivers affecting the design following survey work which was conducted to establish an accurate baseline of the receiving environment.

2.2.4.1 Landscape and Visual

The Upper Tweeddale National Scenic Area (NSA) is recognised as being of particular sensitivity. As part of the design process each iteration of the design was reviewed from viewpoints within the NSA together with the views from other key landscape and visual receptors including the following areas:

- Effects on the special qualities of the SLAs in the immediate vicinity of the Site, including the Upper Clyde Valley and Tinto SLA; Tweedsmuir Uplands SLA; Tweed Valley SLA; Pentland Hills SLA; Pentland Hills and Black Mount SLA; and Gladhouse Reservoir and Moorfoot Scarp SLA;
- Visual effects on sensitive residential receptors within nearby settlements;
- Visual effects on receptors travelling along the road network;
- Visual effects, including cumulative, on sensitive recreational receptors using the core path network, long distance routes, and at nearby hill summits.

Initially 15 viewpoints were proposed for the Landscape and Visual Assessment, following EIA Scoping feedback from NatureScot (formerly Scottish Natural Heritage), Scottish Borders Council and Historic Environment Scotland a total of 26 viewpoints have been agreed for assessment within the EIA Report. The final viewpoint list is included in Appendix C.

2.2.4.2 Peat Depth

Following a peat depth survey, it was established that a majority of the Site is not underlain by peat, however isolated pockets of deep peat do exist particularly at the centre of the Site, towards the eastern extent of boundary. The layout sought to avoid deposits of deep peat where possible.

2.2.4.3 Ecological Receptors

Extensive ecological surveys undertaken across the Site generally recorded few protected species or sensitive habitats. There are generally no significant ecological constraints within

the Site; there are areas of potential Groundwater Dependant Terrestrial Ecosystems (GWDTEs), however, these have been considered fully and turbines are located a suitable distance away.

Although protected species were recorded, including low levels of bat activity and the presence of badger and otter (the latter likely associated with the hydrological connectivity with the River Tweed Special Area of Conservation (SAC)), no notable ecological sensitivities that cannot be avoided or appropriately mitigated have been recorded.

Good practice has been adopted to avoid disturbance to protected species or direct effects on sensitive habitats.

2.2.4.4 Ornithology Receptors

Surveys on and around the Site have been undertaken, the scope of which were agreed with NatureScot. Whilst there is relatively little activity within the Site, there are known sensitive ornithology receptors within 500 m of the Site, and suitable set-back distances have been adopted to avoid disturbance either during construction or operation. This will be covered a part of a confidential annex to the EIA Report.

2.2.4.5 Hydrological Receptors & Private Water Supplies

The Site has several watercourses running through it which were carefully considered when designing the layout with turbines positions sited outwith 50 m watercourse buffers. Watercourse crossings were minimised, as much as possible, and any watercourse crossings will be in accordance with best practice and SEPA guidelines.

2.2.4.6 Archaeological Features

There are several archaeological features located in and around the Site. The design has sought to avoid such features, as well as consideration of indirect effects to designated assets in the wider area.

Archaeological features subject to assessment has been agreed with Historic Environment Scotland (HES) as part of the EIA process. A full setting assessment of the agreed archaeological features will be undertaken in the EIA Report and appropriate mitigation, if required, will be included therein.

2.2.4.7 Noise

There are several residential receptors in close proximity to the Site. Turbine locations have been modelled to evaluate the potential for impacts to arise at these noise receptors. The Development has been designed to adhere to the conditioned noise limits for the Consented Development.

2.2.5 Draft Track Layout – August 2020: 12 Turbines x 149.9 m Tip Height

Minor changes to the layout occurred between the Draft Design layout and the latest design iteration and these were largely based on engineering feedback relating to detailed construction considerations within the established environmental constraints of the Site. The minor changes to the layout included micrositing turbines and more detailed track design. Subsequent minor changes were made to the alignment of hardstandings and tracks to minimise construction requirements (such as micrositing infrastructure to minimise footprint / excavated volumes, etc).

The draft track layout incorporates infrastructure elements not present on the scoping layout, this includes internal tracks, substation compound, temporary construction compound, and borrow pits. The Site contains an existing internal network of forestry tracks, and reusing these wherever possible has been a key design criteria.

The draft track layout is provided in Figure 5. The inclusion of Battery Energy Storage Systems (BESS) has been considered as part of the development and was included within the initial scope of the assessment. It has been confirmed that BESS will not be taken forward at this time.

Any further changes are anticipated to be limited. The current design has drawn upon our current understanding of the environmental and technical constraints of the site. However it should be noted that studies relating to Private Water Supplies and Ecology are ongoing. If these identify new or enhanced environmental sensitivities, they might lead to further design changes. Otherwise we do not envisage significant amendments to the turbine layout.

3 SCOPING AND CONSULTATION

3.1 Scoping

In line with Regulation 12 of The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 as amended ("the EIA Regulations"), the Applicant sought a Scoping opinion from the Scottish Ministers to confirm the scope of the required assessment which is to be provided in the EIA Report. A Scoping Report was submitted with the request for a Scoping opinion in October 2019 which described the Development, identified potential environmental effects and proposed methodologies to investigate and assess the significance of environmental effects. The Scoping Report was issued to a list of statutory and non-statutory consultees as agreed with the ECU, and listed below in Table 1.

A scoping opinion was received from the ECU on 18th December 2019.

Table 1: Scoping Opinion Consultee List

Consultee	Response Date
Statutory Consultees	
Scottish Borders Council	15/11/2019
Scottish Environment Protection Agency (SEPA)	30/10/2019
NatureScot (formerly Scottish Natural Heritage)	21/11/2019
HES	01/11/2019
Non-Statutory Consultees	
Atkins	05/11/2019
British Telecommunications Plc	21/10/2019
Defence Infrastructure Organisation	31/10/2019
Edinburgh – BAA Aerodrome Safeguarding	04/11/2019
Fisheries Management Scotland	25/10/2019
Glasgow Prestwick Airport	01/11/2019
Highlands and Islands Airport Limited	24/10/2019
John Muir Trust	15/10/2019
Joint Radio Company Limited	23/10/2019
Civil Aviation Authority - Airspace	No Response
Crown Estate Scotland	No Response
Scottish Forestry	No Response
Mountaineering Scotland	No Response
Marine Scotland	23/10/2019
NATS Safeguarding	15/10/2019
RSPB Scotland	No Response
Scottish Rights of Way and Access Society (ScotWays)	29/11/2019
Scottish Water	15/10/2019
Scottish Wild Land Group (SWLG)	No Response
Scottish Wildlife Trust	No Response
Transport Scotland	22/10/2019
Visit Scotland	No Response

Consultee	Response Date
Additional Consultees	
Eddleston & District Community Council	15/11/2019
Lamancha, Newlands and Kirkurd Community Council	18/11/2019
Manor, Stobo & Lyne Community Council	21/11/2019
Community Council of the Royal Burgh of Peebles & District	27/10/2019

Appendix A presents a table of scoping consultation responses.

The Applicant has sought to address the comments raised in the Scoping Opinion and subsequently by individual consultees through the ongoing EIA and site design process.

The Scoping Opinion and responses were considered by the project team and circulated to EIA specialists to be acted upon in the EIA process. Further discussions/consultations were held with consultees to ensure that their points are understood and addressed effectively within the EIA process.

The scope of the EIA was revised, where required, to ensure that the specific feedback and technical requests could be accommodated where appropriate.

3.2 Tip Height Increase

As previously stated, the Applicant wished to include consideration of turbines up to 149.9 m to blade tip within the envelope to be assessed as part of the wind farm design to allow for greater flexibility in turbine choice.

Arcus contacted EIA consultees regarding the 5 m increase in turbine tip heights under consideration so that they could make amendments to their previous scoping advice if necessary. Arcus' methodology and request letter is published on the ECU website[4] under the Reference: ECU00001956. This letter from the ECU acknowledging Arcus' methodology and confirmed that re-scoping was not required.

The further consultation exercise was issued to a list of consultees as agreed with the ECU, and are listed below in Table 2.

Table 2: Agreed Tip Height Increase Consultee List

Consultee	Response Date
Statutory Consultees	
Scottish Borders Council	17/02/2020 & 25/02/2020
NatureScot (formerly Scottish Natural Heritage)	Ongoing Consultation between 17/02/2020 & 20/7/2020
Non-Statutory Consultees	

[4] Scottish Government (2020) Energy Consents Unit [Online] Available at: https://www.energyconsents.scot/Default.aspx (Accessed 04/08/2020)

Consultee	Response Date
Atkins	24/01/2020
British Telecommunications plc	28/01/2020
Defence Infrastructure Organisation	06/02/2020
Edinburgh – BAA Aerodrome Safeguarding	29/01/2020
Glasgow Prestwick Airport	07/02/2020
Highlands and Islands Airport Limited	30/01/2020
Joint Radio Company Limited	21/01/2020
NATS Safeguarding	21/01/2020
Civil Aviation Authority – Airspace	No Response
OFCOM	No Response
Additional Consultees	
Eddleston and District Community Council	28/01/2020
Lamancha, Newlands and Kirkurd Community Council	No Response
Manor, Stobo & Lyne Community Council	No Response
Community Council of the Royal Burgh of Peebles & District	No Response

3.3 Community Engagement

Engagement with the local community has been a key element of the pre-application consultation exercise. Table 3 outlines the steps undertaken to keep the local community informed and involved with the process.

Table 3: Overview of Community Engagement to Date

Date	Exercise
April 2019	Attendance at meeting (11th April 2019) with Scottish Borders Council to outline project position and re-design plans.
August 2019	Introductory letters were sent to the community councils, including: • Eddleston & District Community Council; • Lamancha, Newlands and Kirkurd Community Council; • Royal Burgh of Peebles & District; and • Manor, Stobo & Lyne Community Council.
October 2019	Attendance at meeting at the Barony Hotel, Peebles, (31st October 2019) with Community Councils and two local residents. The conversations largely related to general discussion around initial proposal, public exhibitions and main EIA elements, including: Private Water Supplies (PWS); Landscape & Visual Impact; Noise; and Telecommunications.
February 2020	First stage public exhibitions held: • Newlands Activity Centre (Romanno Bridge), Tuesday, 18th February (3 pm – 7 pm) • Eddleston Village Hall (Eddleston), Wednesday, 19th February (3 pm – 8 pm) Advertised through EDF project website[5], newspaper adverts (Peeblesshire News), letters to community councils and letters to residents (within ~5 km of the Site).
February / March 2020	Planned meetings with the community council were unfortunately cancelled due to the COVID-19 pandemic; as the pandemic is ongoing, there is no rescheduled date.
Ongoing 2020	Since the February public exhibitions there has been extensive consultation/communication with the local community councils and residents relating largely to PWS. Further consultation was undertaken with Scottish Environment Protection Agency on the issues of PWS Risk Assessment Methodology; further details on this is contained within Section 3.4. There continues to be extensive consultation with community councils and local residents via email and telephone calls.

As detailed in Table 3 above, the first round of Public Exhibitions were undertaken before the COVID-19 pandemic; however, the Applicant is aware that there is a high likelihood that the COVID-19 pandemic will cause disruption to future community engagement, including the second round of public exhibitions.

As the COVID-19 pandemic is still an active concern, the Applicant will develop alternative arrangements to ensure community engagement is undertaken, likely via an online platform, in accordance with the Scottish Government's COVID-19 advice and guidelines[6].

[5] EDF Renewables (2020) Cloich Wind Farm [Online] Available at: https://www.edf-re.uk/our-sites/cloich (Accessed 07/08/2020)

[6] The Scottish Government (2020) Online Public Exhibition established in accordance with COVID-19 Scottish Government advice and regulations [Online] Available online at: https://www.gov.scot/publications/coronavirus-covid-19-planning-guidance-on-pre-application-consultations-for-public-events/ (Accessed 04/08/2020)

3.4 Private Water Supplies

A Private Water Supply Risk Assessment (PWSRA) is currently being undertaken for the Development. The PWSRA aims to identify all PWS within a 3 km radius of the Development and seeks to confirm the location of the source water for the supplies, through consultation and site visits. This process informs the risk assessment of the effects of the Development on the private water supply, source water and associated distribution infrastructure. A Method Statement for the PWSRA has been produced for the Development and distributed and reviewed by SEPA on 13th May 2020, and by the Council Environmental Health Office (EHO) on 27th May 2020. Comments from this review process are incorporated into the PWSRA Method Statement.

Consultation with the Council's Environmental Health Officer was conducted on 29th November 2019 to obtain a list of properties with a registered PWS. As the list of PWS held by the Council is not exhaustive, all properties within 3 km of the Development which are not known to be supplied by Scottish Water Mains were contacted via letter over the period 30th January 2020 to 24th February 2020. This initial resident consultation aimed to confirm if the property is supplied by a PWS or Scottish Water Mains and, if supplied by a PWS, then further information was requested regarding the source and type of supply.

A secondary consultation phase is currently underway with follow-up letters distributed to relevant properties on 29th July 2020. This consultation phase seeks to obtain information on properties water supply where no response from residents & landowners has been received to date, and to conduct consultation and site visits at properties where a PWS is confirmed and has the potential to be hydrologically connected to the Development. The aim of the consultation phase and site visits is to confirm the source location of PWS for the relevant properties. Site visits commenced on the week of the 17th August 2020 and are ongoing.

Additional consultation over email has been conducted with residents of the properties at Stewarton who have raised particular concerns over the effects of the Development on the PWS to these properties.

A total of 210 properties have been contacted via letter to consult on the water supply to the property within 3 km of the Development. To date, approximately 70 properties have confirmed they are supplied by a PWS.

3.5 Bird Surveys

A year of baseline ornithology surveys were undertaken for the Consented Development between April 2011 and March 2012 (inclusive). The baseline survey dataset was used to inform the original EIA for the Development. An additional year of ornithology surveys has been completed between March 2019 and February 2020 (inclusive) for the current EIA.

In addition to the site data, two further wind farm applications were submitted during the intervening period in the areas immediately adjacent to the east and west of the Site: Hag Law Wind Farm and Kilrubie Wind Farm. Planning for both of these was refused on landscape, visual and noise grounds. However, the respective environmental statements, provide additional ornithology data that is valuable to contextualise the results of the 2019/20 Development ornithology surveys. Ornithology surveys for Hag Law Wind Farm were completed between May 2011 and June 2013 while ornithology surveys for Kilrubie Wind Farm were completed between April 2014 and March 2015.

In February 2020, a comparative report was submitted to NatureScot (formerly Scottish Natural Heritage) summarising the results recorded during the 2019/20 surveys, requesting NatureScot reconsider the requirement for a second year of bird surveys. The comparative report presented a robust ornithology dataset which has not changed significantly over time, supported by the information gathered for Hag Law Wind Farm and Kilrubie Wind

Farm during the intervening period. On the 15th April 2020, NatureScot confirmed that a second year of surveys was not required.

4 APPLICATION DETAILS AND TIMELINE FOR SUBMISSION

4.1 Submission

The Applicant intends to lodge the Section 36 application in November 2020. The application will be for a wind farm consisting of up to 12 turbines and ancillary infrastructure. The ancillary infrastructure will include crane hardstanding areas, transformers, extension to operational forestry access tracks, underground cabling, a substation, and a temporary construction compound. Table 4 below outlines the key parameters, while the layout is shown in Figure 5.

Table 4: Key Parameters of the Development

Element	Details
Turbines	12 turbines, each with a tip height of up to 149.9 m. Each turbine may require a small transformer located at its base. Each turbine will have a foundation with a diameter of approximately 20 m.
Access Track	The design of the Development will make use of the existing forestry access tracks; access track to serve the construction and operation of the wind farm with width of approximately 5 m, this will consist of a combination of upgraded track and newly constructed track. New tracks will be constructed of a graded stone or floated, as appropriate for the ground conditions.
Electrical Infrastructure	The EIA will assume and assess transformers located outside of the turbines. On site underground cabling will be laid alongside the access tracks, where possible, linking the turbine transformers to the onsite substation.
Crane Hardstanding	A hardstanding crane pad and rigging area is required adjacent to each turbine which will have an area of approximately 1400 m^2. In addition to the main hardstanding area, there will be additional flattened areas for crane assembly and turbine blade storage; however, these will be temporary and not constitute hardstanding.
Temporary Construction Compound	A temporary construction compound will be required during the construction of the Development, forming an area of hardstanding providing space for temporary welfare, parking, lay down areas and potentially concrete batching; this will measure approximately 100m 50 m.
Borrow Pits	Up to two onsite borrow pits are proposed, however given that track design will make use of existing forestry tracks, it is expected that the extraction of aggregate should be conservative compared to wind farms of a similar size which do not utilise existing tracks.

Under normal circumstances, the EIA Report would be made available in hard copy for public viewing at suitable locations in the vicinity of the Development. The Electricity Works (Miscellaneous Temporary Modifications) (Coronavirus) (Scotland) Regulations 2020[7] include provisions which suspend the requirement to make such hard copy documents available for public viewing at this time, rather, that documents and information should be published online during the emergency period.

[7] The Scottish Government (2020) The Electricity Works (Miscellaneous Temporary Modifications) (Coronavirus) (Scotland) Regulations 2020 [Online] Available online at: https://www.legislation.gov.uk/ssi/2020/123/contents/made (Accessed 02/07/2020)

If COVID-19 restrictions remain in place, the Applicant shall act in the interests of public health and safety and due to COVID-19 restrictions on both public gatherings and the closure of libraries and offices to the public, the EIA Report will be posted online on the dedicated project webpage (address to be confirmed at application stage), as well as the ECU and Council planning portals.

The application for Section 36 consent will be advertised in the Edinburgh Gazette for two consecutive weeks, a national newspaper for one week, and at least one local newspaper for two weeks. The dates for the advert publication are yet to be determined and will be agreed with ECU at a time closer to the submission date.

5 APPENDIX A – SCOPING COMMENTS

Table A1 Scoping Consultee Comments and Responses

Consultee	Discipline	Scoping Comment	Response for Gatecheck	Chapter/Section in EIA Report where comments are addressed
Scottish Borders Council	Traffic & Transport	The Council are content with the methodology proposed in the scoping report which will be used to consider the effects of vehicle movements to and from the site during the construction, operation and decommissioning phases of the development. More formal comments on the Environmental Impact Assessment (EIA) will be provided once submitted as part of any detailed planning application.	Noted.	N/A

Consultee	Discipline	Scoping Comment	Response for Gatecheck	Chapter/Section in EIA Report where comments are addressed
Scottish Borders Council	Cultural Heritage	There are known historic and archaeological assets, and areas of archaeological potential within the proposed wind farm boundary. There are also potential impacts to the settings of heritage assets in the area, particularly to a prominent and important cluster of Scheduled Monuments located to the south and west of development area. The scoping request specifies a cultural heritage impact assessment will take place as part of the EIA that will analyse potential direct and indirect impacts.	Noted.	Chapter 6 - Archaeology and Cultural Heritage

Consultee	Discipline	Scoping Comment	Response for Gatecheck	Chapter/Section in EIA Report where comments are addressed
Scottish Borders Council	Cultural Heritage	There continues to be potential for significant impacts to the conjoined settings of Scheduled Monuments as a result of the scheme. These require to be fully assessed in the EIA. Having reviewed the applicant's scoping response, there is general contentment with the proposed EIA Report.	Noted.	N/A
Scottish Borders Council	Cultural Heritage	The Council are less accepting of the statement in 6.1.1 that 'The reduction in the number of turbines may reduce the indirect effect to heritage assets due to reduced visibility'. While this may indeed be the case, the increase in height of turbines is of concern particularly with respect to the settings of the large number of Scheduled Monuments (as highlighted in the scoping report's Table 6.1) to the south and west of the development. The Council objected to the original scheme on this basis and in particular with respect to the view from Cademuir Hill and its three Scheduled Monuments, through Meldon Valley marked by two prominent Scheduled Monuments on the White and Black Meldons, and the conjoined settings within this view.	Noted. A full assessment for changes to setting will be included in the EIA Report to assess the reduced number of turbines and increased tip height on Cultural Heritage receptors.	Chapter 6 - Archaeology and Cultural Heritage

Consultee	Discipline	Scoping Comment	Response for Gatecheck	Chapter/Section in EIA Report where comments are addressed
Scottish Borders Council	Cultural Heritage	The increase in turbine heights, albeit with a potentially positive decrease in numbers, has the potential to increase effects on the integrity of settings for both individual monuments and the historic landscape. It is important that all monuments assessed in the original application are assessed again in light of the new scheme. Additional monuments may fall into theoretical visibility and these too should be assessed. In addition, we need a viewpoint from Macbeth's Castle in the Manor Valley as the forts, castles and later settlement/landscape features in the Manor, Meldon and Tweed valleys all form part of the same historic landscape where setting impacts are predicted.	Noted. A full assessment for changes to setting will be included in the EIA Report to assess the reduced number of turbines and increased tip height. A visualisation from Macbeth's Castle will be included in the EIAR as well as other key heritage assets (e.g. Cademuir Hill Fort, Milkiestone Rigs Fort, Camp Hill Fort, Whiteside Hill Fort, Easter Dawyk Fort/Settlement, Black Meldon, White Meldon and Meldon Valley).	Chapter 6 - Archaeology and Cultural Heritage
Scottish Borders Council	Cultural Heritage	There have been substantial increases in the availability of LiDAR in the area. The Council holds >1 m LiDAR for part of the site, and more is possibly available through the Scottish Government. The Council require this to be assessed as part of the EIA for the purpose of identifying unknown archaeological features in the development area, and assessing known assets better.	LiDAR data has been obtained through discussion with the Council. LiDAR data will inform the baseline within the EIA Report.	Chapter 6 - Archaeology and Cultural Heritage
Scottish Borders Council	Ecology	The Council are largely satisfied with the proposed updated desk-top survey, updated surveys and updated Ecological Impact Assessment as set out in the Scoping Report.	Noted.	N/A
Scottish Borders Council	Ecology	In relation to Section 7.3.1.3, the Council state that further data may be available from Forest Land & Estates. Tweed Forum have also been leading the Eddleston water project and may have additional survey data: https://tweedforum.org/our-work/projects/the-eddleston-water-project/	Noted.	N/A
Scottish Borders Council	Ecology	In relation to Section 7.4.3.1, the Council state that NVC surveys should also be carried out for priority habitats on the Scottish Biodiversity List (SBL).	A NVC survey has been carried out for priority habitats on SBL.	Chapter 7 - Ecology

Consultee	Discipline	Scoping Comment	Response for Gatecheck	Chapter/Section in EIA Report where comments are addressed
Scottish Borders Council	Ecology	In relation to Bats, the Council ask for clarification on how the Applicant reached the conclusion that the site is low risk? The surveys for the earlier application at this site (12/01283/S36) identified a low level of activity of predominantly soprano pipistrelle. Common pipistrelle and Myotis sp. were also recorded and very low activity levels of noctule and brown long-eared bat. In accordance with recent guidance (Bats and Onshore wind turbines: Survey, assessment and mitigation (January 2019) NatureScot (formerly Scottish Natural Heritage), Natural England, Natural Resources Wales, RenewableUK, Scottish Power Renewables, Ecotricity Ltd, the University of Exeter and the Bat Conservation Trust (BCT)) survey effort for a medium risk site may be more appropriate. The recent guidance recommends that at height surveys are carried out for sites in woodland or requiring key-holing. At height surveys were carried out for the earlier application. A justification has not been provided as to why at height surveys are not required. It is the Council's opinion that surveys will be required.	A consultation letter has been sent to the Council Ecology Officer addressing this comment. No response received to date.	Chapter 7 - Ecology
Scottish Borders Council	Ecology	In relation to Otter surveying, the Council note guidance on the Council's otter survey requirements can be found at: https://www.scotborders.gov.uk/downloads/file/2961/otters_technical_advice_note The Council state that the Applicant should ensure that survey effort should be consistent with that for a large, extensive development (large wind farm).	Otter surveys have been carried out and follow the guidance note recommendations.	Chapter 7 - Ecology

Consultee	Discipline	Scoping Comment	Response for Gatecheck	Chapter/Section in EIA Report where comments are addressed
Scottish Borders Council	Ecology	In relation to Section 7.4.3.9, on Fisheries Surveys, the Council note the section states that the EIA for the extant consent concluded that following mitigation and enhancement there is no likely significant effect and therefore an appropriate assessment is not required. The Council cite a recent European Union Court of Justice ruling which found mitigation cannot be taken into account when considering the likely significant effects of a proposal on a NATURA 2000 Site. Therefore, the Council state that it can be assumed that there is a likely significant effect and an Appropriate Assessment will be required, taking into account standard, tried and tested forms of mitigation to address sediment run-off and pollution. The EIA should include the relevant information to inform the AA (in a separate section or report), such as details of mitigation proposed. The Council have not seen the scoping response of NatureScot.	Noted and relevant information will be contained within EIA Report to inform Appropriate Assessment.	Chapter 7 - Ecology
Scottish Borders Council	Ornithology	In relation to Ornithology, the Council are satisfied with the proposed updated surveys and updated impact assessment.	Noted.	N/A

Consultee	Discipline	Scoping Comment	Response for Gatecheck	Chapter/Section in EIA Report where comments are addressed
Scottish Borders Council	Forestry	Regarding Compensatory woodland replanting requirements, this will be required to be consistent with the Scottish Borders Woodland Strategy as informed by the Technical Advice Note (2012) https://www.scotborders.gov.uk/downloads/download/411/planning_guidance_woodland_strategy and LDP Policy EP13 Trees, Woodlands and Hedgerows. The Council state this should be included as part of a Forestry Chapter within the EIA Report. Furthermore, the Council note that there are opportunities to deliver multiple benefits for biodiversity, natural flood management and water quality improvements through an appropriate woodland compensation scheme. Noting, the earlier consent had included a commitment to offsite tree planting in the Eddleston Water to provide additional enhancements linked to the Eddleston Water project. The Council state that details of a Compensatory Replanting Scheme should be provided in the EIA Report. The Council would welcome opportunities to provide enhancements in the Eddleston Water catchments, as appropriate.	Noted. This will be addressed within the EIA Report.	Chapter 12 - Forestry

Consultee	Discipline	Scoping Comment	Response for Gatecheck	Chapter/Section in EIA Report where comments are addressed
Scottish Borders Council	Ecology Ornithology	A Habitat Management Plan will be required. Adopting good practice guidance the developers should incorporate measures that are required to deliver ecological enhancements as well as measures to avoid, reduce or compensate for negative ecological impacts. Guidance on the Council's requirements is given in the Supplementary Planning Guidance for biodiversity. The Council's requirements are set out in Sections 4.1 Environmental Impact assessment, 4.2 Ecological Impact Assessment and for species and habitats in Sections 4, 5 and 6 of the SPG. The Environmental Impact Assessment should also include information on: • habitat corridors and links to local habitat network • significance of ecological impacts • avoidance, mitigation and compensation proposed • residual significance of ecological impacts • method statement to include details of how avoidance, mitigation and compensation are to be implemented and the long-term management of habitats and species created, enhanced or protected. Any significant effects should be qualified with reference to an appropriate geographic scale and have regard to no net loss of biodiversity (Local Development Plan Policies EP1, EP2 and EP3 as informed by the Council's Supplementary Planning Guidance for biodiversity).	Noted. A draft Habitat Management Plan will be included within the EIA Report.	Chapter 7 - Ecology & Chapter 8 - Ornithology Technical Appendix Draft Habitat Management Plan
Scottish Borders Council	Hydrology	The Council will require the Applicant to demonstrate that this development will not affect private water supplies in the vicinity.	PWS Risk Assessment will be conducted as part of the EIA Chapter. A PWS Method Statement for the Development has been issued to EHO (29/04/2020) with comments received that will be incorporated into our assessment.	Chapter 9 - Geology, Hydrology and Hydrogeology Technical Appendix Private Water Supply Risk Assessment

Consultee	Discipline	Scoping Comment	Response for Gatecheck	Chapter/Section in EIA Report where comments are addressed
Scottish Borders Council	LVIA	In terms of Landscape & Visual Impact Assessment, the Council state that the methodology is acceptable and the list of guidance to be utilised is appropriate.	Noted.	Chapter 5 - Landscape and Visual Impact Assessment Technical Appendix - LVIA Methodology Technical Appendix - Visualisation Methodology
Scottish Borders Council	LVIA	The scoping report suggests 15no viewpoint locations which are located up to 15km from the outermost turbines. The previous application had 27 viewpoints and while this is a new application, there was merit and purpose in the original selection – it is suggested, in addition to the 15no listed in the scoping report reinstating a number of viewpoints previously selected, giving an all- round better representation of locations from which sensitive receptors might see the windfarm, as following:- 1, Cross Border Drove Road (West); 2, Old Post Road Core Path (to east of Observatory, residential receptor); 3, Minor road near Spylaw and Wester Deans; 4, B7059 near Boghouse; 5, Viewpoint on A701 (either near Mountain Cross or southern end of Romanno Bridge, where there is visibility); 6, Haswellsykes; 7, Glentress Forest (Makeness Kipps?); 8, B7059 near Flemington access. The Council suggest these are reinstated because they were deemed to have a Moderate/Moderate to Substantial/Substantial to Very Substantial level of effect (or are at locations where receptors face straight at the proposed development e.g. to the previous scheme. This would bring the viewpoint locations up to 23, which does not seem excessive for a windfarm of this size and scale.	Noted. Viewpoints 1 - 7, as suggested by the Council, will be included within the LVIA. After discussions with the Council, it was agreed that Viewpoint 8 - B7059 near Flemington access will not be included as a viewpoint within the LVIA. This was agreed with the Council.	Chapter 5 - Landscape and Visual Impact Assessment

Consultee	Discipline	Scoping Comment	Response for Gatecheck	Chapter/Section in EIA Report where comments are addressed
Scottish Borders Council	LVIA	Focussing the cumulative assessment on a 20km study area is acceptable.	Noted.	N/A
Scottish Borders Council	LVIA	It is assumed that the landscape and visual effects on the HES Inventory listed Portmore Designed Landscape will be thoroughly assessed.	Noted. Portmore House will be included as a viewpoint within the LVIA and an assessment of visual effects on recreational receptors will be undertaken. Effects on the setting of the Designed Landscape will be considered in the Cultural Heritage chapter of the EIA Report.	Chapter 5 - Landscape and Visual Impact Assessment
Scottish Borders Council	LVIA	For those properties within 2km of any turbine where visibility will be gained from their windows or curtilages, it would be recommended that wirelines are accompanied by aerial and site photographs plus photomontages to enable the significance of effects to be assessed and conclusions demonstrated, especially for those properties identified as requiring a Stage 4 threshold assessment as per the Landscape Institute Technical Guidance Note on Residential Visual Assessment.	Noted. A residential visual amenity assessment for properties within 2 km of the nearest turbine will be included within the LVIA. This will include wireframes from each property or property group within 2 km. It is not standard practice to include photomontages from every residential property; however photomontages will be produced from two locations, representing the closest property groups.	Technical Appendix - Residential Visual Amenity Assessment
Scottish Borders Council	Socio-economics, Land Use, Recreation & Tourism	Information on the positive and negative economic effects of the development (in addition to environmental/carbon offset benefits and impacts) would be welcome in order to achieve a rounded understanding of the positive and negative aspects of the development.	Noted. This will be addressed within the EIA Report.	Chapter 14 - Socio-economics, Land Use, Recreation & Tourism.
Scottish Borders Council	Socio-economics, Land Use, Recreation & Tourism	The Council would, particularly, wish to be assured that the specific impacts of this development would not have unacceptable effects on established local rural (particularly tourist) businesses.	Noted. This will be addressed within the EIA Report.	Chapter 14 - Socio-economics, Land Use, Recreation & Tourism.

Consultee	Discipline	Scoping Comment	Response for Gatecheck	Chapter/Section in EIA Report where comments are addressed
Scottish Borders Council	Socio-economics, Land Use, Recreation & Tourism	It is also accepted that some comparison in impacts between the consented and proposed schemes would be helpful in focussing on the likely differences, positive or negative.	Noted. Comparisons, where applicable, can be referenced within the EIA Report.	Chapter 14 - Socio-economics, Land Use, Recreation & Tourism.
Scottish Borders Council	Socio-economics, Land Use, Recreation & Tourism	According to the records held by Scottish Borders Council, The Cross Borders Drove Road (one of Scotland's Great Trails) runs through the southern part of this area of land along a right of way from Flemington Burn NT187461 to Stewarton NT221458. This path also forms part of the unofficial Scottish National Trail. Another right of way links Noblehouse NT183314 with Shiplaw NT232494 and a there is a promoted path from Courhope through Cloich and on towards Shiplaw. There are also other rights of way and core paths in the local area from which the development will be clearly visible.	Noted. This will be addressed within the EIA Report.	Chapter 14 - Socio-economics, Land Use, Recreation & Tourism.
Scottish Borders Council	Socio-economics, Land Use, Recreation & Tourism	Wind turbines should be set back at a reasonable distance from rights of way and other potential recreational routes. In their 'Scottish Wind Farm Advice Note', the British Horse Society Scotland recommend a separation distance of four times the overall height should be the target for core paths and National Trails, as these are likely to be used by equestrians unfamiliar with turbines, and a distance of three times overall height from all other routes, including roads to maintain safe access for horses and riders.	Noted. This will be addressed within the EIA Report.	Chapter 14 - Socio-economics, Land Use, Recreation & Tourism.
Scottish Borders Council	Socio-economics, Land Use, Recreation & Tourism	With regards to managing access during and after construction, Developers should follow the guidance set out in the document 'Good Practice during Wind Farm Construction – Part 7 Recreation and Access'. See: www.snh.gov.uk/docs/A1168678.pdf	Noted. This will be addressed within the EIA Report.	Chapter 14 - Socio-economics, Land Use, Recreation & Tourism.

Consultee	Discipline	Scoping Comment	Response for Gatecheck	Chapter/Section in EIA Report where comments are addressed
Scottish Borders Council	Shadow Flicker	The development's compatibility with current guidance, which refers to a 10 x rotor diameter range within 130 degrees due north, should be considered. The Council SG also requests assessment for residential properties within 2km of each turbine. I note that an assessment will be included in the ES of the forthcoming EIA covering these matters and would agree that if no properties lie within 2km, then shadow flicker can be scoped out.	Noted. The shadow flicker assessment in the EIA Report will include a study area of 2 km from each turbine location and will assess any properties within this area.	Chapter 15 - Other Issues
Scottish Borders Council	Noise	A noise impact assessment should be undertaken in accordance with ETSU-R-97 and having regard to the methods described in the Institute of Acoustics Good Practice Guide to the Application of ETSU-R-97. The assessment should detail the following: (a) Accurate twelve digit grid references for the turbines; (b) Accurate twelve digit grid references for the noise sensitive receptors; (c) Elevations of turbines and receptors; (d) Details of any financial involvement at noise sensitive receptors; (e) Sound power level details for the turbine, in its intended mode of operation. Broadband and Aweighted octave band data required, together with uncertainty figures and any tonal penalty; (f) Ground factor used; (g) Atmospheric conditions for Aatm; (h) Propagation height; (i) Unless it can be shown that it would be possible to meet the simplified noise condition of 35 dB LA90 (10 min) at wind speeds up to 10m/s measured at 10m height, then a background noise survey will require to be carried out. (j) The cumulative noise effect from existing, consented or approved wind turbines. When considering the cumulative effect of other turbines regard should be had the consented noise levels detailed in the approval. (k) Information regarding any valley effect. It will be necessary to demonstrate whether or not, a 3dB correction is required in respect of the valley significantly sloping ground effect.	Noted. With specific regard to point i), the assessment will be undertaken relative to the noise limits already set in the extant consent, which themselves were derived in accordance with current best practice. As such, no further background noise surveys are required. With specific regard to point j), the noise assessment will consider the Development's ability to operate within the limits already set by the extant noise planning conditions. As the Development will not increase noise levels above what is already permitted, no cumulative assessment is required.	Chapter 10 - Noise

Consultee	Discipline	Scoping Comment	Response for Gatecheck	Chapter/Section in EIA Report where comments are addressed
Scottish Borders Council	Noise	If background surveys are carried out then the following details are required: • Wind shear methodology • Best fit curve polynomials for daytime and night time (there must be sufficient data collected across the range of wind speeds from 4m/s to 12m/s • Location of monitoring positions • Method to record rainfall (noise data affected by rainfall or extraneous noise sources e.g. dawn chorus, agricultural activities, aircraft etc. should be excluded). • Equipment used including the type of wind shield fitted to the microphone (the preferred wind shield is a large diameter double layer item). A standard wind shield may not be suitable and it is recommended that the sound level meter manufacturer be consulted to confirm the suitability of any wind shield used.	The assessment will be undertaken relative to the noise limits already set in the extant consent, which themselves were derived in accordance with current best practice. As such, no further background noise surveys are required.	Chapter 10 - Noise
Scottish Borders Council	Noise	When considering the cumulative impact of large and small wind turbines the preferred option is to use the ETSU-R-97 guidance for large wind and the BWEA guidance for small wind and add the two together. As mentioned in (j) above, when considering the cumulative effect of other turbines regard should be had the consented noise levels detailed in the approval. The applicant should provide information on construction noise and how this will be mitigated.	Noted. The noise assessment will consider the Development's ability to operate within the limits set by the extant noise planning conditions. No cumulative assessment is therefore required, as the Development will not increase noise levels above what is already permitted. No change is anticipated with regard to construction noise effects, relative to the extant consent. However, as requested, a discussion of construction noise and best practice construction noise management methods will be included.	Chapter 10 - Noise

Consultee	Discipline	Scoping Comment	Response for Gatecheck	Chapter/Section in EIA Report where comments are addressed
Historic Environment Scotland	Cultural Heritage	HES are broadly content with the scope of assessment as set out for our interests. HES would advise caution with hard boundaries on search areas for heritage assets whose settings may be affected. HES recommend that where assets are themselves outside the ZTV, consideration should still be given to impacts on views of these assets, where they make a contribution to cultural significance.	Further consultation will be undertaken to agree the final selection of heritage assets for inclusion in the EIA Report which will be based on the ZTV.	Chapter 6 - Archaeology and Cultural Heritage
Historic Environment Scotland	Cultural Heritage	HES have not identified any assets in this instance beyond ten kilometres that require assessment for HES interests. However, HES consider that with development of this type, significant impacts can occur at greater distances. The ten kilometre search radius should therefore be agreed with the other relevant consultees for this topic. HES also consider the definition of assets between five and ten kilometres that are to be considered to be too narrow and would refer the developer to our setting guidance for further considerations that may be relevant.	Further consultation will be undertaken to agree the final selection of heritage assets for inclusion in the EIA Report which will be based on the ZTV.	Chapter 6 - Archaeology and Cultural Heritage
Historic Environment Scotland	Cultural Heritage	The details of the assessment methodology provided are appropriate for HES interests, although very limited in detail. HES refer the developer to the EIA Handbook for best practice guidance on assessing impacts on cultural heritage. This includes a sample methodology, focusing on impacts on cultural significance.	Noted. Full assessment methodology will be included in the EIA Report in lines with EIA Handbook and best practice guidance.	Chapter 6 - Archaeology and Cultural Heritage
Historic Environment Scotland	Cultural Heritage	HES have identified the scheduled hillforts of Black and White Meldon as being particularly sensitive to impacts from this development. HES welcome the fact that a visualisation will be provided showing the view from the White Meldon. HES state it will be equally important to consider impact on views of these heritage assets and that the assessment should consider impacts on views from the south, with particular reference to views from other assets which may have a relationship (either past or present) with the hillforts. This includes the fort on Cademuir Hill, which is itself a scheduled monument. There is also the potential for impacts on views from the south approaching the Meldons from the Meldon valley.	Noted. A full assessment for changes to setting will be included in the EIA Report to assess the reduced number of turbines and increased tip height. Visualisation will be included in the EIA Report as well as other key heritage assets (e.g. Cademuir Hill Fort, Milkiestone Rigs Fort, Camp Hill Fort, Whiteside Hill Fort, Easter Dawyk Fort/Settlement, Black Meldon, White Meldon and Meldon Valley).	Chapter 6 - Archaeology and Cultural Heritage

Consultee	Discipline	Scoping Comment	Response for Gatecheck	Chapter/Section in EIA Report where comments are addressed
Historic Environment Scotland	Cultural Heritage	HES state that detailed consideration should also be given to impacts on the category A listed Portmore House and its associated Inventory garden and designed landscape. Views of these assets from the east contribute to their current setting and have the potential to be impacted by the proposed development.	The EIA Report will include an assessment of Portmore House and gardens with a visualisation provided.	Chapter 6 - Archaeology and Cultural Heritage
Historic Environment Scotland	Cultural Heritage	As there are scheduled monuments within the boundary, the turbines and their associated infrastructure have the potential to significantly affect both the site and setting of several heritage assets. Any direct impacts should be avoided through design and setting impacts will be a key consideration when finalising the layout of the development. This should be considered in the context of the current forestry and future proposed felling.	Noted. Scheduled Monuments will be avoided in the design and these assets will be considered in the EIA Report for changes to setting in light of the forestry plan.	Chapter 6 - Archaeology and Cultural Heritage
Historic Environment Scotland	Cultural Heritage	HES recommend that further visualisations are provided for the cultural heritage assessment, particularly for the above heritage assets. HES would be happy to agree locations for these through further consultation. Draft wirelines would allow HES to provide further advice on the level of impact and identify whether or not photomontages are required for our interests.	Further consultation will be undertaken with HES to agree final selection of heritage assets, wirelines and photomontages. A full assessment for changes to setting will be included in the EIAR to assess the reduced number of turbines and increased tip height. Visualisation will be included in the EIA Report as well as other key heritage assets (e.g. Cademuir Hill Fort, Milkiestone Rigs Fort, Camp Hill Fort, Whiteside Hill Fort, Easter Dawyk Fort/Settlement, Black Meldon, White Meldon and Meldon Valley).	Chapter 6 - Archaeology and Cultural Heritage
Historic Environment Scotland	Cultural Heritage	HES note that for some of the scheduled monuments within the boundary, there may be the potential to clear forestry which currently obstructs views that may contribute to setting. HES recommend that these options are explored and would be happy to comment on felling proposals at pre-application stage.	Noted. Further consultation will be undertaken with HES as the design progresses.	Chapter 6 - Archaeology and Cultural Heritage

Consultee	Discipline	Scoping Comment	Response for Gatecheck	Chapter/Section in EIA Report where comments are addressed
Scottish Environment protection Agency	Hydrology	The site layout must be designed to avoid impacts upon the water environment. Where activities such as watercourse crossings, watercourse diversions or other engineering activities in or impacting on the water environment cannot be avoided then the submission must include justification of this and a map showing: a) All proposed temporary or permanent infrastructure overlain with all lochs and watercourses. b) A minimum buffer of 50m around each loch or watercourse. If this minimum buffer cannot be achieved each breach must be numbered on a plan with an associated photograph of the location, dimensions of the loch or watercourse and drawings of what is proposed in terms of engineering works. c) Detailed layout of all proposed mitigation including all cut off drains, location, number and size of settlement ponds.	Noted. 50 m buffers currently observed with no breaches.	Chapter 9 – Geology, Hydrology and Hydrogeology
Scottish Environment protection Agency	Hydrology	The layout, Figure 2 (of the Scoping Report), indicates that turbines 5, 9 and 10 are proposed in a significantly higher risk location combined with moderate slopes. We would recommended that these turbines and associated infrastructure are relocated away from these receptors. It would be urged that at this stage due consideration is given to the silt mitigation that will be required so that this can occur outside the buffer zones i.e. ensuing adequate space for mitigation is built into the layout design.	Noted. Turbines have been moved from these locations through the on-going design process; turbines will not be located within 50 m of watercourses.	Chapter 9 – Geology, Hydrology and Hydrogeology
Scottish Environment protection Agency	Hydrology	It is anticipated that further watercourse crossings may be needed, although the track layout is not yet clear. The design should minimise water crossings not only from a morphology point of view but also avoid areas that can become a pinch point for pollution risk.	Noted. Watercourse crossings will be minimised in the design and located at acceptable crossing locations.	Chapter 9 – Geology, Hydrology and Hydrogeology Technical Appendix - Water Crossing Inventory

Consultee	Discipline	Scoping Comment	Response for Gatecheck	Chapter/Section in EIA Report where comments are addressed
Scottish Environment protection Agency	Hydrology	It is important that accurate information is obtained on the Private Water Supplies actual supply location rather than just the location of the property or header tank.	A PWSRA is being conducted as part of the EIA Chapter in which the source location is identified. A PWS Method Statement for the Development has been issued to SEPA (29/04/2020) with response received.	Chapter 9 - Geology, Hydrology and Hydrogeology Technical Appendix - Private Water Supply Risk Assessment
Scottish Environment protection Agency	Hydrology	Given the scale of the development it is likely that a Construction Site Licence will be needed.	Noted.	N/A
Scottish Environment protection Agency	Hydrology	If water abstractions or dewatering are proposed, a table of volumes and timings of groundwater abstractions and related mitigation measures must be provided.	Noted.	N/A
Scottish Environment protection Agency	Hydrology	Watercourse crossings must be designed to accommodate the 0.5% Annual Exceedance Probability (AEP) flows, or information provided to justify smaller structures. If it is thought that the development could result in an increased risk of flooding to a nearby receptor then a Flood Risk Assessment must be submitted in support of the planning application.	Noted.	Chapter 9 - Geology, Hydrology and Hydrogeology Technical Appendix - Water Construction Management Plan (WCMP) Technical Appendix - Watercourse Crossing Inventory

Consultee	Discipline	Scoping Comment	Response for Gatecheck	Chapter/Section in EIA Report where comments are addressed
Scottish Environment protection Agency	Geology & Peat	The planning submission must: a) demonstrate how the layout has been designed to minimise disturbance of peat and consequential release of CO2; and b) outline the preventative/mitigation measures to avoid significant drying or oxidation of peat through, for example, the construction of access tracks, drainage channels, cable trenches, or the storage and re-use of excavated peat. There is often less environmental impact from localised temporary storage and reuse rather than movement to large central peat storage areas.	Noted. These comments will be addressed in the EIA Report.	Chapter 9 - Geology, Hydrology and Hydrogeology
Scottish Environment protection Agency	Geology & Peat	Dependent upon the volumes of peat likely to be encountered and the scale of the development, applicants must consider whether a full Peat Management Plan (as detailed in the above guidance) is required or whether the above information would be best submitted as part of the schedule of mitigation.	Following peat probing on the Site, we do not believe the quantities of peat warrant a Peat Management Plan or Peat Slide Risk Assessment. Further consultation ongoing with SEPA.	Chapter 9 - Geology, Hydrology and Hydrogeology
Scottish Environment protection Agency	Ecology	GWDTE are protected under the Water Framework Directive and therefore the layout and design of the development must avoid impact on such areas. The following information must be included in the submission: a) A map demonstrating that all GWDTE are outwith a 100m radius of all excavations shallower than 1m and outwith 250m of all excavations deeper than 1m and proposed groundwater abstractions. If micro-siting is to be considered as a mitigation measure the distance of survey needs to be extended by the proposed maximum extent of micro-siting. The survey needs to extend beyond the site boundary where the distances require it. b) If the minimum buffers above cannot be achieved, a detailed site specific qualitative and/or quantitative risk assessment will be required. SEPA are likely to seek conditions securing appropriate mitigation for all GWDTE affected.	Noted. A GWDTE assessment was carried out concurrently with the NVC survey which identified habitats with potential to be groundwater dependent. A map showing confirmed GWDTEs with appropriate buffers will be produced within the EIA Report and appropriate risk assessments if required.	Chapter 7 - Ecology

Consultee	Discipline	Scoping Comment	Response for Gatecheck	Chapter/Section in EIA Report where comments are addressed
NatureScot	LVIA	Related to the Special Qualities of this NSA other key issues to consider are: - The appreciation of distinctive landforms within and immediately adjacent to the NSA (e.g. the Meldons) and how the proposed turbines could visually compete with and detract from their setting and importance; - The scenic composition of views from within the NSA – e.g. from lower level areas such as the intimate valleys of the Meldon Burn and its fringes – from where views of turbines could detract from people's experience of remoteness, tranquillity and overall landscape quality; - For a site of this landscape sensitivity and location we would strongly advise that close attention is paid to the wind farm's design and visual coherence, forest removal and ancillary infrastructure. NatureScot advise that any revision to the consented turbine layout should not undo the design mitigation put in place by the consented layout.	Noted. An assessment of the special qualities of designated landscapes will be included within the LVIA, in line with NatureScot draft guidance 'Assessing the impacts on Special Landscape Qualities – Working Draft 11-09 November 2018'. Several viewpoints from within the NSA (including valleys and hill summits) will be included within the LVIA.	Chapter 5 - Landscape and Visual Impact Assessment
NatureScot	LVIA	With regards to the LVIA methodology and viewpoints an assessment of the NSA Special Qualities should be carried out using draft guidance Assessing the impacts on Special Landscape Qualities – Working Draft 11-09 November 2018.	Noted. An assessment of the special qualities of designated landscapes including the NSA will be included within the LVIA.	Chapter 5 - Landscape and Visual Impact Assessment

Consultee	Discipline	Scoping Comment	Response for Gatecheck	Chapter/Section in EIA Report where comments are addressed
NatureScot	LVIA	We request that the following VPs are included: - One of the hill tops in the Moorfoots to show both Cloich and Bowbeat. - From the B7007 on the northern edge of the Moorfoots – possibly at NT08633890 a location with panoramic views before road turns into the interior of the hills. - From the A701 to the west of the site. - A viewpoint along the minor road on the north western slopes of the Moorfoots connecting Gladhouse reservoir to the A703 - where the wind farm would be seen in straight ahead views. Possibly somewhere to the west of Westloch at NT14124759 or NT20324686. This could be in addition to or instead of VP 10 at Gladhouse reservoir.	Noted. A viewpoint has been included to represent views from within the Moorfoot Hills (including views of Bowbeat), the A701 and B7007. After discussions with NatureScot, it was confirmed that the viewpoint at Gladhouse Reservoir should be retained (rather than from the minor road to the reservoir) as it represents views from the SLA.	Chapter 5 - Landscape and Visual Impact Assessment
NatureScot	LVIA	It would have been helpful if the ZTV in the scoping report also showed the boundary of the NSA and we advise that ZTVs included in the LVIA should do so.	Noted. The boundary of the NSA will be included on ZTVs.	Chapter 5 - Landscape and Visual Impact Assessment
NatureScot	LVIA	NatureScot note that the selection of viewpoints differs from that in the earlier LVIA. NatureScot would welcome clarification that the current selection better represents the range of receptors whilst at the same time clearly indicating the design and layout of the wind farm in wider and local views. NatureScot suggest that wirelines are included from the original viewpoints.	After discussions with both NatureScot and the Council, it was agreed that a number of viewpoints from the original application will be included as viewpoints within the LVIA for this application. Comparative wirelines from these viewpoints will be included in the Project Comparison Document, alongside comparisons from any new viewpoints.	Chapter 5 - Landscape and Visual Impact Assessment
NatureScot	Ecology	NatureScot are content with the habitat and species surveys set out in the Ecology section of the scoping report.	Noted.	N/A

Consultee	Discipline	Scoping Comment	Response for Gatecheck	Chapter/Section in EIA Report where comments are addressed
NatureScot	Ornithology	With regards to ornithology, the 2017 guidance requires that a minimum two years of surveys should be undertaken. NatureScot note there were surveys undertaken in 2012 and while they can provide some context they are, as set out in the guidance, now too old to inform the impact assessment. NatureScot therefore advise surveys should continue until an additional year is gathered. NatureScot are happy with the program of surveys that was used in 2019 and for this to be used again in 2020.	Further consultation with NatureScot confirmed one year of ornithology surveys would be sufficient to inform EIA Report and further surveys in 2020 ceased. Email confirmation received 15th April 2020.	Chapter 8 - Ornithology
Atkins	Aviation, Radar & Telecommunications	No objection to the Development.	Noted.	N/A
British Telecommunications	Aviation, Radar & Telecommunications	No objection to the Development.	Noted.	N/A
Defence Infrastructure Organisation	Aviation, Radar & Telecommunications	The turbines will be 65.8 km from, detectable by, and will cause unacceptable interference to the ATC radar used by Spadeadam Deadwater Fell.	Noted. Further consultation will take place with the Defence Infrastructure Organisation to establish suitable mitigation.	Chapter 13 - Aviation, Radar & Telecommunications
Defence Infrastructure Organisation	Aviation, Radar & Telecommunications	The noise budget required for this revised proposal exceeds the amount of budget previously allocated to the Cloich Forest Wind Farm application. Therefore, the MOD has concerns with this proposal as it will exceed the allocated budget.	Noted. Further Consultation will take place with the Defence Infrastructure Organisation to establish suitable mitigation.	Chapter 13 - Aviation, Radar & Telecommunications
Defence Infrastructure Organisation	Aviation, Radar & Telecommunications	If the developer can overcome the issues stated above, the MOD will request that the perimeter turbines be fitted with MOD accredited 25 candela omni-directional red lighting or infrared lighting with an optimised flash pattern of 60 flashes per minute of 200ms to 500ms duration at the highest practicable point.	Noted. Further Consultation will take place with the Defence Infrastructure Organisation in relation to this point.	Chapter 13 - Aviation, Radar & Telecommunications

Consultee	Discipline	Scoping Comment	Response for Gatecheck	Chapter/Section in EIA Report where comments are addressed
Eddleston & District Community Council	Hydrology	EDF must identify, to the satisfaction of SEPA and of Local Government the source and pathway of each and every property's water supply, into the borehole or holding tank from which each property draws its water. This is the only way to ensure that the development is designed and constructed to give full protection to PWS. Only by doing this analysis will EDF be sure that turbines and ancillary infrastructure are sited and constructed in such a way that PWS are fully protected. Contingency plans and mitigation of the loss of PWS are not enough; prevention of loss is required as an integral part of the scheme design.	PWSRA being conducted as part of the EIA Chapter in which the source location is identified. A PWS Method Statement for the Development has been issued to SEPA and the EHO (29/04/2020) for comment. Comments received are incorporated into the assessment.	Chapter 9 - Geology. Hydrology and Hydrogeology Technical Appendix - Private Water Supply Risk Assessment
Eddleston & District Community Council	Noise	It is therefore incumbent on EDF to undertake a full and accurate noise assessment to ensure that impacts on residents are fully understood.	Noted.	Chapter 10 - Noise
Eddleston & District Community Council	LVIA	Viewpoints should include those residential receptors most directly affected together with other visual receptors, such as walkers, riders and cyclists whose use of these paths and trails increases year on year and separation distances between turbines and known paths for users must adhere to the relevant guidelines.	Noted. A residential visual amenity assessment for properties within 2 km of the nearest turbine will be included within the LVIA. Other receptors in the study area, such as walkers, riders and cyclists, will be represented by viewpoints throughout the study area.	Chapter 5 - Landscape and Visual Impact Assessment Technical Appendix - Residential Visual Amenity Assessment
Eddleston & District Community Council	Cultural Heritage	EDCC state it is incorrect to conclude that with respect to cultural heritage 'there is expected to be a limited change to direct effects on known features, with a possible reduction to previously assessed effects due to the reduced number of turbines and associated footprint' and that 'no change is anticipated to the previously assessed effects on unknown features.'	This is expected but not concluded. A full assessment of both direct and indirect effects will be included in the EIA Report.	Chapter 6 - Archaeology and Cultural Heritage
Eddleston & District Community Council	Socio-economics, Land Use, Recreation & Tourism	EDCC state that it is incorrect to conclude that with respect to land use, socio economics, recreation and tourism 'there is anticipated to be a reduction in the overall footprint for the windfarm and the wind farm would not give rise to changes to land use, recreation or tourism activities.'	Noted. The EIA Report will fully assess Socio-economics, Land Use, and Recreation & Tourism.	Chapter 14 - Socio-economics, Land Use, Recreation & Tourism.

Consultee	Discipline	Scoping Comment	Response for Gatecheck	Chapter/Section in EIA Report where comments are addressed
Eddleston & District Community Council	General EIA	This is a new development with significantly larger turbines, in different locations yet to be determined. It is not acceptable for the applicant to 'remove from the scope of the EIA those environmental effects where no significant effects were previously identified.' The environmental impacts of the proposed new scheme must be fully scoped and considered as part of a new and full EIA.	The EIA Report will be new and fully assess scoped-in impacts, as agreed through the Scoping Process.	EIA Report
Edinburgh Airport	Aviation, Radar & Telecommunications	No objection to the Development.	Noted.	N/A
Fisheries Management Scotland	Ecology	The proposed development falls within the district of the River Tweed Commission, and the catchments relating to the Tweed Foundation. It is important that the proposals are conducted in full consultation with these organisations	Tweed Foundation have been contacted and have undertaken the necessary in 2019.	Chapter 7 - Ecology
Glasgow Prestwick Airport	Aviation, Radar & Telecommunications	No objection to the Development.	Noted.	N/A
Highlands and Islands Airport Limited	Aviation, Radar & Telecommunications	No objection to the Development.	Noted.	N/A
Joint Radio Company	Aviation, Radar & Telecommunications	No objection to the Development.	Noted.	N/A

Consultee	Discipline	Scoping Comment	Response for Gatecheck	Chapter/Section in EIA Report where comments are addressed
Lamancha, Newlands and Kirkurd Community Council	LVIA	With respect to the Proposed Assessment Viewpoints identified in Table 5.2, we consider that more should be done to reflect the impact on users of the Cross Borders Drove Road. This core path is being used increasingly by both local walkers, cyclists and horse riders as well as visitors from elsewhere in the Lothian/Borders region and long-distance walkers (it forms part of Scotland's National Trail, between Cape Wrath and Kirk Yetholm). Accordingly, we propose that there is an additional Assessment Viewpoint taking account of the impact on walkers travelling in a south easterly direction from Romanno towards Cloich, e.g. at GR 318600 646150. In addition there is another important viewpoint on Grange Hill, just above the village of Lamancha, at GR 320150 651450, that should be used as a Proposed Assessment Viewpoint.	A viewpoint on the Cross Borders Drove Road to the west of the site will be included within the LVIA. It was decided not to include a viewpoint from Grange Hill and SBC/NatureScot raised no concerns about this, however a nearby viewpoint on the road near Spylaw and Wester Deans will be included in the LVIA.	Chapter 5 - Landscape and Visual Impact Assessment
Manor, Stobo & Lyne Community Council	LVIA	We are concerned about the limited number and location of the viewpoints that are proposed in the Scoping Report. In particular, we believe that there should be additional viewpoints at/on: (a) The Old Drove Road to the South-West of the development site, where the route skirts the edge of the site and of Cloich Forest. (b) To the West of the development site near to the Vodafone mobile phone mast on the ridge above Lamancha, as many people walk there regularly. (c) To the North of the development site near to at least one of the settlements at Wester Deans, Spylaw and Cowieslinn. All of these are linked by the road that runs from Whim to Shiplaw, so that a viewpoint on this road – perhaps close to the 90° bend at the Cowieslinn junction – might be the best option.	Viewpoints including the Cross Borders Drove Road (West of the site) and Minor Road near Spylaw and Wester Deans will be included in the LVIA. It was decided not to include a viewpoint from near the mast (Lamancha) and SBC/NatureScot raised no concerns about this, however a nearby viewpoint on the road near Spylaw and Wester Deans will be included in the LVIA.	Chapter 5 - Landscape and Visual Impact Assessment

Consultee	Discipline	Scoping Comment	Response for Gatecheck	Chapter/Section in EIA Report where comments are addressed
Manor, Stobo & Lyne Community Council	Hydrology	The statement of proposed work in Section 9.3.6 of the Scoping Report is completely inadequate. There are many more private water supplies at risk than are acknowledged in the Scoping Report. At the original inquiry it became clear that 40-50 properties were at risk from the impact of the original proposal, most of which had not been identified nor properly investigated.	A PWSRA being conducted as part of the EIA in which the properties supplied by a private water supply and the source location is identified. This assessment is still underway. A PWS Method Statement for the Development has been issued to SEPA and the EHO (29/04/2020) for comment. Comments received are incorporated into the assessment.	Chapter 9 - Geology, Hydrology and Hydrogeology Technical Appendix - Private Water Supply Risk Assessment
Manor, Stobo & Lyne Community Council	Aviation, Radar & Telecommunications	Ensure that they have detailed discussions with Borders Online before finalising the proposed siting for the turbines.	Noted. Further consultation with Borders Online has been undertaken, and will be undertaken again following design freeze.	Chapter 13 - Aviation, Radar & Telecommunications

Consultee	Discipline	Scoping Comment	Response for Gatecheck	Chapter/Section in EIA Report where comments are addressed
Marine Scotland	Ecology	MSS advises that the developer consults our generic scoping guidelines (https://www2.gov.scot/Topics/marine/Salmon-Trout-Coarse/Freshwater/Research/onshoreren) paying particular attention to the following: - that the River Tweed is an SAC with salmon being a qualifying feature for this designation status; - the advice to carry out site characterisation surveys of watercourses potentially impacted as a result of the proposed development, as outlined in our scoping guidelines, and following our guidance relating to survey/monitoring (as also outlined in the above web site) notably in our recommendation regarding fully quantitative electrofishing surveys; - the advice to consider the potential cumulative impacts on the water quality and fish populations associated with adjacent developments (operational and consented); - the advice to consider the potential impacts on the water quality and fish populations associated with any proposed felling operations; and he advice to contact the Tweed District Salmon Fishery Board; and - the Tweed Foundation, if not already done so, for further information on local fish populations.	The Tweed Foundation have been contacted and have undertaken fish population surveys on the necessary watercourses.	Chapter 7 - Ecology
NATS Safeguarding	Aviation, Radar & Telecommunications	No objection to the Development.	Noted.	N/A
ScotWays	Socio-economics, Land Use, Recreation & Tourism	The National Catalogue of Rights of Way shows rights of way BT6, BT10, BT40 and BT41 appear to be affected by the area outlined in red on Site Location Figure 1. BT40 is recorded as an equestrian right of way.	Noted. These receptors will be fully considered within the EIA Report.	Chapter 14 - Socio-economics, Land Use, Recreation & Tourism.

Consultee	Discipline	Scoping Comment	Response for Gatecheck	Chapter/Section in EIA Report where comments are addressed
ScotWays	LVIA & Socio-economics, Land Use, Recreation & Tourism	The Heritage Paths project promotes two routes affected by the proposed application: the Cross Borders Drove Road and the Post Road through the Meldons. The Cross Borders Drove Road, which uses BT40, is also promoted by the Tweed Trails initiative as part of a long distance equestrian route, and has been designated by NatureScot as one of Scotland's Great Trails.	Noted. These receptors will be fully considered within the EIA Report.	Chapter 14 - Socio-economics, Land Use, Recreation & Tourism.
ScotWays	Socio-economics, Land Use, Recreation & Tourism	As right of way BT40 is recorded as an equestrian right of way we would strongly recommend consulting the British Horse Society Scotland as their guidance regarding separation distance may differ from that set out above.	Noted. Further consultation will be undertaken.	Chapter 14 - Socio-economics, Land Use, Recreation & Tourism.
ScotWays	LVIA	We do not recognise the LVIA as providing a satisfactory approach to care for the interests of people involved in active open-air recreation.	Recreational receptors in the study area, such as walkers, riders and cyclists, will be represented by viewpoints throughout the study area.	Chapter 5 - Landscape and Visual Impact Assessment
Scottish Water	Hydrology	No objection to the Development. Drinking Water Protected Areas - there are no established Scottish Water Drinking water catchments or water abstraction resources, in the area that may be affected by the Development.	Noted.	Chapter 9 - Geology, Hydrology and Hydrogeology
Scottish Water	Hydrology	Unfortunately, according to our records there is no public Scottish Water, Water infrastructure within the vicinity of this proposed development therefore we would advise applicant to investigate private options.	Noted.	Chapter 9 - Geology, Hydrology and Hydrogeology
Scottish Water	Hydrology	Unfortunately, according to our records there is no public Scottish Water, Waste Water infrastructure within the vicinity of this proposed development therefore we would advise applicant to investigate private treatment options.	Noted.	Chapter 9 - Geology, Hydrology and Hydrogeology
Transport Scotland	Traffic & Transport	Transport Scotland will, therefore, require to be satisfied that the larger turbine components can negotiate the selected abnormal loads route, and that their transportation will not have any detrimental effect on structures within the trunk road route path.	An Abnormal Load Route Assessment will be undertaken and submitted with the EIA Report.	Chapter 11 - Access, Traffic & Transportation Technical Appendix - Abnormal Load Route Assessment

Consultee	Discipline	Scoping Comment	Response for Gatecheck	Chapter/Section in EIA Report where comments are addressed
Transport Scotland	Traffic & Transport	The SR indicates that an Abnormal Load Route Assessment (ALRA) will be undertaken for the revised turbine specification, and that this will be used to inform and define the route to site. It will also indicate any road improvement works which are required to permit delivery.	Noted	N/A
Transport Scotland	Traffic & Transport	Transport Scotland note that the SR states that this will include Swept Path Analysis "where required". Transport Scotland would request that a detailed review of the chosen route be undertaken, from the port of delivery through to the proposed site access point, and would request that details be provided with regard to any required works to the trunk road network including any changes to street furniture or structures. Transport Scotland would request that the ALRA be submitted with the EIA Report as a technical appendix.	An Abnormal Load Route Assessment will be undertaken and submitted with the EIA Report.	Chapter 11 - Access, Traffic & Transportation Technical Appendix - Abnormal Load Route Assessment
Transport Scotland	Traffic & Transport	The SR states that the potential environmental impacts associated with construction traffic will be considered and assessed where appropriate (i.e. where Institute of Environmental Management and Assessment Guidelines for further assessment are breached). We note that an assessment of effects on road safety, driver delay, pedestrian amenity, severance, noise and vibration will be undertaken as appropriate. Transport Scotland is satisfied with this approach, and would add that potential trunk road related environmental impacts will require to be considered and assessed where appropriate.	Noted, trunk road impacts will also be considered.	Chapter 11 - Access, Traffic & Transportation

Consultee	Discipline	Scoping Comment	Response for Gatecheck	Chapter/Section in EIA Report where comments are addressed
Transport Scotland	Traffic & Transport	Transport Scotland would also state that where significant changes in traffic are not noted for any link, no further assessment needs to be undertaken. Where environmental impacts have been fully investigated but found to be of little or no significance, it is sufficient to validate that part of the assessment by stating in the report: - The work that has been undertaken e.g. Transportation/ Noise / Air Quality Assessments etc; - What this has shown i.e. what impact if any has been identified; and - Why it is not significant. It is not necessary to include all the information gathered during the assessment of these impacts although this information should be available if requested.	Noted.	N/A
Energy Consent Unit	General EIA	The mitigation measures suggested for any significant environmental impacts identified should be presented as a conclusion to each chapter. Applicants are also asked to provide a consolidated schedule of all mitigation measures proposed in the environmental assessment, provided in tabular form, where that mitigation is relied upon in relation to reported conclusions of likelihood or significance of impacts.	Noted.	Chapter 16 - Summary of Mitigation
Energy Consent Unit	Hydrology	Scottish Ministers request an investigation into the presence of any private water supplies which may be impacted by the development. The EIA report should include details of any supplies identified by this investigation, and if any supplies are identified, the Company should provide an assessment of the potential impacts, risks, and any mitigation which would be provided.	A PWSRA being conducted as part of the EIA in which the properties supplied by a private water supply and the source location is identified. This assessment is still underway. A PWS Method Statement for the Development has been issued to SEPA and the EHO (29/04/2020) for comment. Comments received are incorporated into the assessment.	Chapter 9 - Geology, Hydrology and Hydrogeology Technical Appendix - Private Water Supply Risk Assessment

Consultee	Discipline	Scoping Comment	Response for Gatecheck	Chapter/Section in EIA Report where comments are addressed
Energy Consent Unit	Hydrology	Scottish Water provided information on whether there are any drinking water protected areas or Scottish Water assets on which the development could have any significant effect. Scottish Ministers request that the company contacts Scottish Water (via EIA@scottishwater.co.uk) and makes further enquiries to confirm whether there any Scottish Water assets which may be affected by the development, and includes details in the EIA report of any relevant mitigation measures to be provided.	Noted. Consultation with Scottish Water during scoping stage has confirmed no DWPA, clean water or wastewater assets in connection with the Development.	Chapter 9 - Geology, Hydrology and Hydrogeology
Energy Consent Unit	LVIA	The final viewpoints have to be agreed with the Energy Consents Unit in consultation with the relevant Planning Authority and NatureScot.	Viewpoints agreed with NatureScot 14/7/20 and Scottish Borders Council 21/7/20. Issued to ECU on 20/8/20 and included in Appendix C of this Gatecheck Report	Chapter 5 - Landscape and Visual Impact Assessment

6 APPENDIX B – TIP HEIGHT INCREASE CONSULTATION COMMENTS

Table B1 Further Consultation (Tip Height Increase) Consultee Comments and Responses

Consultee	Discipline	Further Consultation (Tip Height Increase) Comment	Response for Gatecheck	Chapter/Section in EIA Report where comments are addressed
Atkins	Aviation, Radar & Telecommunications	No Objection to the Development.	Noted.	N/A
British Telecommunications	Aviation, Radar & Telecommunications	No Objection to the Development.	Noted.	N/A
Eddleston & District Community Council	N/A	Holding response received but no formal response received.	N/A	N/A
Edinburgh Airport	Aviation, Radar & Telecommunications	No Objection to the Development.	Noted.	N/A
Highlands and Islands Airport Limited	Aviation, Radar & Telecommunications	No Objection to the Development.	Noted.	N/A
Joint Radio Company	Aviation, Radar & Telecommunications	No Objection to the Development.	Noted.	N/A
Defence Infrastructure Organisation	Other Issues (Aviation)	The turbines will be 65.8 km from, detectable by, and will cause unacceptable interference to the ATC radar used by Spadeadam Deadwater Fell.	Noted. Discussions ongoing with the Defence Infrastructure Organisation.	Chapter 13 - Aviation, Radar & Telecommunications
Defence Infrastructure Organisation	Aviation, Radar & Telecommunications	The noise budget required for this revised proposal exceeds the amount of budget previously allocated to the Cloich Forest Wind Farm application. Therefore, the MOD has concerns with this proposal as it will exceed the allocated budget.	Noted. Discussions ongoing with the Defence Infrastructure Organisation.	Chapter 13 - Aviation, Radar & Telecommunications

Consultee	Discipline	Further Consultation (Tip Height Increase) Comment	Response for Gatecheck	Chapter/Section in EIA Report where comments are addressed
Defence Infrastructure Organisation	Aviation, Radar & Telecommunications	If the developer can overcome the issues stated above, the MOD will request that the perimeter turbines be fitted with MOD accredited 25 candela omni-directional red lighting or infrared lighting with an optimised flash pattern of 60 flashes per minute of 200ms to 500ms duration at the highest practicable point.	Noted. Further Consultation will take place with the Defence Infrastructure Organisation in relation to this point.	Chapter 13 - Aviation, Radar & Telecommunications
NATS Safeguarding	Aviation, Radar & Telecommunications	No Objection to the Development.	Noted.	N/A
Prestwick Airport	Aviation, Radar & Telecommunications	No Objection to the Development.	Noted.	N/A
Scottish Borders Council	LVIA	There is clearly a difference in turbine locations (as well as a reduction of two in number of turbines proposed and an increase in height of 5m). The ZTV shows an increased visual impact on north edge of Upper Tweeddale NSA as well as other (limited) increases elsewhere. The differences and consequent visual effects should be addressed in the LVIA – the area of additional visibility may correspond to a Core Path route, in an area popular for walking.	Noted. The concerns raised will be fully assessed within the EIA Report.	
Scottish Borders Council	Noise & Hydrology	Environmental Health expects that an EIA which is likely to follow this scoping process will include a full noise impact assessment and address the applicant's strategy to ensure the quality, quantity and continuity of nearby private water supplies is not negatively impacted.	Noted. A full noise impact assessment, as well as PWS assessment will be undertaken and included in the EIA Report.	Chapter 10 - Noise Chapter 9 - Geology, Hydrology and Hydrogeology

Consultee	Discipline	Further Consultation (Tip Height Increase) Comment	Response for Gatecheck	Chapter/Section in EIA Report where comments are addressed
Scottish Borders Council	LVIA Cultural Heritage	The increase in turbine heights, albeit with a potentially positive decrease in numbers, has the potential to increase effects on the integrity of settings for both individual monuments and the historic landscape. It is important that all monuments assessed in the original application are assessed again in light of the new scheme. Additional monuments may fall into theoretical visibility and these too should be assessed. In addition, I feel we need a viewpoint from Macbeth's Castle in the Manor Valley as the forts, castles and later settlement/landscape features in the Manor, Meldon and Tweed valleys all form part of the same historic landscape where setting impacts are predicted.	An additional viewpoint from Macbeth's Castle in the Manor Valley has been included as a cultural heritage viewpoint.	Chapter 5 - Landscape & Visual Impact Assessment
Scottish Borders Council	LVIA	Looking at the Comparative ZTV, the Council would certainly recommend consideration of Viewpoints to cover the additional areas of visibility (if not already included as viewpoints or referred to by the Landscape Architect) at Kirkton Manor, the Stobo road junction with the A72, the Manor Valley, Traquair House, Bonnington Road in Peebles, Dawyck and the Meldons Road SW of Eddleston.	Noted. After discussions with the Council, it was confirmed there is very limited/no visibility from Kirkton Manor, Traquair House, and Bonnington Road in Peebles. Therefore it was confirmed these viewpoints did not need to be included within the LVIA. A viewpoint from Stobo Road, Meldons Road and near Dawyck will be included.	Chapter 5 - Landscape & Visual Impact Assessment
Scottish Borders Council	Ornithology	The revised turbine parameters will be required to be included in the Collision Risk Modelling for birds.	Noted. The EIA Report will use the most up-to-date turbine parameters for all assessments, including Collision Risk Modelling.	Chapter 8 - Ornithology

7 APPENDIX C - FINAL AGREED VIEWPOINT LIST

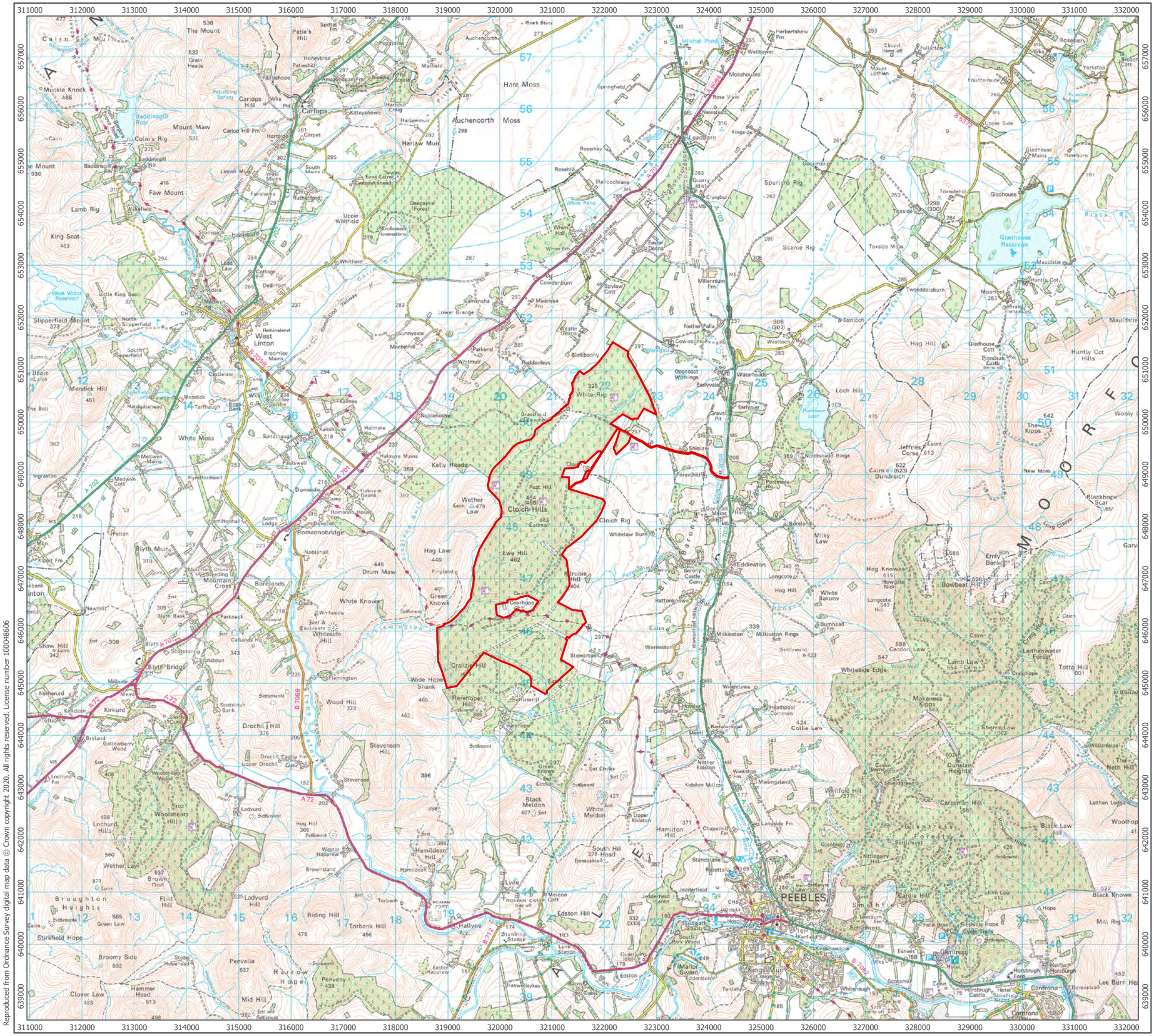
Table C1: Final Agreed Viewpoint List

VP No.	Viewpoint Name	Easting	Northing	Distance from turbine (km)	Description	Reasoning
1	Cross Borders Drove Road (west)	318620	646166	0.8	Represents views of recreational walkers along the Cross Borders Drove Road (one of Scotland's Great Trails) which passes through the Site.	Viewpoint in original application. SBC - Was requested as it was a VP in the original application and was deemed to have moderate or substantial effects.
2	Cross Borders Drove Road (east)	322532	644774	2.3	Represents views of recreational walkers along the Cross Borders Drove Road (one of Scotland's Great Trails) which passes through the Site.	Viewpoint in original application.
3	Old Post Road Core Path (east of Observatory)	323157	649501	2.5	Represents views of local residents, road users and walkers on a minor road and Core Path.	Viewpoint in original application. Requested by SBC - Was requested as it was a VP in the original application and was deemed to have moderate or substantial effects.
4	Black Meldon	320602	642554	3.5	Represents views of recreational receptors at a hilltop location within the NSA.	Requested by NatureScot (formerly Scottish Natural Heritage), SBC agreed to swap from White Meldon.
5	Meldon Valley	321242	641980	3.7	Represents views of road users and recreational receptors at a gateway to the NSA.	HES - Important to consider impact on views of White and Black Meldon including the potential for impacts on views from the south approaching the Meldons from the Meldon valley. NatureScot - The Meldon Valley has featured in our previous responses and is an important part of and gateway to the NSA. Impacts should be explored with wirelines and the worst case included as an LVIA viewpoint.
6	Core Path 154 near Eddleston	324732	647452	3.8	Represents views of walkers travelling along Core Path 154 to the east of Eddleston.	

VP No.	Viewpoint Name	Easting	Northing	Distance from turbine (km)	Description	Reasoning
7	Minor Road near Spylaw and Wester Deans	322066	652214	3.8	Represents views of road users on this minor road, and residential receptors at Spylaw Cottage and Wester Deans.	Viewpoint in original application. SBC - Was requested as it was a VP in the original application and was deemed to have moderate or substantial effects.
8	B7059 between Boghouse/Kaimeshouse	316552	649749	3.8	Represents views of road users and local residents	SBC - Was requested as it was a VP in the original application and was deemed to have moderate or substantial effects.
9	Portmore House	325193	648812	4.4	Represents views of recreational receptors within a Garden and Designed Landscape.	Taking forward at request of SBC/HES. SBC – "In the inventory it is described as of 'high' value as a Work of Art, with an 'outstanding' historical record of its development and has a scenic value with the mature woods and parks creating a setting for Portmore House while also enriches the valley landscape of the Eddleston Water." HES - Detailed consideration should also be given to impacts on Portmore House and its associated Inventory garden and designed landscape. Views of these assets from the east contribute to their current setting and have the potential to be impacted by the proposed development.
10	A701 Mountain Cross	314967	646680	4.5	Represents views of road users and residents at Mountain Cross.	Viewpoint in original application. SBC – Was requested as it was a VP in the original application and was deemed to have moderate or substantial effects. NatureScot – Request a viewpoint from the A701 to the west of the site.
11	A703 near Langside Farm (North of Peebles)	324940	641909	6.0	Represents views of road users and residents, adjacent to the A703 to the north of Peebles and within the Tweed Valley SLA.	Viewpoint in original application. Represents views travelling out of Peebles.

VP No.	Viewpoint Name	Easting	Northing	Distance from turbine (km)	Description	Reasoning
12	A702, approach to West Linton	315380	652507	6.1	Represents views of road users on the A702. This viewpoint is within the Pentland Hills SLA.	Taking forward instead of B7059 near Boghouse which is the same viewing direction, with similar receptors, but greater visibility of the development from the A702.
13	A703 Lay-by	324063	654030	6.5	Represents views of road users along the A703, to the north-east of the Site.	Viewpoint in original application. Represents views travelling out of Peebles.
14	B712 / Stobo Road	319396	639265	6.7	Represents views of road users within the Upper Tweeddale NSA.	Additional VP on the Stobo Road and Tweed Cycle Route. Requested by NatureScot and SBC. NatureScot GR 318881, 638288.
15	Path near Wester Happrew Burn	315433	640430	7.2	Represents views of recreational receptors along the path near Riding Hill and within the Tweedsmuir Uplands SLA.	Represents views from Tweed Uplands SLA.
16	Haswelskyes	321175	638649	7.4	Represents views of road users and recreational receptors within the NSA	Viewpoint in original application. SBC - Was requested as it was a VP in the original application and was deemed to have moderate or substantial effects.
17	Glentress Forest, Makeness Kipps	328129	644723	7.6	Represents views of recreational receptors at the summit of Makeness Kipps.	Viewpoint in original application. SBC - Was requested as it was a VP in the original application and was deemed to have moderate or substantial effects.
18	A702, Dolphinton	310611	646800	8.8	Represents views of road users and residents adjacent to the A702, near Dolphinton. This viewpoint is within the Pentland Hills and Black Mount SLA.	Requested by NatureScot. Represents views experienced by residential receptors at Dolphinton. This viewpoint will be an additional viewpoint.
19	Cademuir Hill Fort	323040	637490	8.9	Represents views of recreational receptors visiting Cademuir Hill Fort, within the Upper Tweeddale NSA.	Viewpoint in original application. HES - Important to consider impact on views of White and Black Meldon including the potential for impacts on views from the fort on Cademuir Hill

VP No.	Viewpoint Name	Easting	Northing	Distance from turbine (km)	Description	Reasoning
20	Blackhope Scar	331510	648320	10.7	Represents views of walkers on the edge of the Gladhouse Reservoir and Moorfoot Scarp SLA.	Requested by NatureScot. Represents views from within the Moorfoot Hills – cumulative effect. NatureScot - A viewpoint within the hill tops of the Moorfoots to show both Cloich and Bowbeat.
21	Gladhouse Reservoir	330490	654308	11.4	Represents views of road users and visitors to Gladhouse Reservoir, in the Gladhouse Reservoir and Moorfoot Scarp SLA.	Viewpoint in original application. Represents views from the SLA.
22	Carnethy Hill	320372	661898	13.0	Represents views of recreational receptors at a hilltop location within the Pentland Hills SLA.	Viewpoint in original application. Only VP from Pentlands in the north. Representative of views from SLA.
23	Stob Law	323047	633281	13.0	Represents views of recreational receptors at a hilltop location within the Upper Tweeddale NSA.	Viewpoint in original application. Represents views from hill top location within Upper Tweeddale NSA.
24	Bleak Law	306505	651248	13.8	Represents views of recreational receptors at the hill summit, within the Pentland Hills and Black Mount SLA.	Viewpoint in original application. Only VP from Pentlands in the west. Representative of views from SLA.
25	Lee Pen	332594	638598	14.1	Represents views of recreational receptors at a hilltop location within the Tweed Valley SLA.	Viewpoint in original application. Represents views from the Tweed Valley SLA.
26	B7007 (northern edge of Moorfoot Hills)	335229	654767	15.9	Represents views of road users within the Gladhouse Reservoir and Moorfoot Scarp SLA.	Requested by NatureScot. Represents panoramic views experienced by road users. NatureScot – It is a location with panoramic views before road turns into the interior of the hills.



Site Boundary

1:70,000 Scale @ A3

0 1 2 km

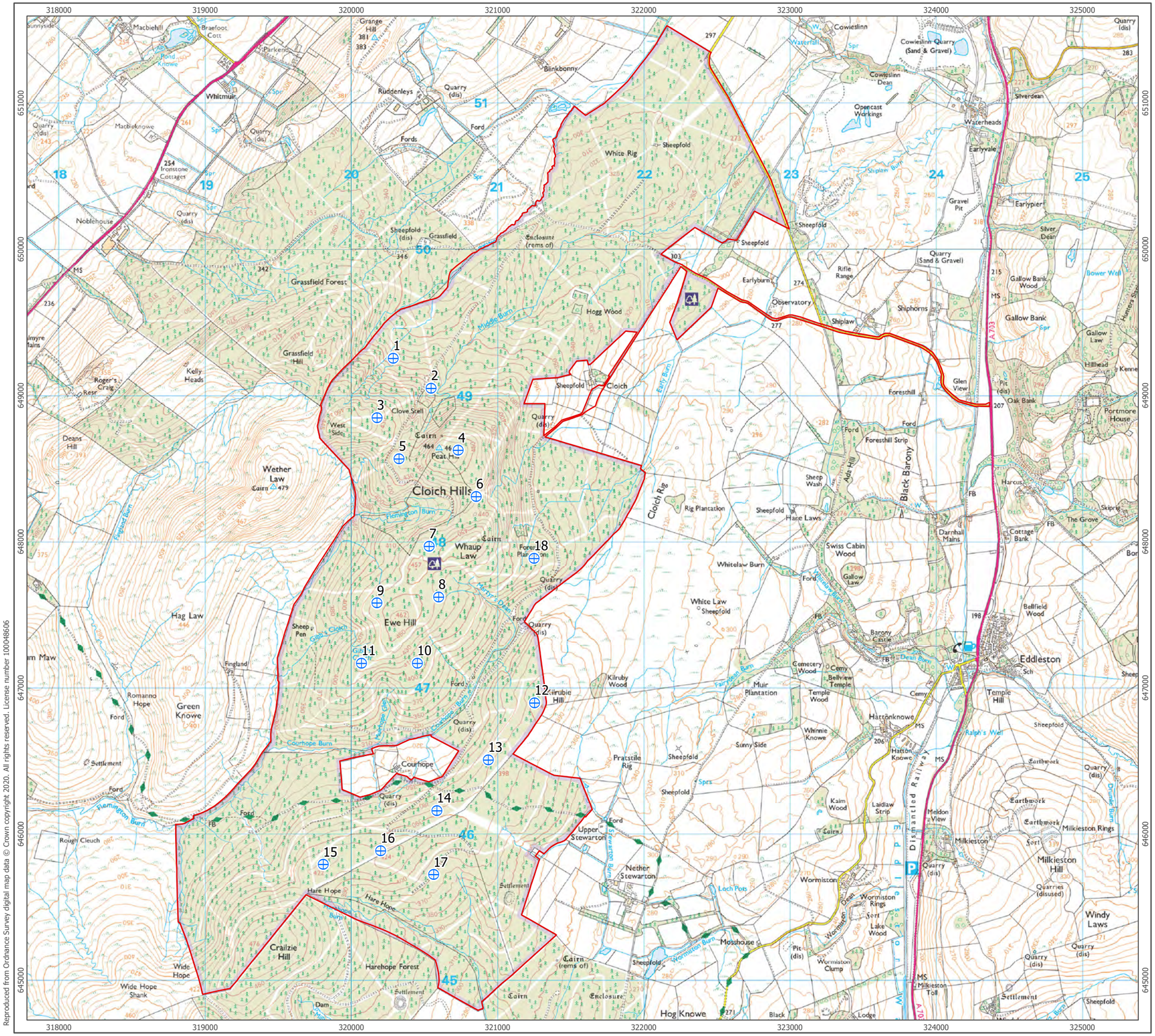
NORTH

Produced By: FC	Ref: 3439-REP-019
Checked By: SC	Date: 21/08/2020

Site Location
Figure 1

Cloich Forest Wind Farm
Gatecheck Report

P:\Projects\Environment\3439 Cloich WF\3439 Cloich WF.aprx\3439-REP-019 Fig01 Site Location



1:25,000 Scale @ A3

0 0.5 1 km

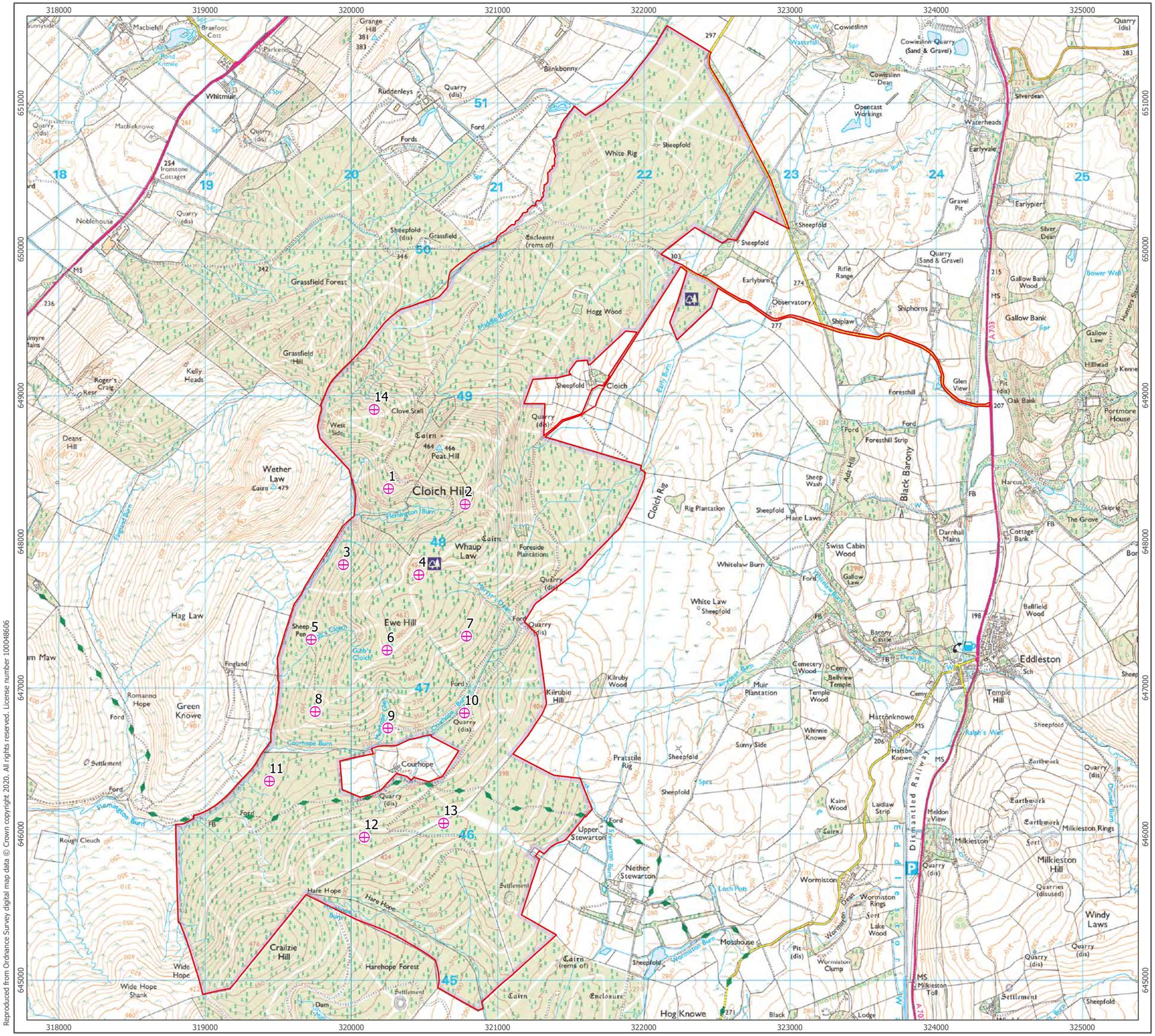
NORTH

Produced By: FC	Ref: 3439-REP-020
Checked By: SC	Date: 21/08/2020

Original Consented Layout
Figure 2

Cloich Forest Wind Farm
Gatecheck Report

P:\Projects\Environment\3439 Cloich WF\3439 Cloich WF.aprx\3439-REP-020 Fig02 Original Consented Layout



Reproduced from Ordnance Survey digital map data © Crown copyright 2020. All rights reserved. License number 100048606

P:\Projects\Environment\3439 Cloich WF\3439 Cloich WF.aprx\3439-REP-021 Fig03 Scoping Layout

eDF renewables

ARCUS

Site Boundary

Scoping Turbine Layout

1:25,000 Scale @ A3

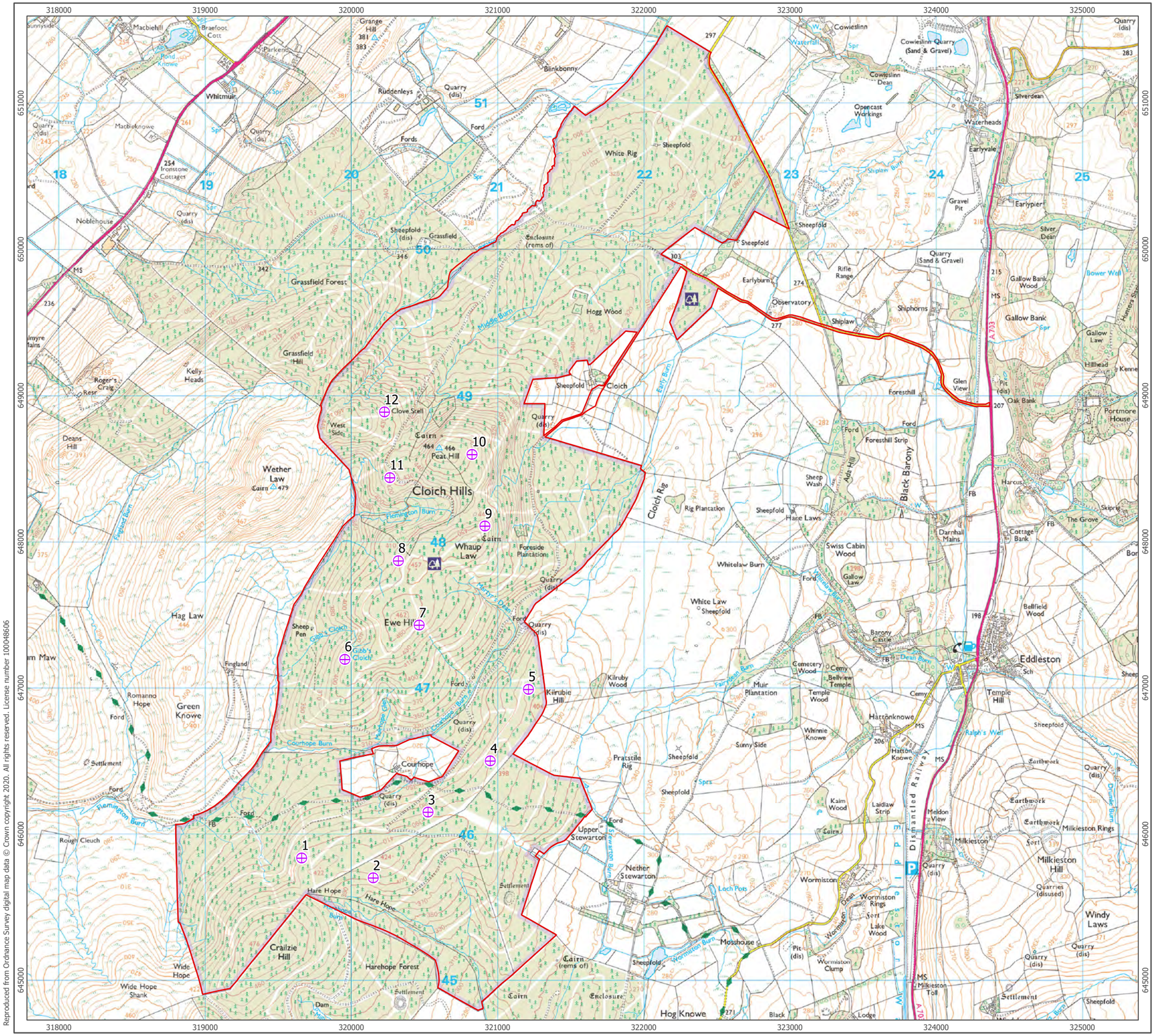
0 0.5 1 km

NORTH

Produced By: FC	Ref: 3439-REP-021
Checked By: SC	Date: 21/08/2020

Scoping Layout
Figure 3

Cloich Forest Wind Farm
Gatecheck Report



P:\Projects\Environment\3439 Cloich WF\3439 Cloich WF.aprx\3439-REP-022 Fig04 Design Iteration (Increased Tip Height) Layout

Site Boundary

Design Iteration (Increased Tip Height) Turbine Layout

1:25,000 Scale @ A3

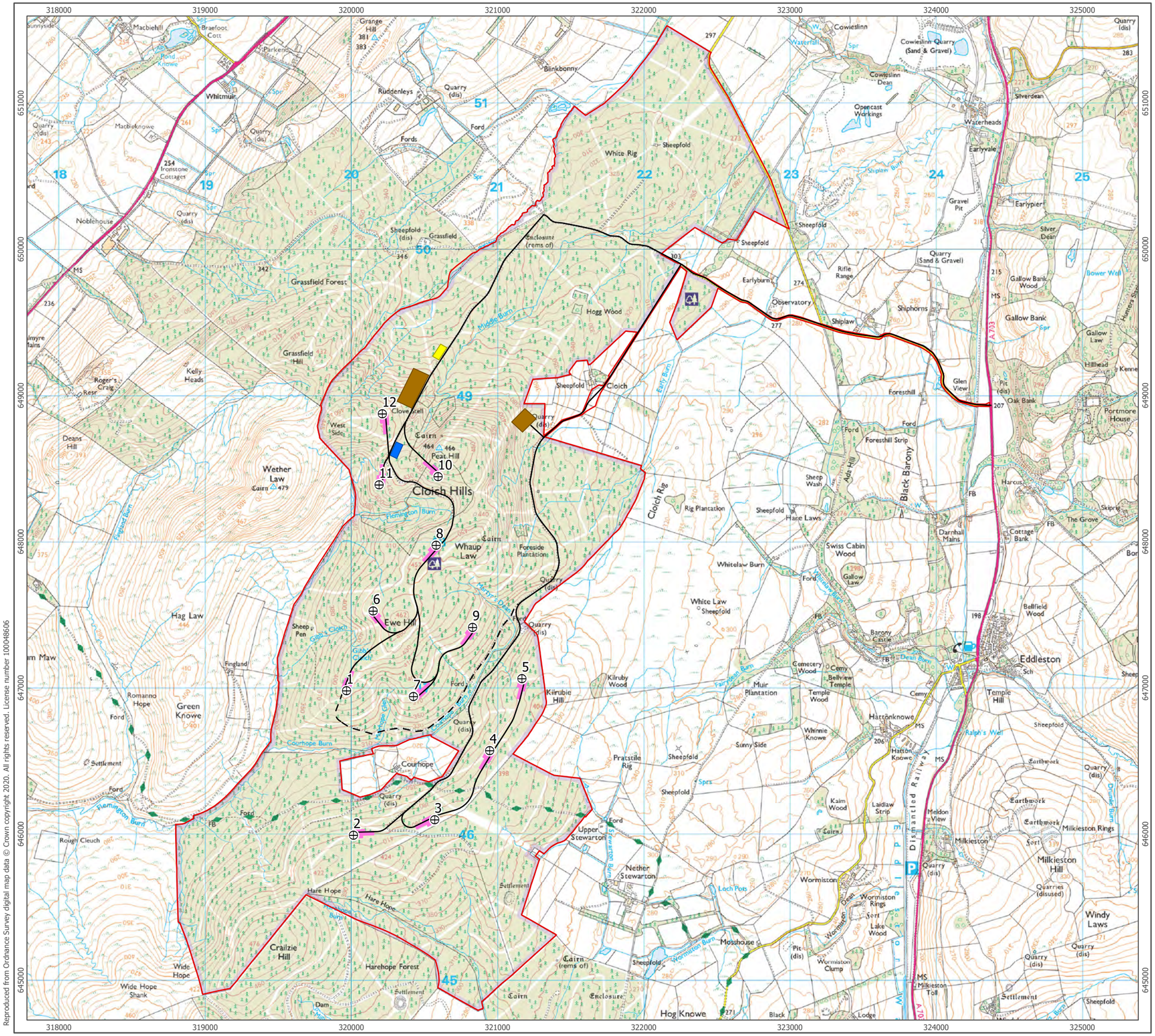
0 0.5 1 km

NORTH

Produced By: FC	Ref: 3439-REP-022
Checked By: SC	Date: 21/08/2020

Design Iteration (Increased Tip Height) Layout
Figure 4

Cloich Forest Wind Farm Gatecheck Report



Reproduced from Ordnance Survey digital map data © Crown copyright 2020. All rights reserved. License number 100048606

P:\Projects\Environment\3439 Cloich WF\3439 Cloich WF.aprx\3439-REP-023 Fig05 Draft Track Layout

Planning Boundary

⊕ Draft Track Turbine Layout

Proposed Crane Hardstanding

Proposed Construction Compound

Proposed Substation

Proposed Borrow Pits

Access Track

Access Track for Construction Traffic Only

1:25,000 Scale @ A3

0 0.5 1 km

NORTH

Produced By: FC	Ref: 3439-REP-023
Checked By: SC	Date: 24/08/2020

Draft Track Layout
Figure 5

Cloich Forest Wind Farm
Gatecheck Report

CLOICH FOREST WIND FARM

VOLUME 3: TECHNICAL APPENDICES

TECHNICAL APPENDIX A5.1: LVIA METHODOLOGY

JUNE 2021

Prepared By:

Arcus Consultancy Services

7th Floor
144 West George Street
Glasgow
G2 2HG

T +44 (0)141 221 9997 l **E** info@arcusconsulting.co.uk
w www.arcusconsulting.co.uk

Registered in England & Wales No. 5644976

TABLE OF CONTENTS

1 LVIA METHODOLOGY

1.1 Introduction

This appendix sets out the detailed methodology used for the Cloich Forest Wind Farm Landscape and Visual Impact Assessment (LVIA) and Cumulative Landscape and Visual Impact Assessment (CLVIA) set out in Chapter 5: LVIA, Volume 1 of the Environmental Impact Assessment Report (EIA Report).

The methodology for the production of accompanying visualisations was based on current good practice guidance as set out by Scottish Natural Heritage (SNH)[1] (now known as NatureScot), and detailed information about the approach to viewpoint photography, and Zone of Theoretical Visibility (ZTV) and visualisation production is provided in Appendix A5.2.

Landscape and visual assessments are separate, although linked, processes. LVIA therefore considers the likely effects of a proposed development on:

- Landscape as a resource in its own right (caused by changes to the constituent elements of the landscape, its specific aesthetic or perceptual qualities and the character of the landscape); and
- Views and visual amenity as experienced by people (caused by changes in the appearance of the landscape).

LVIA deals with landscape and visual effects separately, followed by an assessment of cumulative landscape and visual effects where relevant.

1.2 Guidance

This methodology has been developed by Chartered Landscape Architects (Chartered Members of the Landscape Institute (CMLI)) at Land Use Consultants Ltd (LUC), who have extensive experience in the assessment of landscape and visual effects arising from wind energy developments.

The methodology has been developed primarily in accordance with the principles contained within the Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA3)[2]. SNH cumulative guidance[3] also informs the approach to the assessment of cumulative landscape and visual effects in relation to onshore wind energy development.

1.3 Scope of an Assessment

An LVIA considers physical changes to the landscape as well as changes in landscape character. It also considers changes to areas designated for their scenic or landscape qualities, and the visual impacts of a proposed development as perceived by people.

All potentially significant landscape and visual effects (including cumulative effects) are examined, including those relating to construction, operation and, where relevant, decommissioning.

Where it is judged that significant effects are unlikely to occur, the assessment of likely effects on some receptors may be '*scoped out*'. For an Environmental Impact Assessment (EIA) development this is usually agreed at scoping stage.

[1] Scottish Natural Heritage (2017). Visual Representation of Wind Farms Guidance, Version 2.2.

[2] The Landscape Institute and Institute of Environmental Management and Assessment (2013). Guidelines for Landscape and Visual Impact Assessment, 3rd Edition. Routledge.

[3] Scottish Natural Heritage (2012). Guidance: Assessing the Cumulative Impact of Onshore Wind Energy Developments.

1.4 Assessment Methodology

1.4.1 Study Area

The study area for an LVIA is determined by the nature and scale of the development proposed and the nature of the study area (*e.g.,* complex topography or extensive tree cover leading to visually enclosed areas may limit the extent of likely significant effects).

1.4.2 Methodological Overview

The key steps in the methodology for assessing landscape and visual effects are as follows:

- the landscape of the study area is analysed, and landscape receptors identified, informed by desk and field-survey;
- the area over which the development will potentially be visible is established through the creation of an initial ZTV plan4;
- the visual baseline is recorded in terms of the different receptors (groups of people) who may experience views of the development (informed by the initial ZTV) and the nature of their existing views and visual amenity;
- potential assessment viewpoints are selected, as advocated by GLVIA3 to represent a range of different receptors and views, in consultation with statutory consultees;
    - *'**Representative viewpoints**, selected to represent the experience of different types of visual receptor, where larger numbers of viewpoints cannot all be included individually and where the significant effects are unlikely to differ – for example, certain points may be chosen to represent the views of users of particular public footpaths and bridleways;*
    - ***Specific viewpoints**, chosen because they are key and sometimes promoted viewpoints within the landscape, including for example specific local visitor attractions, viewpoints in areas of particularly noteworthy visual and/or recreational amenity such as landscapes with statutory landscape designations, or viewpoints with particular cultural landscape associations; and*
    - ***Illustrative viewpoints,** chosen specifically to demonstrate a particular effect or specific issues, which might, for example, be the restricted visibility at certain locations' (*GLVIA3, Para 6.19, Page 109).
- likely significant effects on both the landscape as a resource and visual receptors will be identified; and
- the level (and significance) of landscape and visual effects are judged with reference to the nature of the receptor (commonly referred to as the sensitivity of the receptor), which considers both susceptibility and value, and the nature of the effect (commonly referred to as the magnitude of effect), which considers a combination of judgements including size/scale, geographical extent, duration and reversibility.

1.4.3 Direction of Effects

As required by the EIA Regulations[5], the assessment must identify the direction of effect as either being beneficial, adverse (also referred to as positive or negative) or neutral.

The direction of landscape, visual and cumulative effects (**beneficial**, **adverse** or **neutral**) is determined in relation to the degree to which the proposal fits with the existing landscape character or views, and the contribution to the landscape or views that the proposed development makes, even if it is in contrast to the existing character of the landscape or views.

[4] A bare ground ZTV indicates areas from where a development is theoretically visible, but does not account for screening from vegetation and/or buildings

[5] Scottish Government (2017). The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended).

With regard to wind energy development, whilst there is a broad spectrum of response from the strongly positive to the strongly negative, an assessment is required to take an objective approach. Therefore, to cover the '*maximum case effect'* situation, likely landscape, visual effects (including cumulative effects) relating to commercial scale wind farm developments are generally assumed to be adverse (negative).

1.5 Method for Assessing Landscape Effects

As outlined in GLVIA3: '*An assessment of landscape effects deals with the effects of change and development on landscape as a resource*.' (GLVIA3, Para 5.1, Page 70). Changes may affect the elements that make up the landscape, the aesthetic and perceptual aspects of the landscape and its distinctive character.

An assessment of landscape effects requires consideration of the nature of landscape receptors (sensitivity of receptor) and the nature of the effect on those receptors (magnitude of effect). GLVIA3 states that the nature of landscape receptors, commonly referred to as their sensitivity, should be assessed in terms of the susceptibility of the receptor to the type of change proposed, and the value attached to the receptor. The nature of the effect on each landscape receptor, commonly referred to as its magnitude, should be assessed in terms of size and scale of effect, geographical extent, duration and reversibility.

These aspects are considered together, to form a judgement regarding the overall significance of landscape effects (GLVIA3, Figure 5.1 Page 71). The following sections set out the methodology used to evaluate sensitivity and magnitude.

1.5.1 Significance of Landscape Effects

As outlined in GLVIA3: '*An assessment of landscape effects deals with the effects of change and development on landscape as a resource.'* (GLVIA3, Para 5.1, Page 70). The introduction of a development could affect the elements which make up the landscape, the aesthetic or perceptual aspects of the landscape or its distinctive character.

Landscape receptors are the constituent elements of the landscape, its specific aesthetic or perceptual qualities and the character of the landscape in different areas (GLVIA3, Para. 3.21, Page 36).

GLVIA3 states that the sensitivity of landscape receptors should be assessed in terms of the susceptibility of the receptor to the type of change or development proposed, and the value attached to the landscape. The magnitude of effect should be assessed in terms of the size and scale, geographical extent, duration and reversibility of the effect.

These aspects are considered together, to form a judgement regarding the overall significance of landscape effect (GLVIA3, Figure 5.1 Page 71). The following sections set out the methodology used to evaluate sensitivity and magnitude.

1.5.2 Sensitivity of Landscape Receptors

The sensitivity of a landscape receptor to change is defined as **high**, **medium** or **low** and is based on weighing up professional judgements regarding susceptibility and value, as set out below.

Table 5.1.1: Sensitivity of Landscape Receptors

Sensitivity of Landscape Receptors			
	Higher	⟷	**Lower**
Susceptibility	Attributes that make up the character of the landscape offer very limited opportunities for the accommodation of change without key characteristics being fundamentally altered by wind energy development, leading to a different landscape character.	⟷	Attributes that make up the character of the landscape are resilient to being changed by wind energy development.
Value	Landscapes with high scenic quality, high conservation interest, recreational value, important cultural associations or a high degree of rarity. Areas or features designated at a national level *e.g.,* National Parks or National Scenic Areas or key features of these with national policy level protection.	⟷	Landscape of poor condition and intactness, limited aesthetic qualities, or of character that is widespread. Areas or features that are not formally designated.

1.5.2.1 Susceptibility of Landscape Receptors

Susceptibility is defined by GLVIA3 as '*the ability of the landscape receptor (whether it be the overall character or quality/condition of a particular type or area, or an individual element and/or feature, or a particular aesthetic and perceptual aspect) to accommodate the proposed development without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies*' (GLVIA3 paragraph 5.40).

A series of criteria are used to evaluate the susceptibility of Landscape Character Types (LCTs) or Landscape Character Areas (LCAs) to wind energy development as set out in the table below. These criteria or aspects are drawn from a range of published sources relating to wind farm development, including SNH's Siting and Designing Windfarms in the Landscape[6] and GLVIA3.

[6] Scottish Natural Heritage (2017). Siting and Designing Windfarms in the Landscape, Version 3a.

Table 5.1.1: Aspects Influencing Susceptibility of Landscape Receptors to Wind Turbines

Aspects Influencing Susceptibility of Landscape Receptors to Wind Turbines			
Characteristic/ attribute	**Aspects indicating reduced susceptibility to wind energy development**	⟷	**Aspects indicating greater susceptibility to wind energy development**
Scale	Large scale	⟷	Small scale
Value	Absence of strong topographical variety, featureless, convex or flat	⟷	Presence of strong topographical variety or distinctive landform features
Landscape pattern and complexity	Simple Regular or uniform	⟷	Complex Rugged and irregular
Settlement and man-made influence	Presence of contemporary structures *e.g.,* utility, infrastructure or industrial elements	⟷	Absence of modern development Presence of small scale, historic or vernacular settlement
Skylines	Non-prominent /screened skylines Presence of existing modern man-made features	⟷	Distinctive, undeveloped skylines Skylines that are highly visible over large areas or exert a large influence on landscape character Skylines with important historic landmarks
Inter-visibility with adjacent landscapes	Little inter-visibility with adjacent sensitive landscapes or viewpoints	⟷	Strong inter-visibility with sensitive landscapes Forms an important part of a view from sensitive viewpoints
Perceptual aspects	Close to visible or audible signs of human activity and development	⟷	Remote from visible or audible signs of human activity and development

Published landscape capacity or sensitivity studies (where they exist) may be reviewed to inform the evaluation of susceptibility, in addition to fieldwork undertaken across the study area. This review includes an evaluation as to the relevance of the publication to the assessment being undertaken (*e.g.,* consideration of the purpose and scope of the published studies and whether they have become out of date).

Landscape susceptibility is described as being **high**, **medium** or **low**.

1.5.2.2 Value of Landscape Receptors

The European Landscape Convention advocates that all landscape is of value, whether it is the subject of defined landscape designation or not: '*The landscape is important as a component of the environment and of people's surroundings in both town and country and whether it is ordinary landscape or outstanding landscape*' (Explanatory Report to the European Landscape Convention, Page 6). The value of a landscape receptor is recognised as being a key contributing factor to the sensitivity of landscape receptors.

The value of landscape receptors is determined with reference to:

- Review of relevant designations and the level of policy importance that they signify (such as landscapes designated at international, national or local level); and/or
- Application of criteria that indicate value (such as scenic quality, rarity, recreational value, representativeness, conservation interests, perceptual aspects and artistic associations) as described in GLVIA3, paragraphs 5.44 - 5.47.

Internationally and nationally designated landscapes would generally indicate landscape of higher value whereas those without formal designation (such as a widespread or common landscape type without high scenic quality) are likely to be of lower value, bearing in mind that all landscapes are valued at some level. There is however variation across both designated and undesignated areas, and so judgements regarding value are also informed by fieldwork.

Landscape value is described as being **high**, **medium** or **low**.

1.5.3 Magnitude of Landscape Effect

The overall judgement of magnitude of landscape effect is based on combining professional judgements on size and scale, geographical extent, duration and reversibility. Further information on the criteria is provided below.

1.5.3.1 Size and Scale of Effect

For landscape elements/features this depends on the extent of existing landscape elements that would be lost or changed, the proportion of the total extent that this represents, and the contribution of that element to the character of the landscape.

In terms of landscape character, this reflects the degree to which the character of the landscape would change as a result of removal or addition of landscape components, and how the changes would affect key characteristics.

The size and scale of the effect is described as being **large**, **medium**, **small**, or **barely perceptible**.

1.5.3.2 Geographical Extent of Effect

The geographical extent over which the landscape effect would arise is described as being **large** (scale of the landscape character type, or widespread, affecting several landscape types or character areas), **medium** (more immediate surroundings) or **small** (site level).

1.5.3.3 Duration of Effect

GLVIA3 states that '*Duration can usually be simply judged on a scale such as short term, medium term or long term*' (GLVIA3, Page 91). For the purposes of the assessment, duration is often determined in relation to the phases of the proposed development, as follows:

- **Short-term** effects are those that occur during construction, and may extend into the early part of the operational phase, e.g., construction activities, generally lasting 0 - 5 years;
- **Medium-term** effects are those that occur during part of the operational phase, generally lasting 5 - 10 years; and
- **Long-term** effects are those which occur throughout the operational phase (in this instance 30 years), e.g., presence of turbines, or are permanent effects which continue after the operational phase, generally lasting over 10 years.

1.5.3.4 Reversibility of Effect

In accordance with the principles contained within GLVIA3, reversibility is reported as **reversible**, **partially reversible** or **irreversible** (*i.e.,* permanent), and is related to whether the change can be reversed at the end of the phase of development under consideration (*i.e.,* at the end of construction or at the end of the operational lifespan of the development).

Judgements on the magnitude of landscape effect (nature of landscape effect) are recorded as **high**, **medium** or **low** and are guided by the table below.

Table 5.1.2: Magnitude of Landscape Effect

Magnitude of Landscape Effect			
	Higher	⟷	**Lower**
Size/Scale	Extensive loss of landscape features and/or elements, and/or change in, or loss of key landscape characteristics, and/or creation of new key landscape characteristics	⟷	Limited loss of landscape features and/or elements, and/or change in or loss of some secondary landscape characteristics
Geographical Extent	Change in landscape features and/or character extending considerably beyond the immediate site and potentially affecting multiple landscape character types/areas	⟷	Change in landscape features and/or character extending contained within or local to the immediate site and affecting only a small part of the landscape character type/area
Duration	Changes experienced for a period of around 10 years or more	⟷	Changes experienced for a shorter period of up to 5 years
Reversibility	Change to features, elements or character which cannot be undone or are only partly reversible after a long period	⟷	A temporary landscape change which is largely reversible following the completion of construction, or decommissioning of the development

1.5.4 Judging Levels of Landscape Effect and Significance

The final step in the assessment requires the judgements of sensitivity and magnitude of effect to be combined to make an informed professional assessment on the significance of each landscape effect (GLVIA3, Figure 5.1, Page 71).

There may be a complex relationship between the value attached to a landscape and the susceptibility of the landscape to a specific change. Therefore, the rationale for judgements on the sensitivity of landscape receptors needs to be clearly set out for each receptor. Further information on the criteria is provided below. It should be noted that whilst landscape designations at an international or national level are likely to be accorded the highest value, it does not necessarily follow that such landscapes all have a high susceptibility to all types of change, and conversely, undesignated landscapes may also have high value and susceptibility to change (GLVIA3, Page 90).

Although a numerical or formal weighting system is not applied, consideration of the relative importance of each aspect is made to feed into the overall decision. Levels of effect are identified as **negligible**, **minor**, **moderate** or **major** where moderate and major effects are considered **significant** in the context of the EIA Regulations.

This determination requires the application of professional judgement and experience to take on board the many different variables which need to be considered, and which are given different weight according to site-specific and location-specific considerations in every instance. Judgements are made on a case-by-case basis, guided by the principles set out in **Diagram 1** below. A rigid matrix-type approach, which does not take on board professional judgement and experience, and where the level of effect is defined simply based on the level of sensitivity (nature of receptor) combined with the magnitude of change (nature of effect), is not used. As such, the conclusion on the level of effect is not always the same.

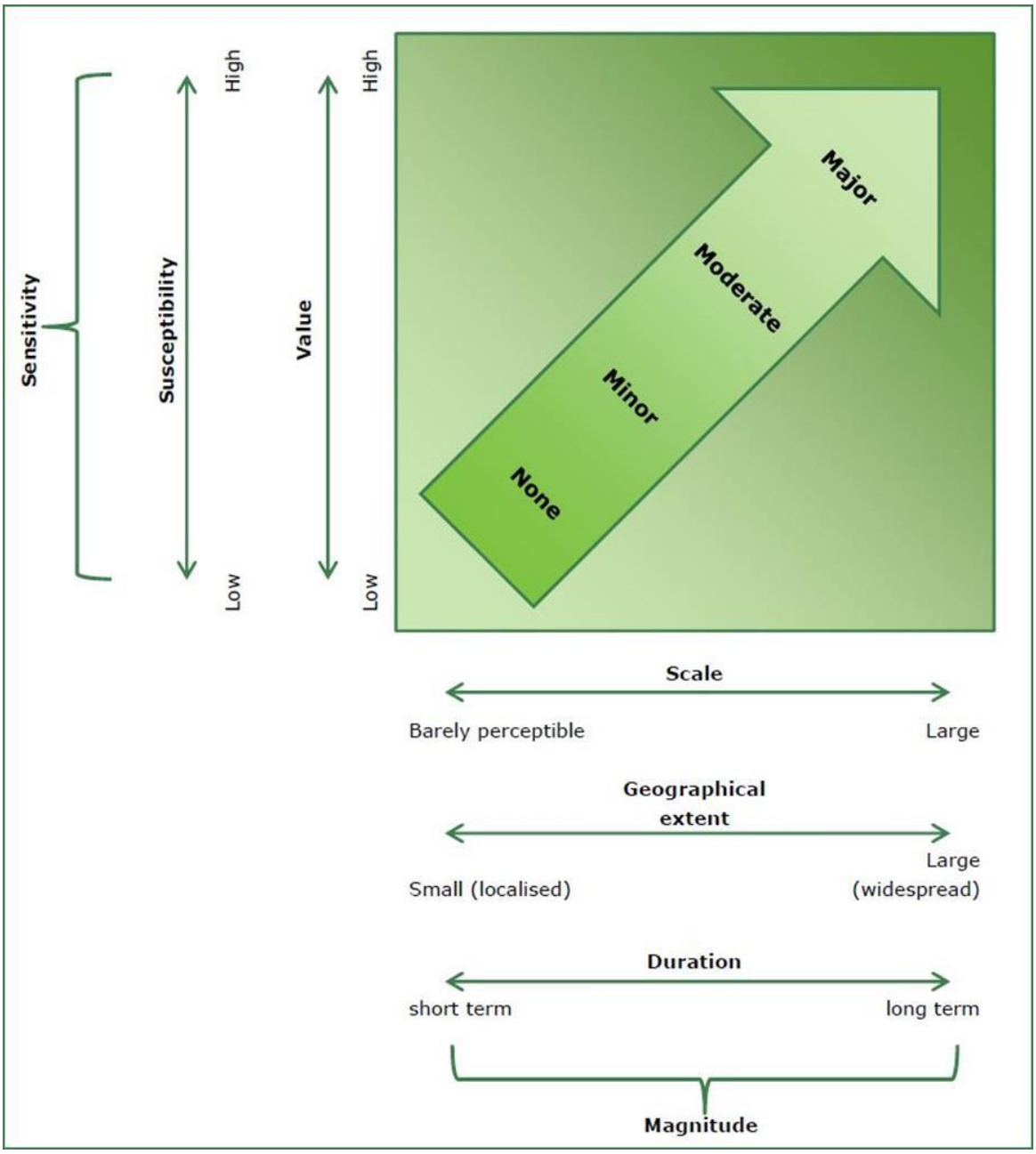


Diagram 1: Judging levels of effect – Landscape or Visual (including cumulative)

1.6 Method for Assessing Visual Effects

1.6.1 Significance of Visual Effects

As outlined in GLVIA3: '*An assessment of visual effects deals with the effects of change and development on views available to people and their visual amenity'* (GLVIA3, Para 6.1, Page 98). Changes in views may be experienced by people at different locations within the study area including from static locations (normally assessed using representative viewpoints) and whilst moving through the landscape (normally referred to as sequential views, *e.g.,* from roads and walking routes).

Visual receptors are individuals or groups of people who may be affected by changes in views and visual amenity. They are usually grouped by their occupation or activity (*e.g.,* residents, motorists, recreational users) and the extent to which their attention is focused on the view (GLVIA3, Paras. 6.31 – 6.32, Page 113).

GLVIA3 states that the sensitivity of visual receptors should be assessed in terms of the susceptibility of the receptor to change in views and/or visual amenity and the value attached to particular views. The magnitude of effect should be assessed in terms of the size and scale, geographical extent, duration and reversibility of the effect.

These aspects are considered together, to form a judgement regarding the overall significance of visual effect (GLVIA3, Figure 6.1 Page 99). The following sections set out the methodology used to evaluate sensitivity and magnitude.

1.6.2 Sensitivity of Visual Receptor

The sensitivity of a visual receptor to change is defined as **high**, **medium** or **low** and is based on weighing up professional judgements regarding susceptibility and value, and each of their component considerations, as set out in the below.

Table 5.1.3: Sensitivity of Visual Receptors

Sensitivity of Visual Receptors			
	Higher	⟷	**Lower**
Susceptibility	Viewers whose attention or interest is focused on their surroundings, including communities/ individual residential receptors/ people engaged in outdoor recreation/ visitors to heritage assets or other attractions where views of surrounding area an important contributor.	⟷	People whose attention is not on their surroundings (and where setting is not important to the quality of working life) such as commuters/ people engaged in outdoor sports/ people at their place of work.
Value	Views may be recorded in management plans, guide books, and/or which are likely to be experienced by large numbers of people. Views may be associated with nationally designated landscapes; local authority designated landscapes; designed views recorded in citations for historic parks, gardens/scheduled monuments etc.	⟷	Views which are not documented or protected. Views which are more incidental, and less likely to be associated with somewhere people travel to or stop, or which may be experienced by smaller numbers of people.

1.6.2.1 Susceptibility of Visual Receptor

The susceptibility of visual receptors to changes in views/visual amenity is a function of the occupation or activity of people experiencing the view and the extent to which their attention is focused on views (GLVIA 3, para 6.32). This is recorded as **high**, **medium** or **low** informed by the table below.

Table 5.1.4: Susceptibility of Visual Receptors

Susceptibility of Visual Receptors		
High	**Medium**	**Low**
Viewers whose attention or interest is focussed on their surroundings, including: • communities where views contribute to the landscape setting enjoyed by residents; • people engaged in outdoor recreation (including users of cycle routes, footpaths and public rights of way whose interest is likely to be focused on the landscape); • visitors to heritage assets or other attractions where views of surroundings are an important contributor to experience; and • visitors to formal or promoted stopping places on scenic or tourist routes.	• People travelling in vehicles on scenic routes and tourist routes, where attention is focused on the surrounding landscape, but is transitory; and • People at their place of work whose attention is focused on the surroundings and where setting is important to the quality of working life.	• People travelling more rapidly on more major roads, rail or transport routes (not recognised as scenic routes); • People engaged in outdoor sport or recreation which does not involve or depend upon appreciation of views of the landscape; and • People at their place of work whose attention is not on their surroundings (and where setting is not important to the quality of working life).

1.6.2.2 Value of View or Visual Amenity

GLVIA3 also requires evaluation of the value attached to the view or visual amenity and relates this to planning designations and cultural associations (GLVIA3, Para. 6.37, Page 114).

Recognition of the value of a view is determined with reference to:

- planning designations specific to views;
- whether it is recorded as important in relation to designated landscapes (such as views specifically mentioned in the special qualities of a National Scenic Area);
- whether it is recorded as important in relation to heritage assets (such as designed views recorded in citations of Gardens and Designed Landscapes (GDL) or views recorded as of importance in Conservation Area Appraisals); and
- the value attached to views by visitors, for example through appearances in guide books or on tourist maps, provision of facilities for their enjoyment and references to them in literature and art.

A designated viewpoint or scenic route advertised on maps and in tourist information, or which is a significant destination in its own right, such as a Munro summit, is likely to indicate a view of higher value. High value views may also be recognised in relation to the special qualities of a designated landscape or heritage asset, or it may be a view familiar from photographs or paintings.

Views experienced from viewpoints or routes not recognised formally or advertised in tourist information, or which are not provided with interpretation or, in some cases, formal access are likely to be of lower value.

Judgements on the value of views or visual amenity are recorded as **high**, **medium** or **low**.

1.6.3 Magnitude of Visual Effect

The overall judgement of magnitude of visual effect (nature of visual effect) is based on weighing up professional judgements on size and scale, geographical extent, duration and reversibility. Further information on the criteria is provided below.

1.6.3.1 Size and Scale

The size and scale of a visual change depends on:

- the scale of the change in the view with respect to the loss or addition of features in the view and changes in its composition, including the proportion of the view occupied by the proposed development;
- the degree of contrast or integration of any new features or changes in the landscape with the existing or remaining landscape elements and characteristics in terms of form, scale and mass, line, height, colour and texture; and
- the nature of the view of the proposed development, in terms of the relative amount of time over which it will be experienced and whether views will be full, partial or glimpses.

All changes are assumed to be during winter, representing a 'maximum case effect' or 'worst case effect' scenario with minimal screening by vegetation and deciduous trees. Note that wireframes and ZTVs prepared to illustrate potential visual effects are calculated on the basis of bare ground and therefore demonstrate the maximum extent of visibility possible, in the absence of buildings or vegetation. Where forestry is present, consideration is given to felling regimes if levels of screening by forestry are likely to change notably during the lifetime of the proposed development.

In this assessment size/scale of visual change is described as being **large**, **medium**, **small** or **barely perceptible**.

1.6.3.2 Geographical Extent

The geographical extent of a visual change records the extent of the area over which the changes will be visible *e.g.,* whether this is a unique viewpoint from where the proposed wind farm can be glimpsed, or whether it represents a large area from which similar views are gained. Geographical extent is described as being **large**, **medium** or **small**.

1.6.3.3 Duration

The duration of visual effects is reported as **short-term**, **medium-term** or **long-term**, as defined for the duration of landscape effects (see above).

1.6.3.4 Reversibility

Reversibility is reported as **irreversible** (*i.e.,* permanent), **partially reversible** or **reversible**, and is related to whether the visual change can be reversed at the end of the phase of development under consideration (*i.e.,* at the end of construction or at the end of the operational lifespan of the development). Operational visual effects are generally considered to be partially reversible as the decommissioning phase will remove turbines and most infrastructure at the end of the operational phase.

Judgements on the magnitude of visual effect are recorded as **high**, **medium** or **low** guided by the table below.

Table 5.1.5: Magnitude of Visual Effects

Magnitude of Visual Effects			
	Higher	⟷	**Lower**
Size/Scale	A large visual change resulting from the proposed development is the most notable aspect of the view, perhaps as a result of the development being in close proximity, or because a substantial part of the view is affected, or because the development introduces a new focal point and/or provides contrast with the existing view and/or changes the scenic qualities of the view.	⟷	A small or some visual change resulting from the proposed development as a minor or generally unnoticed aspect of the view, perhaps as a result of the development being in the distance, or because only a small part of the view is affected, and/or because the development does not introduce a new focal point or is in contrast with the existing view and/ does not change the scenic qualities of the view.
Geographical Extent	The assessment location is clearly representative of similar visual effects over an extensive geographic area.	⟷	The assessment location clearly represents a small geographic area.
Duration	Visual change experienced over around 10 years or more.	⟷	Visual change experienced over a short period of up to 5 years.
Reversibility	A permanent visual change which is not reversible or only partially reversible following decommissioning of the proposed development.	⟷	A temporary visual change which is largely reversible following the completion of construction, or decommissioning of the proposed development.

1.6.3.5 Direction of Visual Effects

The direction of visual effects (**beneficial**, **adverse** or **neutral**) is determined in relation to the degree to which the proposal fits with the existing view and the contribution to the view that a proposed development makes, even if it is in contrast to the existing character of the view.

With regard to wind energy development there is a broad spectrum of response from the strongly positive to the strongly negative. However, to cover the 'maximum case effect' situation, potential visual effects relating to commercial scale wind energy developments are generally assumed to be adverse.

1.6.4 Judging the Level of Visual Effect and Significance

As for landscape effects, the final step in the assessment requires the judgements of sensitivity of visual receptor and magnitude of visual effect to be combined to make an informed professional assessment on the significance of each visual effect.

The evaluations of the individual aspects set out above (susceptibility, value, size and scale, geographical extent, duration and reversibility) are considered together to provide an overall profile of each identified visual effect. An overview is then taken of the distribution

of judgements for each aspect to make an informed professional assessment of the overall level of effect, drawing on good practice guidance provided in GLVIA3.

The sensitivity of visual receptors may involve a complex relationship between a visual receptor's (*e.g.,* person's) susceptibility to change and the value attached to a view. Therefore, the rationale for judgements of sensitivity is clearly set out for each receptor in relation to both its susceptibility (to the type of change proposed) and its value. Further information on the criteria is provided below.

A rigid matrix-type approach, where the level of visual effect is defined simply based on the level of sensitivity combined with the magnitude of effect is not used. As such, the conclusion on the level of effect is not always the same. Although a numerical or formal weighting system is not applied, consideration of the relative importance of each aspect is made to feed into the overall decision. Levels of visual effect are identified as **negligible**, **minor**, **moderate** or **major** where moderate and major visual effects are considered **significant** in the context of the EIA Regulations.

This determination requires the application of professional judgement and experience to take on board the many different variables which need to be considered, and which are given different weight according to site-specific and location-specific considerations in every instance. As such, the conclusion on the level of effect is not always the same. Judgements are made on a case-by-case basis, guided by the same principles as set out in **Diagram 1** above.

1.7 Cumulative Landscape and Visual Impact assessment (CLVIA)

The aim of a Cumulative Landscape and Visual Impact Assessment (CLVIA) is to '*describe, visually represent and assess the ways in which a proposed windfarm would have additional impacts when considered together with other existing, consented or proposed windfarms*'[7] (Para. 55, SNH, 2012).

The cumulative assessment therefore focuses on the additional cumulative change which may result from the introduction of a proposed development. The cumulative assessment may also make reference to *total* (also referred to as combined) cumulative effects, where these have the potential to be significant. A cumulative assessment may also consider the potential interactions between different types of development (*e.g.,* transmission infrastructure, other energy generation stations or other built development) if these are likely to result in similar landscape and visual impacts.

As with an LVIA, a CLVIA deals with cumulative landscape and visual effects separately.

1.7.1 Differences between LVIA and CLVIA

Although both LVIA and CLVIA look at the effects of a proposed development on the landscape and on views, there are differences in the baseline against which the assessments are carried out.

For the LVIA, the baseline includes existing wind farm developments which are present in the landscape at the time of undertaking the assessment, which may be either operational or under construction as they form a part of the baseline situation. Their presence has the potential to influence the assessment of effects on landscape character and the assessment of effects on views. For the CLVIA the baseline is partially speculative and includes (in addition to existing wind farms):

- Scenario 1: wind farms which have been granted planning consent but are not yet constructed (consented); and

[7] Scottish Natural Heritage (2012). Assessing the cumulative impact of onshore wind energy developments.

- Scenario 2: submitted valid wind farm applications which are currently awaiting determination by the relevant consenting authority, including those at appeal and in some instances those currently at scoping when specifically requested (proposed).

A cut-off date of 26th January 2021 was applied for the inclusion of developments within the cumulative assessment. This date was agreed following confirmation of design of the Development. However, as of this date there are no wind farms at planning or appeal stage within the cumulative Study Area. Therefore, the CLVIA does not consider Scenario 2 effects.

1.7.2 Types of Cumulative Effects

SNH's Assessing the Cumulative Impact of Onshore Wind Energy Developments[8] states that '*cumulative landscape effects can impact on either the physical fabric or character of the landscape, or any special values attached to it'* (Para. 48, SNH, 2012).

Three types of cumulative effects on visual amenity are considered in the assessment: combined, successive and sequential:

- **Combined effects** occur where a static viewer is able to view two or more wind farms from a viewpoint within the viewers' same arc of vision (assumed to be about 90 degrees for the purpose of the assessment);
- **Successive effects** occur where a static viewer is able to view two or more wind farms from a viewpoint, but needs to turn to see them; and
- **Sequential effects** occur when a viewer is moving through the landscape from one area to another, for instance when a person is travelling along a road or footpath, and is able to see two or more wind farms at the same, or at different times as they pass along the route. Frequently sequential effects occur where wind farms appear regularly, with short time lapses between points of visibility. Occasionally sequential effects occur where long periods of time lapse between views of wind farms, depending on speed of travel and distance between viewpoints.

1.7.3 Assessment Methodology for CLVIA

The CLVIA considers the potential effects of the addition of a proposed development, against a landscape baseline that includes wind farms that may or may not be present in the landscape in the future, *i.e.,* wind farms that are consented but not yet built, and/or undetermined planning applications. The wind farms included in each scenario are assumed to be present in the landscape for the purposes of the CLVIA.

The methodology for the CLVIA follows that of the LVIA, which considers the introduction of a proposed development to a baseline which includes existing (operational and under construction) wind farms. The size and scale of cumulative change focuses on:

- the pattern and arrangement of wind farms in the landscape or view, *e.g.,* developments seen in one direction or part of the view (combined views), or seen in different directions (successive views in which the viewer must turn) or developments seen sequentially along a route;
- the relationship between the scale of the wind farms, including turbine size and number, and if wind farms appear balanced in views in terms of their composition, or at odds with one another;
- the position of the wind farms in the landscape, *e.g.,* in similar landscape or topographical context;

[8] Scottish Natural Heritage (2012). Assessing the cumulative impact of onshore wind energy developments. Available at: https://www.nature.scot/guidance-assessing-cumulative-impact-onshore-wind-energy-developments. Accessed on 02 March 2020.

- the position of the wind farms in the view, *e.g.,* on the skyline or against the backdrop of land; or how the proposed development will be seen in association with another development (separate, together, behind etc.); and
- the distances between wind farms, and their distances from the viewer.

1.7.4 Significance of Cumulative Effects

As for a LVIA, judging the significance of cumulative landscape and visual effects requires consideration of the sensitivity and the magnitude of effect on those receptors. The following sections set out the methodology applied for the assessment of cumulative effects for both landscape and visual receptors and explains the terms used.

1.8 Method for Assessing Cumulative Landscape Effects

1.8.1 Sensitivity

An assessment of cumulative landscape effects requires consideration of the sensitivity of the landscape receptors. This requires consideration of susceptibility and value, and is as recorded in the LVIA.

1.8.2 Magnitude of Cumulative Landscape Effects

Similar to the methodology applied for an LVIA, the magnitude of cumulative landscape effect (nature of cumulative landscape effect) is based on combining professional judgements on size and scale, geographical extent, duration and reversibility. Judgements on the magnitude of cumulative landscape effect (nature of cumulative visual effect) are recorded as **high**, **medium** or **low**.

1.8.2.1 Size and Scale

The size/scale of cumulative landscape change is the additional influence the proposed development has on the characteristics and character of the area assuming the other wind farm developments considered in the CLVIA baseline scenarios are already present in the landscape. This is influenced by:

- how the proposal fits with existing pattern of cumulative wind farm development, including the relationship to landscape character types and areas; and
- the siting and design of the proposed development in relation to other existing and proposed wind farm developments (including distance between wind farms, composition, size and scale).

1.8.2.2 Geographical Extent

As for the LVIA, the geographical extent over which the cumulative landscape change will be experienced is described as being **large** (scale of the landscape character type or widespread, affecting several landscape types or character areas), **medium** (immediate surroundings) or **small** (site level).

1.8.2.3 Duration & Reversibility

For the purpose of the cumulative landscape assessment consideration of the judgements of the duration and reversibility of landscape effects are as recorded in the LVIA.

Judgements on the magnitude of cumulative landscape effect are recorded as **high**, **medium** or **low**.

1.8.3 Levels of Cumulative Landscape Effect and Significance

The final step in the assessment of cumulative landscape effects requires the judgements of sensitivity and magnitude of cumulative landscape effect to be combined to make an informed professional assessment on the significance of each cumulative landscape effect.

As for the LVIA the levels of cumulative landscape effect are described as **negligible**, **minor**, **moderate** or **major** where moderate and major cumulative landscape effects are considered **significant** in the context of the EIA Regulations.

More significant effects are likely where:

- the proposed development extends or intensifies a landscape effect;
- the proposed development 'fills' an area such that it alters the landscape resource; and / or
- the interaction between the proposed development and other wind farm developments means that the total effect on the landscape is greater than the sum of its parts.

GLVIA 3 states '*The most significant cumulative landscape effects are likely to be those that would give rise to changes in the landscape character of the study area of such an extent as to have major effects on its key characteristics and even, in some cases, to transform it into a different landscape type. This may be the case where the project being considered itself tips the balance through its additional effects. The emphasis must always remain on the main project being assessed and how or whether it adds to or combines with the others being considered to create a significant cumulative effect*' (GLVIA 3, Para 7.28).

This determination of cumulative landscape effects requires the application of professional judgement and experience to take on board the many different variables which need to be considered, and which are given different weight according to site-specific and location-specific considerations in every instance. Judgements are made on a case-by-case basis.

1.9 Method for Assessing Cumulative Visual Effects

1.9.1 Sensitivity

The assessment of the significance of cumulative visual effects requires consideration of the sensitivity of the visual receptors. This requires consideration of susceptibility and value, and is as recorded in the LVIA.

1.9.2 Magnitude of Cumulative Visual Effects

As for cumulative landscape effects and the methodology for the LVIA, the magnitude of cumulative visual effect (nature of cumulative visual effect) is based on combining professional judgements on size and scale; geographical extent; duration and reversibility. Judgements on the magnitude of cumulative visual effect (nature of cumulative visual effect) are recorded as **high**, **medium**, **low** or **barely perceptible**.

1.9.2.1 Size and Scale

The size/scale of cumulative change to views depends on the additional influence the proposed development has on views assuming the other wind farm developments are already present in the landscape. This is influenced by:

- whether the proposed development introduces development into a new part of the view so that the proportion of the developed part of the view increases;
- the relationship between the proposed development and other wind farm developments in terms of design, size and layout;

- the apparent visual relationship of cumulative wind farm developments to landscape character types and or landscape character areas; and/or
- in the case of magnitude of change to routes, the relative duration of views of wind farm developments from routes.

There has to be clear visibility of more than one wind farm development, of which one must be the proposed development, for there to be a cumulative effect (given this is an assessment of the effects of the proposed development and not a broader CLVIA of combined cumulative effects or capacity study). Where the proposed development is clearly visible and other wind farm developments are not, the effect is likely to be the same as recorded in the LVIA (*i.e.,* the effect is not a cumulative effect).

1.9.2.2 Geographical Extent

As for the LVIA, the geographical extent of cumulative visual changes records the extent of the area over which the changes will be visible *e.g.,* whether this is a unique viewpoint from where the proposed wind farm can be glimpsed, or whether it represents a large area from which similar views are gained from large areas. Geographical extent is described as being **large**, **medium** or **small**.

1.9.2.3 Duration & Reversibility

For the purpose of the cumulative visual assessment consideration of the judgements of the duration and reversibility of visual effects are as recorded in the LVIA.

1.9.3 Levels of Cumulative Visual Effect and Significance

The final step in the assessment of cumulative visual effects requires the judgements of sensitivity and magnitude of cumulative visual effect to be combined to make an informed professional assessment on the significance of each cumulative visual effect.

As for the LVIA the levels of cumulative visual effect are described as **negligible**, **minor**, **moderate** or **major** where moderate and major cumulative visual effects are considered **significant** in the context of the EIA Regulations.

The evaluations of susceptibility, value, size and scale, geographical extent, duration and reversibility are considered together to provide an overall profile of each identified visual effect. An overview is taken of the distribution of judgements for each aspect to make an informed professional assessment of the overall level of each visual effect, drawing on guidance provided in GLVIA3. Levels of effect are identified as **negligible**, **minor**, **moderate** or **major** where moderate and major visual effects are considered **significant** in the context of the EIA Regulations.

More significant effects are likely where:

- the proposed development extends or intensifies a visual effect;
- the proposed development 'fills' an area such that it alters the view/ visual amenity;
- the interaction between the proposed development and other developments means that the total visual effect is greater than the sum of its parts; and/or
- the proposed development will lengthen the time over which effects are experienced (sequential effects).

This determination of cumulative visual effects requires the application of professional judgement and experience to take on board the many different variables which need to be considered, and which are given different weight according to site-specific and location-specific considerations in every instance. Again, as for the assessment of landscape and visual effects, judgements are made on a case-by-case basis, guided by the same principles as set out in **Diagram 1** above.

CLOICH FOREST WIND FARM

VOLUME 3: TECHNICAL APPENDICES

TECHNICAL APPENDIX A5.2: ZTV MAPPING AND VISUALISATION METHODOLOGY

JUNE 2021

Prepared By:

Arcus Consultancy Services

7th Floor
144 West George Street
Glasgow
G2 2HG

T +44 (0)141 221 9997 l **E** info@arcusconsulting.co.uk
w www.arcusconsulting.co.uk

Registered in England & Wales No. 5644976

TABLE OF CONTENTS

1 ZTV MAPPING AND VISUALISATION METHODOLOGY

1.1 Introduction

This appendix sets out the approach to the production of the visualisations which accompany the Cloich Forest Wind Farm Landscape and Visual Impact Assessment (LVIA) and Cumulative Landscape and Visual Impact Assessment (CLVIA) set out in Chapter 5: Landscape and Visual Amenity, Volume 1 of the Environmental Impact Assessment Report (EIA Report). Figures referred to in this appendix are located in Volume 2b: LVIA Figures and Volume 2c: LVIA Visualisations.

The methodology for the production of visualisations was based on current good practice guidance from NatureScot (formerly SNH)[1] and the Landscape Institute[2]. Further information about the approach is provided below.

Paper Maps Used

- Ordnance Survey (OS) Maps:
  - Landranger 1:50,000 Scale (Sheets 65, 66, 72 and 73); and
  - Explorer 1:25,000 Scale (Sheets 336, 227, 344, and 345).
- Online map search engines*:*
  - Bing, mapping website (Online - Available at: www.bing.com/maps); and
  - Google, mapping website (Online - Available at: www.maps.google.com).

Digital Maps Used

- Ordnance Survey 1:25,000 raster data (to provide detailed maps for viewpoint locations);
- Ordnance Survey 1:50,000 raster data (to show surface details such as roads, forest and settlement detail); and
- Ordnance Survey 1:250,000 raster data (to provide a more general location map).

Data Used for Digital Terrain Modelling (DTM)

- OS Terrain® 50 resolution height data (DTM) (50m grid spacing, 4 metres RMSE).

1.2 Zone of Theoretical Visibility (ZTV) Mapping

Evaluation of the theoretical extent to which the wind farm would be visible across the Study Area was undertaken by establishing a ZTV using specific computer software designed to calculate the theoretical visibility of the proposed turbines within its surroundings. ESRI's ArcMap 10.5.1 software was used to generate the ZTV. The applied Spatial Analyst/Viewshed tool does not use mathematically approximate methods. This program calculates areas from which the turbine hubs and blade tip heights are potentially visible. This is performed on a 'bare ground' computer generated terrain model, which does not take account of potential screening by existing buildings or vegetation. It should be noted that the software uses raster[3] height data, which while displayed as continuous data (with each grid square referred to as a 'cell'), it assumes a single height value for each 50m^2 cell. Therefore, any height variations within each 50m2 cell will not be recognised, but will be represented by a single height value.

[1] Scottish Natural Heritage (2017). Visual Representation of Wind Farms, Version 2.2.

[2] Landscape Institute (2019). Advice Note 01/11 Photography and photomontage in landscape and visual impact assessment.

[3] Raster data is a matrix of cells (or pixels), where each cell has a unique value.

The DTM used for the LVIA analysis is OS Terrain® 50 height data, obtained from Ordnance Survey in 2019. The root-mean-square error (RMSE) of this data is 4m. The DTM data is represented by 50x50m grids, which means that the software calculates the number of turbines visible from the centre point of each 50x50m grid/square area. This data was used to calculate visibility within the 40km Study Area. The DTM data has not been altered (i.e., by the addition of local surface screening features) for the production of the ZTVs. We have not identified any significant discrepancies between the used DTM and the actual topography around the Study Area. The effect of earth curvature and refraction of visible light in the air has been included in the ZTV analysis, using the refractivity coefficient (R_{refr}) 0.13 based on the Gaussian refraction coefficient (Brunner, F. K., 1984). The ZTV has been assessed from a viewer height of 2m above ground level. As the ZTV uses a 'bare ground' model, it is considered to over emphasise the extent of visibility of the Development and therefore represents a 'maximum potential visibility' scenario. The ZTV does not specify the extent a turbine is visible e.g., the whole turbine or only its tip. Such differences are covered by photomontages prepared for representative viewpoints. The ZTV does not take into consideration local atmospheric conditions (e.g., temperature, pressure, humidity) which would affect the turbine visibility at different distances, beyond the inclusion of light refraction noted above.

The ZTV is used as a starting point in the assessment to provide an indication of theoretical visibility. This information is verified in the field so that the assessment conclusions represent the actual visibility of the proposals reasonably accurately.

The ZTV was calculated to show the potential number of turbines visible to maximum blade tip height (149.9m) and maximum hub height (83.4m). The ZTV calculated to blade tip height is shown on Figure 5.1.2a and Figure 5.1.2b, the hub height ZTV is shown in Figure 5.1.3a and Figure 5.1.3b. Subsequent figures which include the ZTV make use of the ZTV to maximum blade tip height.

To construct cumulative ZTVs (CZTVs) to illustrate the cumulative visibility of the Development in conjunction with other wind farms, the ZTV to tip height of each wind farm was generated, and then combined with the Development ZTV (20km radius). The CZTVs are colour coded to distinguish between areas where the Development is predicted to be visible (either on its own, or in conjunction with other wind farms), and areas where other wind farms would be visible, but the Development would not.

1.3 Viewpoint Photography

The methodology for photography is in accordance with guidance from Nature Scot[4] and the Landscape Institute[5]. The focal length used is in accordance with recommendations contained in guidance and is stated on the figures. Photography was undertaken by LUC between October 2019 and September 2020. A Nikon D750 and a D600 full frame sensor digital single lens reflex (SLR) camera, with a fixed 50mm focal length lens, was used to undertake photography from all viewpoint locations.

A tripod with vertical and horizontal spirit levels was used to provide stability and to ensure a level set of adjoining images. The camera was orientated to take photographs in landscape format from all viewpoints. A panoramic head was used to ensure the camera rotated about the no-parallax point of the lens in order to eliminate parallax errors[6] between the successive images and enable accurate stitching of the images. The camera was moved through increments of 24°. The camera was rotated through a full 360° at each viewpoint with fifteen photographs completing each 360° view in landscape format.

[4] Scottish Natural Heritage (2017). Visual Representation of Wind Farms, Version 2.2.

[5] Landscape Institute (2019). Technical Guidance Note Windfarm 06/19 Visual Representation of Development Proposals.

[6] Parallax is the difference in the position of objects when viewed along two different lines of sight. In the case of a camera this would occur if the rotation point of the lens was not constant and would result in stitching errors in the panorama.

The location of each viewpoint was recorded using a handheld GPS device and a number of photographs of the tripod position were taken to cross-reference with hi-resolution aerial photography to enable the viewpoint locations to be micro-sited. Additional information about the conditions was also recorded in the field in accordance with NatureScot (SNH, 2017) and LI guidance (LI, 2019).

Weather conditions and visibility were considered an important aspect of the field visits for the photography. Where possible, visits were planned around clear days with good visibility. Viewpoint locations were visited at times of day to ensure, as far as possible, that the sun lit the scene from behind, or to one side of the photographer. Photography opportunities facing into the sun were avoided where possible to prevent the wind turbines appearing as silhouettes. Adjustments to lighting of the turbines were made in the rendering software to make the turbines appear realistic in the view under the particular lighting and atmospheric conditions present at that time the photography was taken.

1.4 Visualisations

1.4.1 Photographic Stitching, Wirelines and Photomontages

Wirelines are computer generated line drawings which show outlines of the proposed turbines and the bare earth topography. Photomontages are computer generated images of the proposed development modelled into the actual baseline photography. Wirelines and photomontages are assessment tools and are not a substitute for site visits. They don't convey turbine movement and are representative of views but can't represent visibility at all locations.

Photographic stitching software PTGui© 11.19 has been used to stitch together the adjoining frames to create panoramic baseline photography. A selection of identical control points has been created within each of the adjoining frames to increase the level of accuracy when stitching the 360° panoramic photography.

The software package ReSoft© WindFarm version 4.2.5.3 was used to create a digital terrain model (DTM) from OS Terrain® 50 height data. The DTM includes the Site, viewpoint locations and all landform visible within the baseline photography. Turbine and viewpoint location coordinates were entered. Photomontages have been constructed to show the candidate turbine with the specified tip and hub height. A default viewer height of 1.5m above ground level has been set in the ReSoft© software, however on limited occasions this viewer height has been increased by a small increment to achieve a closer match between the terrain data and photographic landform content[7].

Wind farm layouts included within the cumulative assessment have been added to the ReSoft© WindFarm model.

The Panoramic baseline photographic images were imported into ReSoft© WindFarm software. From each viewpoint the wireline views of the landform model with the proposed turbines were carefully adjusted to obtain a precise match. Fixed features on the ground, such as buildings and roads, were located in the model and used as markers to help with the alignment process where necessary. For each view the date and time of the baseline photography was set within the software to ensure that each rendered image would closely replicate the direction and strength of sunlight within the photograph. Blade angle and orientation adjustments were also made to represent a realistic situation.

The exported renders were imported into Adobe Photoshop© where they were aligned and composited with the baseline photography. Turbines or sections of turbines which were located behind foreground elements in the photograph were masked out (removed) to create the photomontage. Where visible, forest removal (including forestry which has/ will

[7] An altered height above ground level was used for mountain summits where local topography did not match the wireframes due to data resolution.

be removed between the day of photography and when the wind farm will theoretically be operational) and infrastructure associated with the Development has been modelled into photomontages, within 5km.

Finally, where applicable, the images were converted from Cylindrical Projection to Planar Projection using PTGui© 11.19 software.

1.4.2 Figure Layout

The printed figures for the viewpoints produced in accordance with NatureScot requirements are presented in Volume 2b: LVIA Figures.

Adobe InDesign© software was used to present the figures. The dimensions for each image (printed height and field of view) are in accordance with NatureScot requirements. Photography information and viewing instructions are provided on each page where relevant.

The elongated A3/A1 width format pages for each viewpoint are set out as follows. This follows NatureScot visualisation standards:

- The first A3 page contains an OS 1:50,000 scale map showing the viewpoint location, direction of the 90° baseline photography and cumulative wireline views and also the 53.5° photomontage view. Wind turbine locations for the Development are also shown when visible in the map view;
- The following page contains 90° baseline photography and cumulative wireline to illustrate the wider landscape and visual context. These are shown in cylindrical projection and presented on an A1 width page. Additional pages in the same format are provided where relevant to illustrate wider cumulative visibility up to 360°; and
- The subsequent two pages contain a 53.5° wireline and photomontage. These images are both shown in planar projection and presented on an A1 width page.

CLOICH FOREST WIND FARM

VOLUME 3: TECHNICAL APPENDICES

TECHNICAL APPENDIX A5.3: RESIDENTIAL VISUAL AMENITY ASSESSMENT

JUNE 2021

Prepared By:

Arcus Consultancy Services

7th Floor
144 West George Street
Glasgow
G2 2HG

T +44 (0)141 221 9997 l **E** info@arcusconsulting.co.uk
w www.arcusconsulting.co.uk

Registered in England & Wales No. 5644976

TABLE OF CONTENTS

1 RESIDENTIAL VISUAL AMENITY ASSESSMENT

1.1 Introduction

This Residential Visual Amenity Assessment (RVAA) describes the change in view likely to be experienced by residents at the closest properties to the Development. The RVAA should be read in conjunction with Chapter 5 of the Environmental Impact Assessment Report (EIA Report): Landscape and Visual Impact Assessment (LVIA).

The RVAA has been undertaken by LUC, in accordance with the principles contained within the Landscape Institute's *Guidelines for Landscape and Visual Impact Assessment 3rd Edition* (GLVIA3) and *Residential Visual Amenity Assessment (RVAA) Technical Guidance Note 2/19* (LI TGN 2/19). The approach has also been informed by numerous decisions made following public inquiries into wind energy proposals in Scotland and elsewhere in the UK.

GLVIA 3 notes the need for a 'residential amenity assessment' to consider the effects of development on private properties (GLVIA3, Page 107, Para. 6.17). This is noted to include an assessment of visual effects, although is separate from LVIA.

LI TGN 2/19 explains that:

"*the purpose of RVAA is to provide an informed, well-reasoned answer to the question: "is the effect of the development on Residential Visual Amenity of such nature and / or magnitude that it potentially affects 'living conditions' or Residential Amenity?*" (LI TGN 2/19, Page 5, Para. 2.1).

The RVAA does not consider other components of residential amenity, such as noise, dust or shadow flicker, which are dealt with in the appropriate chapters of the EIA Report.

Findings of significant effects on views or visual amenity from a property do not automatically imply the need for further assessment. However, for properties likely to experience a high magnitude of visual change and which are in proximity to a development, undertaking an RVAA may be appropriate.

The methodology for the RVAA is set out below along with the scope of the assessment. The findings of the assessment are presented in tabular format and the assessment concludes with a summary of the findings.

1.2 Methodology

The methodology can be summarised as follows:

- Identification of properties to be considered (defining the Study Area and scope);
- Collation of baseline information from maps and aerial photographs and preparation of wireframe visualisations, to inform field survey;
- Field survey to collate information in relation to baseline views and visual amenity from each property;
- Assessment of the magnitude of change in visual amenity likely to be experienced at the property; and
- For properties experiencing a high or medium magnitude of change, and therefore a significant effect, a judgement is made whether the predicted change in views and visual amenity reaches the 'Residential Visual Amenity Threshold' in LI TGN 2/19: that is, whether it would adversely affect residential visual amenity or 'living conditions'.

The following section sets out the methodology and the factors considered in more detail.

1.2.1 Study Area

The assessment includes consideration of the changes in views and visual amenity from all properties within 2 km of the proposed Wind Turbines. Additional properties beyond 2 km have been included where it is considered there may be potential for significant visual effects to occur. However, generally effects beyond 2 km are not considered likely to affect 'living conditions'. This opinion has been informed by the experience of the assessors, observations made on site and an understanding of the Development.

Properties were identified using Address Data and verified in the field. Properties with no theoretical visibility (as indicated by the ZTV in **Figure A5.3.1**) were not considered in the RVAA.

1.2.2 Desktop Studies

For the purposes of this RVAA, the visual amenity experienced at a property is made up of a combination of the type, nature, extent and quality of views that may be available from the property and its domestic curtilage (e.g. gardens and access drives).

OS maps, aerial imagery and Google Streetview were used for desktop research to assist with recording information such as the location of the residential elements of each property, the orientation of the property, and the extent of its curtilage.

In considering baseline visual amenity, the following has been examined:

- The nature and extent of the available existing views (including main/principal views) from the property and its garden, including the proximity and relationship of the property to surrounding landform, landcover and visual foci; and
- Views experienced when approaching or departing from the property via its driveway and/or access roads, if applicable.

1.2.3 Field Surveys

Field surveys were undertaken from publicly accessible locations between March 2020 and September 2020 to determine the following baseline information:

- The orientation and likely views from each property (including principal/primary aspects and presence of windows);
- Layout and orientation of the gardens and property curtilage;
- Access location, and likely views from private or shared driveways or access tracks;
- The nature of existing views from the properties and their gardens, including the proximity and relationship of the properties to surrounding landform, landcover and visual foci and the scenic quality of views; and
- Potential screening provided by local variations in topography, the built environment and vegetation/tree cover within the surrounding landscape.

Initial fieldwork was undertaken at a time which enabled the 'maximum case' scenario to be assessed, on the basis that any available screening offered by deciduous vegetation was at a minimum.

1.2.4 Preparation of Accompanying Visualisations

On this basis of guidance included in LI TGN 2/19, indicative wireline visualisations based on a bare ground digital terrain model were generated from all individual properties using Resoft Windfarm software. They have been centred on the windfarm and illustrate a 90° included angle of view and 2m viewing height from each location. The wirelines are not necessarily representative of the primary outlook of the property and do not show features such as buildings and trees that may provide screening or filtering of views. It should therefore be noted that these indicative wireline visualisations represent a 'maximum

visibility scenario' which may potentially be experienced from the property or its curtilage and this should be borne in mind when using the images.

The illustrative wireline visualisations show the proposed turbines only, with turbines numbered for ease of reference. No other components of the windfarm have the potential to affect views from residential properties and are therefore not included in any of the accompanying visualisations. The principal/primary outlook of residential properties is discussed in the tables for each property in the assessment section which follows below.

Two photomontages have been produced which represent views from the Harehope (Figure A5.3.2) and Nether Stewarton (Figure A5.3.3) which represent some of the closest properties to the south and south-east of the Site, respectively. Where visible, photomontages have included ground level infrastructure such as access tracks and ancillary infrastructure and have modelled in forestry removal.

1.2.5 Assessment of Potential Changes to Views and Visual Amenity

1.2.5.1 Sensitivity of Residential Receptors

GLVIA3 advocates an approach which considers the overall sensitivity of visual receptors (people) in terms of "*both their susceptibility to change in views and visual amenity and also the value attached to particular views*" (Page 113, Para. 6.31), whilst stating that visual receptors most susceptible to change are likely to include "*residents at home*" (Page 113, Para. 6.33).

Taking account of the purposes of this RVAA, and taking a precautionary approach, all people at their place of private residence are considered to be of **high** sensitivity to changes in their views and visual amenity. As a consequence, no individual assessment of sensitivity is outlined in the assessment which follows.

1.2.5.2 Magnitude of Change to Views and Visual Amenity

The likely changes in views and visual amenity as a result of the Development were considered with reference to the individual wireframes from each property (see **A5.3.P1 – A5.3.P12**). A judgement on the magnitude of visual change which would be experienced was made, and the change in views summarised, with reference, as appropriate, to the following factors which are set out in GLVIA3 (Page 115, Para. 6.39-6.40):

- *"scale of the change in the view with respect to the loss or addition of features in the view and changes in its composition, including the proportion of the view occupied by the Proposed Development;*
- *degree of contrast or integration of any new features or changes in the landscape with the existing or remaining landscape elements and characteristics in terms of form, scale and mass, line, height, colour and texture;*
- *angle of view in relation to the main activity of the receptor;*
- *distance of the viewpoint from the Proposed Development; and*
- *extent of the area over which the changes would be visible."*

The following additional factors are specific to the type of development proposed:

- Type and nature of the available view (e.g., panoramic, framed);
- Relative size and proximity of turbines;
- Number, extent and composition of turbines visible (and presence of screening);
- Position of turbines in views from the property e.g., whether in the principal/primary outlook from the property;
- Proportion of the skyline occupied by the turbines;
- Direction (including the aspect) of the view affected; and
- Density and spacing of turbines and their overall composition in the view.

For each property the evaluation consists of:

- A description of the property and of its location and context;
- A description of the likely existing available views and visual amenity from the property and its domestic curtilage, including gardens and private or shared access drives; and
- A description of the likely effect on views and visual amenity resulting from the Development, as well as other existing and proposed schemes included in the Study Area and likely to influence the decision-making process.

The detailed information for each property concludes with a judgement with respect to the visual component of residential amenity or 'living conditions'. It is intended that this judgement may assist the decision maker in coming to the wider planning judgement on overall residential amenity, when considered within the context of other components (e.g. noise, shadow flicker, dust, vibration).

Magnitude of visual change is expressed on a relative scale, as set out in **Table 1** below, which highlights the differences between the types of change experienced in views from residential properties examined as part of this RVAA. The existing and proposed view from each property is described, and the likely relative magnitude of change (**high, medium, low, barely perceptible**) arising from the Development is determined. The nature of existing and predicted views (open, enclosed, panoramic, focused, framed etc.) affects the relative magnitude of change and is taken on board in reaching that judgement. The RVAA looks at the range of views likely to be available from the house and its curtilage and considers potential effects on all of these.

Table 1: Magnitude of change in views and visual amenity

Magnitude of Change in Visual Amenity	Description
High	The Development will be a key/defining element in the view.
Medium	The Development will be clearly discernible but will not be a key/defining element of the view.
Low	The Development will be visible and will form a minor element of the view.
Barely Perceptible	The Development may go unnoticed as a minor element of the view or is not visible.

A magnitude of change of medium or higher, in combination with the high sensitivity of residential receptors, is judged to result in a significant visual effect in EIA terms, but is a matter of private interest, unless it also causes a breach of the 'Residential Visual Amenity Threshold'. A detailed explanation of this is found in *Residential Visual Amenity Assessment (RVAA) Technical Guidance Note 2/19* (LI TGN 2/19). As such, the RVAA concludes, for properties predicted to experience a **high** or **medium** magnitude of change, with a judgement as to the potential effect on 'living conditions', or residential visual amenity. This corresponds to the 'Residential Visual Amenity Threshold' as described in LI TGN 2/19.

For properties experiencing a **low** magnitude of change, it is considered that there is no potential for 'living conditions' to be affected. Therefore, this final stage is not undertaken, with the exception of Stewarton Lodge which was included due to its close proximity to the Site.

1.3 Assessment

11 residential buildings were identified within the 2 km study using Address Data, and ZTV analysis confirmed theoretical visibility from all of them. In addition, one property located just beyond 2 km was included. **Table 2** below identifies the 12 properties which have been assessed.

Table 2: Assessed Properties

Assessment Reference	Property Name	Description	Indicative Wireline Location
1	Harehope Steading	Detached house forming part of the Harehope cluster to the south of the Site.	320006, 644169
2	Harehope Farmhouse	Detached house forming part of the Harehope cluster to the south of the Site.	320063, 644354
3	Old Harehope	Detached house forming part of the Harehope cluster to the south of the Site.	320049, 644248
4	Harehope Cottage	Detached cottage forming part of the Harehope cluster to the south of the Site.	320163, 644044
5	Upper Stewarton	Detached house to the south-east of the Site.	321713, 646050
6	Nether Stewarton	Detached house forming part of the Nether Stewarton cluster to the south-east of the Site.	321912, 645628
7	Stewarton House	Detached house forming part of the Nether Stewarton cluster to the south-east of the Site.	321925, 645537
8	Stewarton Toll	Detached house forming part of the Nether Stewarton cluster to the south-east of the Site.	322015, 645532
9	Stewarton Lodge	Detached house forming part of the Nether Stewarton cluster to the south-east of the Site.	322140, 645514
10	Cloich Farm	Detached house within the north-eastern part of the Site.	321652, 649089
11	Earlyburn	Detached house to the north-east of the Site.	322873, 649574
12	Whitelaw Burn	Detached house to the east of the Site.	322892, 647898

Table 3 to Table 14 below describe the potential change in views from each property, concluding with a statement with respect to living conditions.

Table 3: Harehope Steading

Name: Harehope Steading		**See Figure A5.3.2 and A5.3.P1**	
Direction to Site	North	Number of turbine hubs and tips visible	4 hubs, 8 tips
Distance to nearest turbine	1.8 km	Horizontal field of view	24 degrees
Nearest turbine	2	Angle of direction to Site	10 degrees

Description of property, location and existing context:

A detached two-storey house accessed via a private road from the minor road that runs between Black and White Meldon. The track is shared with other properties in the Harehope cluster. The property is orientated with its primary aspect to the south. There are outbuildings to the north-east. The property is surrounded by private gardens on all sides, with mature woodland to the southern boundary.

Description of existing views and visual amenity:

The property is orientated north / south and the primary outlook of the property is likely to be to the south, overlooking private gardens enclosed by woodland. There is a driveway to the south and east of the property. The outbuilding to the north-east of the property is likely to provide some screening of ground-level views to the north-east (towards the Site). Individual trees planted along the driveway filter views towards the Site from within the garden. Filtered views are also likely to be available from the private road which descends through areas of forest from Harehope to the minor road in Meldon Valley.

Bowbeat Wind Farm is theoretically visible from this property but is likely to be screened by forestry and woodland surrounding the area. However, Bowbeat Wind Farm is visible from more open sections of the private road to the east of the Harehope cluster.

Description of likely change in views and visual amenity as a result of the Development:

Refer to Figure A5.3.P1 and the photomontage in Figure A5.3.2 which represents views from this cluster of properties.

The Development will occupy views to the north from this property and its curtilage. The hubs of up to four and blades of up to eight turbines will be theoretically visible across the skyline, partially screened by the landform of Crailzie Hill and Kilrubie Hill. The vegetation surrounding the property will provide some filtering of the Development, as will the forested and rising slopes of Crailzie Hill and Kilrubie Hill within the Site. The landform will screen most hubs and towers, along with lower-level infrastructure such as tracks and ancillary development. The most southern turbines (T2, T3 and T4), closest to the property, will appear most prominent, with hubs potentially visible.

The most open views are likely to be available from within the curtilage of the property, notably in the garden to the south, as views open up due to less woodland and forestry. From the property itself, nearby vegetation and buildings will partially screen views. However, windows on the upper floors on the north-western façade will potentially have views of the Development above the forestry. Principal views to the south will be unaffected.

The Development will be partially screened from this property due to the presence of mature vegetation in the area to the north of the property. There are no cumulative interactions between the Development and consented or proposed wind farms.
Conclusion with respect to the potential effects on Living Conditions:
The magnitude of change to the visual amenity of this property is medium (significant). The Development will be visible from the property and its garden, however the primary outlook to the south of the property will remain unaffected. In addition, sections of the private road to the property may experience some filtered views of the Development. Garden vegetation along the private road will provide some filtering of views from the garden to the south, and the outbuildings to the north-east of the property may limit views from the rear garden. At a distance of 1.8 km, and given the screening provided by topography, vegetation around the property and forestry on the hills to the north, the Development will not appear overwhelming or oppressive. **As such, the Development does not have the potential to affect overall 'living conditions' rendering it an unattractive place to live, and therefore does not breach the 'Residential Visual Amenity Threshold' (LI TGN 2/19).**

Table 4: Harehope Farmhouse

Name: Harehope Farmhouse		**See Figure A5.3.2 and A5.3.P2**	
Direction to Site	North	Number of turbine hubs and tips visible	3 hubs, 8 tips
Distance to nearest turbine	1.6 km	Horizontal field of view	26 degrees
Nearest turbine	2	Angle of direction to Site	10 degrees
Description of property, location and existing context:			
A detached two-storey house accessed via a track shared with other properties in the Harehope cluster. The primary aspect of the property appears to be to the east. There are farm buildings to the north and south and a driveway to the east of the property. The property is surrounded by private gardens on all sides, with mature woodland in the wider landscape enclosing the garden on all sides. To the north-west of the property the land rises to the small wooded summit of Harehope Hill.			
Description of existing views and visual amenity:			
The primary outlook of the property appears to be to the east. Views towards the Site to the north, are likely to be screened by areas of woodland and forestry surrounding the property, although upper level windows on the northern façade of the property may have more open views towards the Site. Principal views to the east appear more open, overlooking a large, grassed garden area. Both the gardens to the front and rear of the property are enclosed by woodland and forestry, however, more open locations within the garden may have visibility above the tree canopy. Views towards the Site to the north may be experienced from the property's access road which approaches from the south. Due to the presence of vegetation along the access road, and blocks of woodland and forestry, views are often filtered and experienced in a transient nature. The access road extends to the east to join the Meldon Valley road, and from here some open views towards the forested hills within the Site are available.			

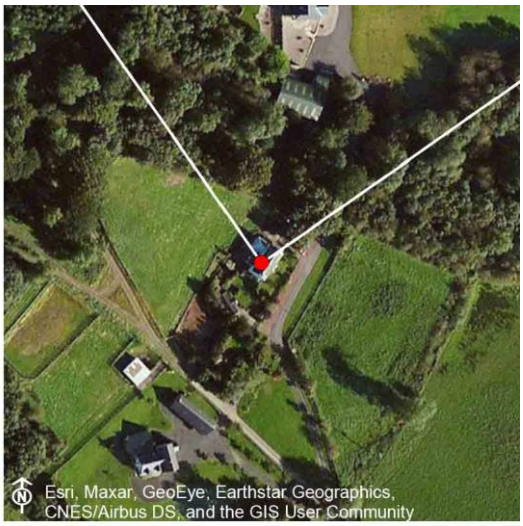
Bowbeat Wind Farm may be visible in easterly views from this property, particularly from upper floor windows facing east. Views of the wind farm are also experienced from more open sections of the access road.
Description of likely change in views and visual amenity as a result of the Development:
Refer to Figure A5.3.P2 and the photomontage in Figure A5.3.2 which represents views from this cluster of properties. The Development will occupy views to the north from this property, its curtilage and access road. The hubs of up to three and blade tips of up to eight turbines will be theoretically visible across the skyline, partially screened by the landform within the Site. Several other blade tips which will be theoretically visible (T1, T7 and T9) are likely to be screened by forestry within the Site, as will lower-level infrastructure such as tracks and ancillary development. The most southern turbines (T2, T3 and T4), closest to the property, will appear most prominent, with hubs potentially visible. However, the area of dense woodland to the north of the property is likely to provide some screening of the Development. Therefore, visibility will be largely limited to blades. The most open views are likely to be available from within the open gardens to the east and west of the property. From the property itself, nearby vegetation to the north will largely screen views, however upper-level windows (if present) on the northern gable end of the property may also experience some visibility. Principal views to the east will be unaffected, as will views to the south and west. The operational Bowbeat Wind Farm is visible from the access road to this property. In addition, it is likely that the property experiences views of Bowbeat from upper-floor windows on the eastern façade of the property. There are no cumulative interactions between the Development and consented or proposed wind farms.
Conclusion with respect to the potential effects on Living Conditions:
The magnitude of change to the visual amenity of this property is medium (significant). The Development will potentially be visible from any upper floor windows on northern façade of the property, areas within the more open garden, and in filtered views from the access road. However, the primary outlook to the east of the property will remain unaffected. The dense areas of woodland to the north of the property may provide some screening from windows on the northern elevation. In addition, this woodland and forestry may screen views from within the garden. However, some visibility of the Development in the southern extents of the garden may be possible above the tree canopy. At a distance of 1.6 km, and given the screening provided by topography, vegetation around the property and forestry on the hills to the north, the Development will not appear overwhelming or oppressive. **As such, the Development does not have the potential to affect overall 'living conditions' rendering it an unattractive place to live, and therefore does not breach the 'Residential Visual Amenity Threshold' (LI TGN 2/19).**

Table 5: Old Harehope

Name: Old Harehope		**See Figure A5.3.2 and A5.3.P3**	
Direction to Site	North	Number of turbine hubs and tips visible	4 hubs, 9 tips
Distance to nearest turbine	1.7km	Horizontal field of view	25 degrees
Nearest turbine	2	Angle of direction to Site	10 degrees

Description of property, location and existing context:

A detached two-storey house forming part of the Harehope cluster, accessed via private road shared with other properties in the Harehope cluster. The property is orientated with its primary aspect to the south-east. It has a large conservatory on its north-western side and a separate cabin in the grounds to the south of the house. The property is surrounded by private gardens on all sides, with tree and shrub planting. To the north-west of the property the land rises to the small wooded summit of Harehope Hill.



Description of existing views and visual amenity:

The primary outlook of the property is to the south-east, with relatively open views overlooking the fields to the east of the private road. Views to the south, north (towards the Site), and west of the property, including from the conservatory on the north-western elevation of the property, and from the gardens surrounding the property are likely to be limited by enclosing areas of woodland.

Views towards the Site may be experienced from sections of the private road which descends from Harehope through areas of forest to the minor road in Meldon Valley. Often, these views are filtered by blocks of forestry adjacent to the private road, however some sections offer more open views towards the Site where forestry has been felled. Views may appear more open on the immediate northerly approach to the property due to less roadside vegetation.

Bowbeat Wind Farm may be visible in easterly views from this property, particularly from upper floor windows facing east. Views of the wind farm are also experienced from more open sections of the private road.

Description of likely change in views and visual amenity as a result of the Development:

Refer to Figure A5.3.P3 and the photomontage in Figure A5.3.2 which represents views from this cluster of properties.

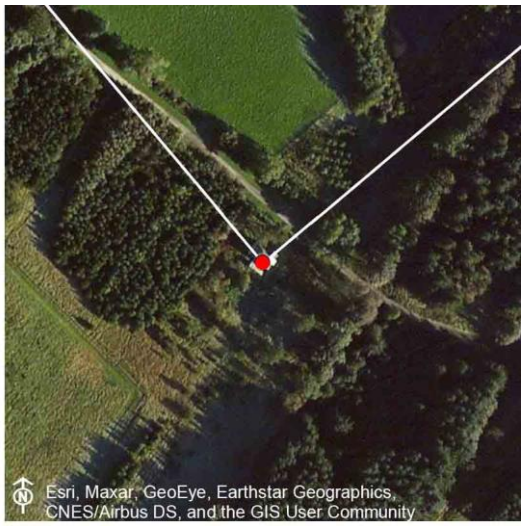
The Development will theoretically occupy views to the north from this property and its curtilage. The hubs of up to four and blades of up to nine turbines will theoretically be visible across the skyline, partially screened by the landform of Crailzie Hill and Kilrubie Hill. However, the area of dense woodland to the north of the property will provide some screening of views of the Development, as will the forested and rising slopes of the hills within the Site. The landform will screen at least three turbines, along with lower-level infrastructure such as wind farm tracks and ancillary development. The most southern turbines (T2, T3 and T4), which are closest to the property, would appear most prominent, with hubs potentially visible on the skyline.

The most open views are likely to be available from the private road on the approach to the property, as transient views open up due to less woodland and forestry, and vegetation along the private road. From the property itself, nearby vegetation to the north is likely to screen views. Principal views to the south-east will be unaffected, as will views to the south-west. Views north-westwards from the conservatory are unlikely to be affected due to intervening mature woodland.

There are no cumulative interactions between the Development and consented or proposed wind farms.

Conclusion with respect to the potential effects on Living Conditions:
The magnitude of change to the visual amenity of this property is medium (significant). The Development will theoretically be visible from the property and the private road. Visibility is likely to be limited from the garden to the south of the property, as the property itself would provide screening, along with vegetation. The primary outlook to the south-east of the property will remain unaffected. Vegetation within the property's garden, and areas of woodland to the north, provide some screening of views from the northern and western façades of the property, including the conservatory at the rear. In addition, the property itself will provide some screening of visibility from the garden and cabin in the south. At a distance of 1.7 km, and given the screening provided by topography, vegetation around the property and forestry on the hills to the north, the Development will not appear overwhelming or oppressive. **As such, the Development does not have the potential to affect overall 'living conditions' rendering it an unattractive place to live, and therefore does not breach the 'Residential Visual Amenity Threshold' (LI TGN 2/19).**

Table 6: Harehope Cottage

Name: Harehope Cottage		**See Figure A5.3.2 and A5.3.P4**	
Direction to Site	North	Number of turbine hubs and tips visible	4 hubs, 10 tips
Distance to nearest turbine	1.9 km	Horizontal field of view	25 degrees
Nearest turbine	2	Angle of direction to Site	5 degrees
Description of property, location and existing context:			
A detached cottage located on the south side of the private road to the Harehope cluster of properties. There is forestry to the north-west and south-east of the property.			
Description of existing views and visual amenity:			
From aerial photography the primary outlook of the property appears to be to the north-east. The north-eastern façade of the property has windows facing out towards the private road. Views in this direction are quite enclosed by the area of forestry to the north of the private road. This forestry largely screens views of the Cloich Hills in the distance. Likewise, forestry to the east, west and south screens longer ranging views from the property and its curtilage in these directions. Due to the presence of forestry around the property, no other wind farms are likely to visible from this location. However, the operational Bowbeat Wind Farm is visible in easterly views from sections of the private road.			
Description of likely change in views and visual amenity as a result of the Development:			
Refer to Figure A5.3.P4 and the photomontage in Figure A5.3.2 which represents views from this cluster of properties. The wind farm will occupy views to the north from this property and its curtilage. The hubs of up to four and blades of up to ten turbines will be theoretically visible across the skyline, partially screened by the landform of Crailzie Hill and Kilrubie Hill. However, the turbines will likely be further filtered or			

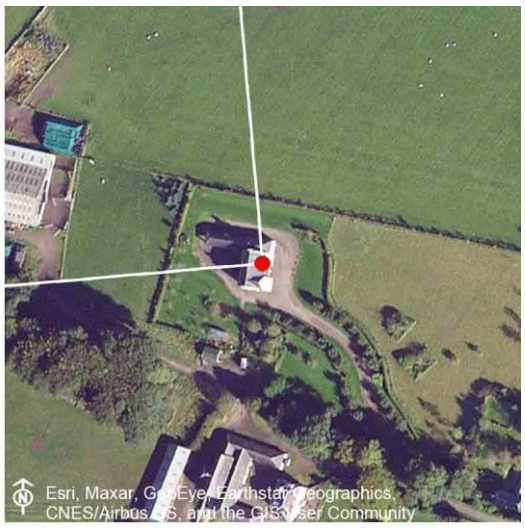
screened by forestry within the Site, and the area of forestry immediately north of the property. The most open views are likely to be available from the southern extents of the garden, as views open up due to the clearing in the forestry in which the property sits. Views orientated to the south, east and west will be unaffected. Visibility of the Development will be largely screened from view from this property due to the presence of mature vegetation surrounding the property in all directions. However, some views of the Development may be experience from sections of the private road. Often, these views are filtered by forestry adjacent to the track, but some sections offer more open views towards the Site where forestry has been recently felled. There are no cumulative interactions between the Development and consented or proposed wind farms.
Conclusion with respect to the potential effects on Living Conditions:
The magnitude of change to the visual amenity of this property is medium (significant). At distances of 1.9 km visibility of the Development from the property and its curtilage is unlikely, however visibility of the Development is likely from sections of the private road with more open views to the north. Principal views to the north-east will be unaffected, due to forestry located immediately adjacent to the private road. In this context the Development will not appear visible. **As such, the Development does not have the potential to affect overall 'living conditions' rendering it an unattractive place to live, and therefore does not breach the 'Residential Visual Amenity Threshold' (LI TGN 2/19).**

Table 7: Upper Stewarton

Name: Upper Stewarton		**See Figure A5.3.P5**	
Direction to Site	North-west	Number of turbine hubs and tips visible	3 hubs, 6 tips
Distance to nearest turbine	0.9 km	Horizontal field of view	60 degrees
Nearest turbine	4	Angle of direction to Site	300 degrees
Description of property, location and existing context:			
A detached single storey house located at Upper Stewarton. There is no formal access road or driveway to the property, however access is likely to be via the track in the field to the east which eventually joins the minor access road to the Stewarton cluster of properties by Stewarton Toll. This field track follows part of the Cross Borders Drove Road. The property appears to have an open aspect to the south from its primary elevation. The property has a large private garden with tree and shrub planting, mainly to the south and east. To the rear (north) of the property the landform rises steeply up the slopes of Kilrubie Hill which partially screens the Site from this location. There is a small domestic turbine in the grounds of the property.			
Description of existing views and visual amenity:			
The primary outlook of the property appears to be to the south. Views in this direction are open towards the larger cluster of properties at Nether Stewarton. The northern façade of the property features small windows on the ground floor looking out into the garden at the rear of the property. Whilst views to the south are open, those to the north are more enclosed due to the screening provided by garden vegetation, and the in the mid-distance, the forested slopes of Kilrubie Hill. Mature trees to the east of the property limit views of the operational Bowbeat Wind Farm, to the east.			

Description of likely change in views and visual amenity as a result of the Development:
Refer to Figure A5.3.P5. The hub of three turbines, and blades of up to six turbines will be theoretically visible across the forested skyline in views to the north-west from the rear of this property at a distance of 0.9 km. Views are most open in views to the south of property, away from the Site. The north façade (rear) of the property features small windows at the ground floor level. The vegetation within the rear garden will provide some screening of the Development, as will the forested and rising slopes of Kilrubie Hill, within the Site. The landform will screen at least seven turbines, and will screen most hubs and towers, along with lower-level infrastructure such as tracks and ancillary development. Principal views to the south will be unaffected. There are no cumulative interactions between the Development and consented or proposed wind farms.
Conclusion with respect to the potential effects on Living Conditions:
The magnitude of change to the visual amenity of this property is medium (significant). Views of the Development will be available from the rear of the property at a distance of 0.9 km, however, is likely to be filtered by mature vegetation within the garden to the rear of the property. Views will also be available from within the gardens to the rear of the property, although similarly, vegetation will provide some filtering in views. The rising nature of the landform and coniferous forestry will help to provide a degree of separation and screening of the lower parts of most turbines. Principal views to the south will be unaffected. In this context the Development will not appear overwhelming or oppressive. **As such, the Development does not have the potential to affect overall 'living conditions' rendering it an unattractive place to live, and therefore does not breach the 'Residential Visual Amenity Threshold' (LI TGN 2/19).**

Table 8: Nether Stewarton

Name: Nether Stewarton		**See Figure A5.3.3 and A5.3.P6**	
Direction to Site	North-west	Number of turbine hubs and tips visible	5 hubs, 10 tips
Distance to nearest turbine	1.3 km	Horizontal field of view	55 degrees
Nearest turbine	4	Angle of direction to Site	310 degrees
Description of property, location and existing context:			
A detached two-storey house with single storey extension to the north, accessed via a tree-lined driveway from the access road which is shared with other properties in the Stewarton cluster. The property is orientated with its primary aspect to the east and there appear to be windows on all elevations. The property is surrounded by private gardens contained by a boundary hedgerow and tree and shrub planting. To the north there are open views towards the rolling hills which form the Site from the single storey northern aspect of the property.			
Description of existing views and visual amenity:			
The property is orientated with its primary aspect to the east, which is afforded open views towards the Moorfoot Hills. The single storey extension to the north features a number of windows on its northern façade, with open views to the north. A small first-floor window on the northern gable end of property also has a northerly outlook. Windows looking north are afforded open views across low-			

lying farmland with the forested Cloich Hills in the middle-distance framing views to the west. The hedges and intermittent trees along the boundary of the property provide some filtering of views. The operational Bowbeat Wind Farm is visible in easterly views from the property, its garden and sections of the access road.
Description of likely change in views and visual amenity as a result of the Development:
Refer to Figure A5.3.P6 and the photomontage in Figure A5.3.3 which represents views from this cluster of properties. The hubs of up to five and blades of up to ten turbines will be visible to the north from the northern elevations of this property. In addition, areas within the curtilage of the property, and the first-floor windows on the western façade of the property will also experience views of the of the Development, at distances of 1.3 km. The turbines will be visible on the skyline at a higher elevation in views to the north-west of the property. The rising landform and forested nature of the Site will screen lower level infrastructure such as tracks and ancillary development. In addition, the intervening landform of Kilrubie Hill will helping provide screening of turbine towers and hubs. The most northerly turbines (T11 and T12) and T1 will be entirely screened by the landform. Forestry may further screen several other hubs and blades. Turbines 3, 4 and 5 which sit on the ridge of Kilrubie Hill will appear most prominent, with hubs above the horizon. Views from the property and garden remain open, however boundary trees may provide some intermittent screening, particularly the cluster to the north-west of the property. There are no cumulative interactions between the Development and consented or proposed wind farms.
Conclusion with respect to the potential effects on Living Conditions:
The magnitude of change to the visual amenity of this property is high (significant). Views of the Development will be available from the rear of the property at a distance of 1.3 km. Views from the property and its garden may be afforded some limited filtering by vegetation within the curtilage of the property. The rising nature of the landform and coniferous forest will help to provide a degree of separation and screening of the lower parts of most turbines. Principal views to the east will be unaffected. In this context the Development will not appear overwhelming or oppressive. **As such, the Development does not have the potential to affect overall 'living conditions' rendering it an unattractive place to live, and therefore does not breach the 'Residential Visual Amenity Threshold' (LI TGN 2/19).**

Table 9: Stewarton House

Name: Stewarton House		**See Figure A5.3.3 and A5.3.P7**	
Direction to Site	North-west	Number of turbine hubs and tips visible	5 hubs, 10 tips
Distance to nearest turbine	1.4 km	Horizontal field of view	53 degrees
Nearest turbine	4	Angle of direction to Site	310 degrees

Description of property, location and existing context:

A detached two-storey house accessed via a minor road from Mosshouse. The road is shared with other properties in the Stewarton cluster. The property is orientated with its primary aspect to the east and there are windows on all elevations. There are single storey outbuildings to the west which form a courtyard with the western aspect of the property. The property has a large private garden with tree and shrub planting, mainly to the south and east. To the north views towards the rolling hills which form the Site are filtered by mature trees along the track.

Description of existing views and visual amenity:

The property is orientated with its primary aspect to the east, which looks out over private gardens located to the east and south. Views from the west of the property are limited by the presence of single storey outbuildings, and nearby trees. Mature deciduous vegetation along the minor access road to the north of the property, and the block of woodland to the north-west of the outbuilding, will filter views in these directions in the summer months when vegetation is in leaf. Likewise, vegetation within the private gardens to the east and south limit longer ranging views in these directions.

Windows on the upper floors are likely to be afforded more open views. In particular, those located on the northern and western façade of the property may experience more open views towards the forested slopes of the Site in the north-west.

The operational Bowbeat Wind Farm is unlikely to be views from the property and its garden. However, more open sections of the access road have visibility of the wind farm.

Description of likely change in views and visual amenity as a result of the Development:

Refer to Figure A5.3.P7 and the photomontage in Figure A5.3.3 which represents views from this cluster of properties.

The Development will be largely screened from this property due to the presence of mature vegetation to the north of the property, and outbuildings to the west of the property. Some views may be attained from the upper floors of the property, notably from windows on the northern and western elevations of the property. Views from within the curtilage of the property are also likely to be filtered by enclosing mature vegetation.

From the upper floors where visibility may be possible, the hubs of up to five and blades of up to ten turbines may be visible to the north-west, at a distance of 1.4 km. The turbines will be visible above the skyline of the ridge forming Kilrubie Hill. This forested ridge will provide screening of all lower-level infrastructure such as tracks and ancillary development and will also provide screening of turbine hubs and towers for the more distant turbines. The most northerly turbines (T11 and T12) will be entirely screened by the landform. Forestry is likely to further screen several other hubs and blades, notably T1 and T7. Turbines 3, 4 and 5 which sit on the ridge of Kilrubie Hill appear most prominent, with hubs above the horizon.

There are no cumulative interactions between the Development and consented or proposed wind farms.

Conclusion with respect to the potential effects on Living Conditions:
The magnitude of change to the visual amenity of this property is medium (significant). Views of the Development from the property will likely be limited to the upper floors on the northern and western elevations of the property, at a distance of 1.4 km. Views from the ground floor level of the property and its gardens are likely to be largely screened by buildings and mature vegetation. Where views of the Development are possible, the landform within the Site and the coniferous forest will help to screen the lower parts of most turbines. Principal views to the east will be unaffected. In this context the Development will not appear overwhelming or oppressive. **As such, the Development does not have the potential to affect overall 'living conditions' rendering it an unattractive place to live, and therefore does not breach the 'Residential Visual Amenity Threshold' (LI TGN 2/19).**

Table 10: Stewarton Toll

Name: Stewarton Toll		**See Figure A5.3.3 and A5.3.P8**	
Direction to Site	North-west	Number of turbine hubs and tips visible	6 hubs, 10 tips
Distance to nearest turbine	1.5 km	Horizontal field of view	52 degrees
Nearest turbine	4	Angle of direction to Site	310 degrees
Description of property, location and existing context:			
A detached 1.5 storey house accessed via a minor road from Mosshouse. The road is shared with other properties in the Stewarton cluster. The property is orientated with its primary aspect to the south, and there are windows on all elevations. The property has a large private garden with tree and shrub planting, mainly to the west and north. To the north views towards the rolling hills which form the Site are available, with some deciduous tree planting providing filtering.			
Description of existing views and visual amenity:			
The property is orientated with its primary aspect to the south. The southern and eastern elevations of the property look out over the access road to the cluster of properties to the south, and the track forming the Cross Borders Drove Road to the east. The northern and western elevations of the property overlook the rear private garden, located to the north and west. The garden is well vegetated, with mature trees and shrubs located along the boundary of the garden. This vegetation screens longer ranging views out of the property's curtilage. The upper storey of the property is to have longer ranging views, including towards the Site to the north-west. Bowbeat Wind Farm is unlikely to be visible from the property and its garden, due to mature boundary vegetation within the garden and adjacent to the access road to the east of the property.			
Description of likely change in views and visual amenity as a result of the Development:			
Refer to Figure A5.3.P8 and the photomontage in Figure A5.3.3 which represents views from this cluster of properties. The Development will be partially screened from this property due to the presence of vegetation around the boundary of the property's garden to the north and west. This appears to be deciduous vegetation, and therefore would provide less screening in the winter months. Views may be attained			

from the upper floors of the property, notably from windows on the northern and western elevations. Areas within the curtilage of the property will also experience views of the of the Development, however this is likely to be largely screened in the summer months. Where visibility may be possible, the hubs of up to six and blades of up to ten turbines may be visible to the north-west, at distances of 1.5 km. The turbines will be visible above the skyline of the ridge forming Kilrubie Hill. This forested ridge will provide screening of all lower-level infrastructure such as wind farm tracks and ancillary development and will also provide screening of turbine hubs and towers for the more distant turbines. The most northerly turbine (T12) will be entirely screened by the landform. Turbines 3, 4 and 5 which sit on the ridge of Kilrubie Hill appear most prominent, with hubs above the horizon. There are no cumulative interactions between the Development and consented or proposed wind farms.
Conclusion with respect to the potential effects on Living Conditions:
The magnitude of change to the visual amenity of this property is high (significant). Views of the development from the ground floor of the property and its garden are expected to be largely screened by mature boundary vegetation in summer. However, visibility will be more extensive when the vegetation is sparser in the winter months. In summer, views of the Development from the property will likely be limited to windows on the upper storey on the northern and western elevations of the property. Where views of the Development are possible from the property and its curtilage, they would likely be partially filtered by vegetation, and further screened by the landform and forestry of the Site which reduces visibility of turbine towers and blades. Principal views to the south will be unaffected. In this context the Development will not appear overwhelming or oppressive. **As such, the Development does not have the potential to affect overall 'living conditions' rendering it an unattractive place to live, and therefore does not breach the 'Residential Visual Amenity Threshold' (LI TGN 2/19).**

Table 11: Stewarton Lodge

Name: Stewarton Lodge		**See Figure A5.3.3 and A5.3.P9**	
Direction to Site	North-west	Number of turbine hubs and tips visible	7 hubs, 10 tips
Distance to nearest turbine	1.6 km	Horizontal field of view	50 degrees
Nearest turbine	4	Angle of direction to Site	305 degrees
Description of property, location and existing context:			
Bungalow located on the south side of the minor road that provides access to the Stewarton cluster of properties. This minor road also forms part of the long-distance Cross Borders Drove Road. The property is surrounded by gardens and vegetation and there is a driveway to the north of the property.			
Description of existing views and visual amenity:			

The property is orientated with its primary aspect to the north, which overlooks the minor road leading to the Stewarton cluster of properties. The property only features ground-level windows to the north and south, with no windows identified on the gable ends of the property. Views in all directions from the property and its curtilage are generally screened by mature trees, however some longer distance glimpsed views are available between trees and vegetation on the northern side of the minor road to the north of the property. These views are however heavily filtered. Bowbeat Wind Farm is not visible from this property due to surrounding vegetation. However, it is visible from more open sections of the minor road leading to the property.
Description of likely change in views and visual amenity as a result of the Development:
Refer to Figure A5.3.P9 and the photomontage in Figure A5.3.3 which represents views from this cluster of properties. The Development will be largely screened from this property due to the presence of mature vegetation surrounding the property in all directions. Some glimpsed views may be attained from the minor road which provides access to the property in winter when deciduous vegetation is not in leaf. There are no cumulative interactions between the Development and consented or proposed wind farms.
Conclusion with respect to the potential effects on Living Conditions:
The magnitude of change to the visual amenity of this property is barely perceptible (not significant). Vegetation to the north of the property will heavily filter views although glimpses of the Development may be available in winter at a distance of 1.6 km. **As such, the Development does not have the potential to affect overall 'living conditions' rendering it an unattractive place to live, and therefore does not breach the 'Residential Visual Amenity Threshold' (LI TGN 2/19).**

Table 12: Cloich Farm

Name: Cloich Farm		**See Figure A5.3.P10**	
Direction to Site	South-west	Number of turbine hubs and tips visible	7 hubs, 10 tips
Distance to nearest turbine	1.2 km	Horizontal field of view	53 degrees
Nearest turbine	10	Angle of direction to Site	230 degrees
Description of property, location and existing context:			
A detached two storey house located to the north-east of the Site. The property is accessed via a private track from the north-east. From aerial maps the house appears to be oriented to the south-east, however there appears to be a conservatory on the south-western elevation of the property which looks out towards the Site. There are gardens mainly to the south. There are farm buildings to the north, and a small block of deciduous woodland to the north-east.			
Description of existing views and visual amenity:			
The primary outlook of this property is assumed to be to the south-east, however it is noted that the south-western elevation of the property features a conservatory with an outlook towards the Site.			

Largely open views are available in this south-westerly direction across the farmed lower slopes of the Cloich Hills, with coniferous forestry visible on the upper slopes. Bowbeat Wind Farm is visible from this property, in successive views to the east. Views towards the forested hills within the Site are likely to be available from the conservatory and other ground-floor windows on the south-west façade of the property. In addition, views will be available from the garden to the south of the property, other areas within the farmyard to the north of the property, and from sections of the adjacent private track. The presence of deciduous woodland to the north and east of the property limits views in these directions.
Description of likely change in views and visual amenity as a result of the Development:
Refer to Figure A5.3.P10. The hubs of up to seven and blades of up to ten turbines will be theoretically visible from windows on the south-western façade of the property, and from areas within its curtilage, including the garden to the south, and open farmyard to the north. From the south-western elevation of the property turbines will be visible at a distance of 1.2 km with T10, near the summit of Peat Hill in the north of the Site, being the closest. Coniferous forestry and the rising nature of the landform within the Site will screen lower level infrastructure including tracks and ancillary development. In addition, the landform of the Site will screen turbines 1 and 2 in the south of the Site, and will partially screen the remaining turbines, providing a sense of separation. Principal views to the south-east will be unaffected. There are no cumulative interactions between the Development and consented or proposed wind farms.
Conclusion with respect to the potential effects on Living Conditions:
The magnitude of change to the visual amenity of this property is high (significant). The Development will be visible from the south-western façade of the property, which includes a conservatory, and from the properties curtilage. The closest turbine (T10) is located at a distance of 1.2 km from the property. Due to the open nature of the farmland to the south and west of the property, views of the Development will be largely unscreened. Forestry on the Cloich Hills will however screen lower-level infrastructure. Views to the north and east will not be affected. Although there will be a high magnitude of change at this property, the Development will not appear overwhelming or oppressive given that principal views to the south-east will not be affected. **As such, the Development does not have the potential to affect overall 'living conditions' rendering it an unattractive place to live, and therefore does not breach the 'Residential Visual Amenity Threshold' (LI TGN 2/19).**

Table 13: Earlyburn

Name: Earlyburn		**See Figure A5.3.P11**	
Direction to Site	South-west	Number of turbine hubs and tips visible	10 hubs, 12 tips
Distance to nearest turbine	2.5 km	Horizontal field of view	45 degrees
Nearest turbine	10	Angle of direction to Site	235 degrees

Description of property, location and existing context:

A detached two storey house located to the east of the Early Burn. The property is accessed via a driveway off the minor road to the south. There are windows on all aspects and glass patio doors on the southern aspect. There are private gardens on all sides but mainly to the west. The driveway and parking area are to the south of the property. There is a small observatory to the north of the property. The property currently has an open outlook in all directions with panoramic views. There is some recent tree planting to the west and south within its curtilage.

A wooden hut painted green and understood to be used for occasional holiday accommodation is located in a shelter belt, approximately 500 m further west along the road from this property. The status of this property is uncertain, however coniferous forestry to the south of this property would largely screen views once mature.

Description of existing views and visual amenity:

The primary outlook of the property appears to be to the west and south. The property is orientated to the west; however, gable end views are towards the south and include visibility of the Cloich Hills to the south-west. The southern façade of the property features large floor-to-ceiling patio doors on the ground floor, with two small windows on the first floor. Views from this property are open in all directions. Views to the south and south-west extend across low-lying farmland and moorland, with the forested Cloich Hills forming the skyline in mid-range views.

The operational Bowbeat Wind Farm is visible in easterly views from the property, its garden and the access road.

Description of likely change in views and visual amenity as a result of the Development:

Refer to Figure A5.3.P11, and Figure 5.2.3 (LVIA VP3: Old Post Road Core Path (east of observatory).

The hubs of ten and blades of twelve turbines will be visible to the south-west from the southern and western elevations of the property and its curtilage, at a distance of 2.5 km. The turbines will be visible on the skyline at a higher elevation. Viewpoint 3: Old Post Road Core Path (east of observatory) in the LVIA chapter is in proximity to this property.

The rising landform and forested nature of the Site will screen lower level infrastructure including tracks and ancillary development, helping to provide a degree of separation. Turbines in the west of the Site (T1 and T11) will be partially screened by the landform, with only blades visible. Turbine 12 in the north of the Site appears to extend down the northern slopes of the Cloich Hills. Currently the garden remains very open, however the recently planted trees to the south of the property will provide some partial filtering of views from the garden and property in the future.

There are no cumulative interactions between the Development and consented or proposed wind farms.

Conclusion with respect to the potential effects on Living Conditions:

The magnitude of change to the visual amenity of this property is high (significant). The Development will be visible from the southern gable end of the property, its western frontage and its curtilage, at a distance of 2.5 km. Due to the open nature of the farmland and moorland to the

south of the property, there is unlikely to be any screening of the Development. However, recently planted trees within the curtilage of the property may provide filtering of views in the future. Views to the north and east will not be affected. Although there will be a high magnitude of change at this property, the Development will not appear overwhelming or oppressive given the distance of the turbines and available views in other directions (north and east). **As such, the Development does not have the potential to affect overall 'living conditions' rendering it an unattractive place to live, and therefore does not breach the 'Residential Visual Amenity Threshold' (LI TGN 2/19).**

Table 14: Whitelaw Burn

Name: Whitelaw Burn		**See Figure A5.3.P12**	
Direction to Site	South-west	Number of turbine hubs and tips visible	10 hubs, 12 tips
Distance to nearest turbine	1.9 km	Horizontal field of view	59 degrees
Nearest turbine	5	Angle of direction to Site	260 degrees
Description of property, location and existing context:			
From aerial photographs the property appears to be a 2-storey detached farmhouse located at the end of a private track from the north-east. The property appears to have a driveway to the front (south-east facing aspect), which is accessed via the private track. The outlook appears to be open with the exception of a belt of coniferous trees immediately to the west of the property curtilage. The Whitelaw Burn runs to the south of the property.			
Description of existing views and visual amenity:			
The primary outlook of the property appears to be to the south-east across the Eddleston Valley. The south-western elevation of the property faces towards the Site to the west, and there may also be oblique views from the north-west elevation. A shelterbelt of coniferous forestry is located immediately to the west of the property and will play a role in screening views towards the Site from the property. More open views from the curtilage and private track may be available. Should the forestry to the west of the property be felled, there would be open views of the Development on the skyline above the Cloich Hills. The operational Bowbeat Wind Farm is visible in easterly views towards the Moorfoot Hills.			
Description of likely change in views and visual amenity as a result of the Development:			
Refer to Figure A5.3.P12 The hubs of ten and blades of up to twelve turbines will be theoretically visible from the property, its curtilage and private track. From the private track to the north-east of the property, the turbines will be visible on the skyline above the retained coniferous shelterbelt immediately west of the property. It is anticipated that this shelterbelt will screen the Development from within the property and principal views south-east from the property will be unaffected. There are no cumulative interactions between the Development and consented or proposed wind farms.			
Conclusion with respect to the potential effects on Living Conditions:			

The magnitude of change to the visual amenity of this property is medium (significant). The Development will be visible from the property's private track at a distance of over 1.9 km. A coniferous shelterbelt to the immediate west of the property is expected to play a role in largely screening views from the property itself and will provide a degree of separation. Principal views to the south-east of the property will not be affected. In this context the Development will not appear overwhelming or oppressive. **As such, the Development does not have the potential to affect overall 'living conditions' rendering it an unattractive place to live, and therefore does not breach the 'Residential Visual Amenity Threshold' (LI TGN 2/19).**

1.4 Summary of Effects

Table 15 provides a summary of the effects at each of the assessed properties.

Table 15 Summary of Effects on Residential Visual Amenity

Ref	Property Name	Magnitude of Effect	Effect on Living Conditions
P1	Harehope Steading	Medium	The Development does not have the potential to affect overall 'living conditions' rendering it an unattractive place to live, and therefore does not breach the 'Residential Visual Amenity Threshold' (LI TGN 2/19).
P2	Harehope Farmhouse	Medium	The Development does not have the potential to affect overall 'living conditions' rendering it an unattractive place to live, and therefore does not breach the 'Residential Visual Amenity Threshold' (LI TGN 2/19).
P3	Old Harehope	Medium	The Development does not have the potential to affect overall 'living conditions' rendering it an unattractive place to live, and therefore does not breach the 'Residential Visual Amenity Threshold' (LI TGN 2/19).
P4	Harehope Cottage	Medium	The Development does not have the potential to affect overall 'living conditions' rendering it an unattractive place to live, and therefore does not breach the 'Residential Visual Amenity Threshold' (LI TGN 2/19).
P5	Upper Stewarton	Medium	The Development does not have the potential to affect overall 'living conditions' rendering it an unattractive place to live, and therefore does not breach the 'Residential Visual Amenity Threshold' (LI TGN 2/19).
P6	Nether Stewarton	High	The Development does not have the potential to affect overall 'living conditions' rendering it an unattractive place to live, and therefore does not breach the 'Residential Visual Amenity Threshold' (LI TGN 2/19).
P7	Stewarton House	Medium	The Development does not have the potential to affect overall 'living conditions' rendering it an unattractive place to live, and therefore does not breach the 'Residential Visual Amenity Threshold' (LI TGN 2/19).

Ref	Property Name	Magnitude of Effect	Effect on Living Conditions
P8	Stewarton Toll	High	The Development does not have the potential to affect overall 'living conditions' rendering it an unattractive place to live, and therefore does not breach the 'Residential Visual Amenity Threshold' (LI TGN 2/19).
P9	Stewarton Lodge	Barely perceptible	The Development does not have the potential to affect overall 'living conditions' rendering it an unattractive place to live, and therefore does not breach the 'Residential Visual Amenity Threshold' (LI TGN 2/19).
P10	Cloich Farm	High	The Development does not have the potential to affect overall 'living conditions' rendering it an unattractive place to live, and therefore does not breach the 'Residential Visual Amenity Threshold' (LI TGN 2/19).
P11	Earlyburn	High	The Development does not have the potential to affect overall 'living conditions' rendering it an unattractive place to live, and therefore does not breach the 'Residential Visual Amenity Threshold' (LI TGN 2/19).
P12	Whitelaw Burn	Medium	The Development does not have the potential to affect overall 'living conditions' rendering it an unattractive place to live, and therefore does not breach the 'Residential Visual Amenity Threshold' (LI TGN 2/19).

Figure A5.3.P1	P1: Harehope Steading	Produced with 90° FOV

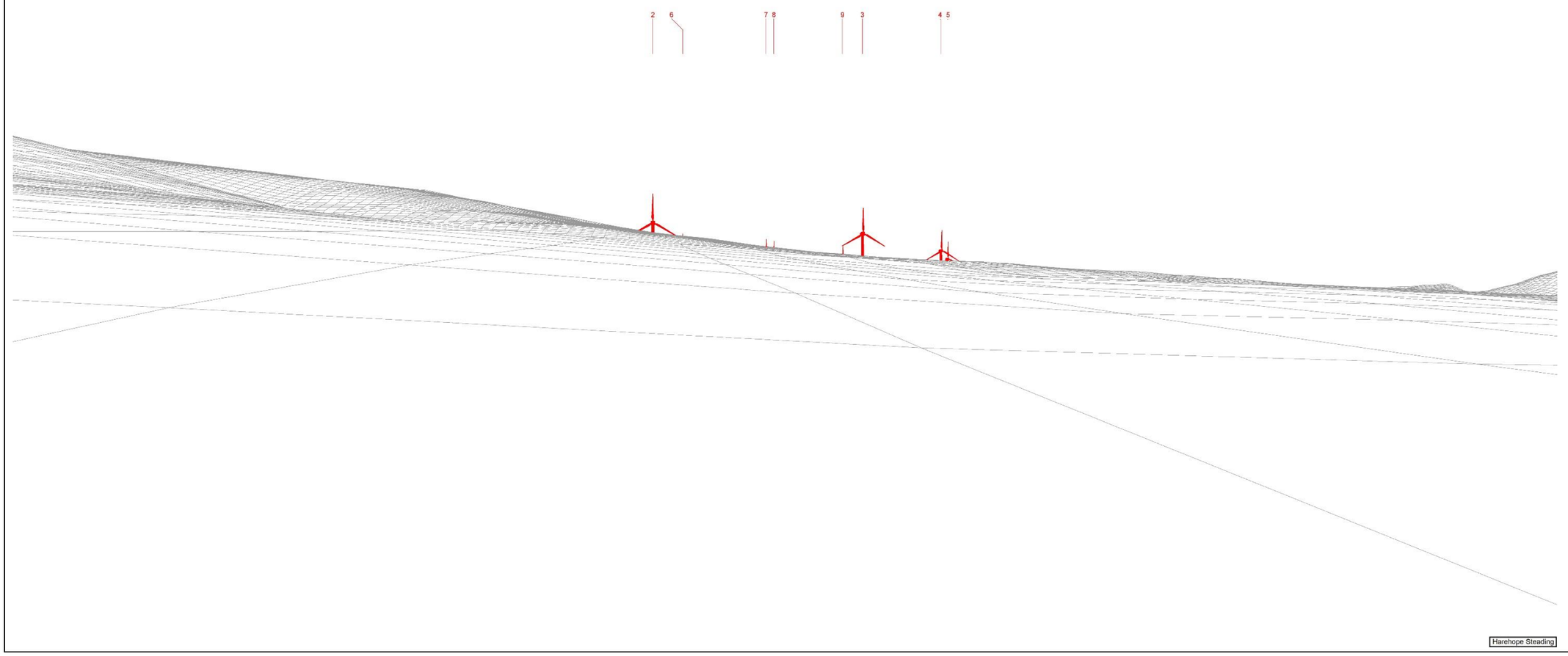


Figure A5.3.P2	P2: Harehope Farmhouse	Produced with 90° FOV

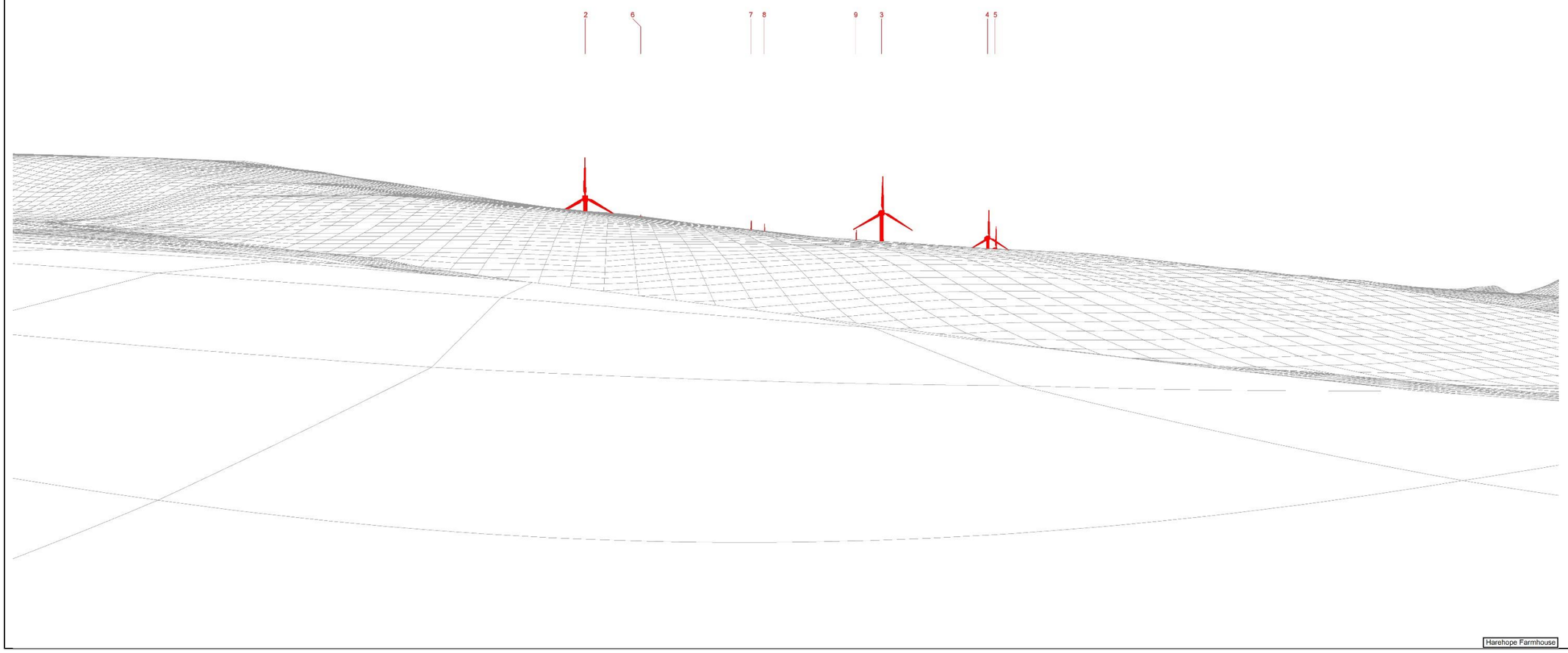


Figure A5.3.P3	P3: Old Harehope	Produced with 90° FOV

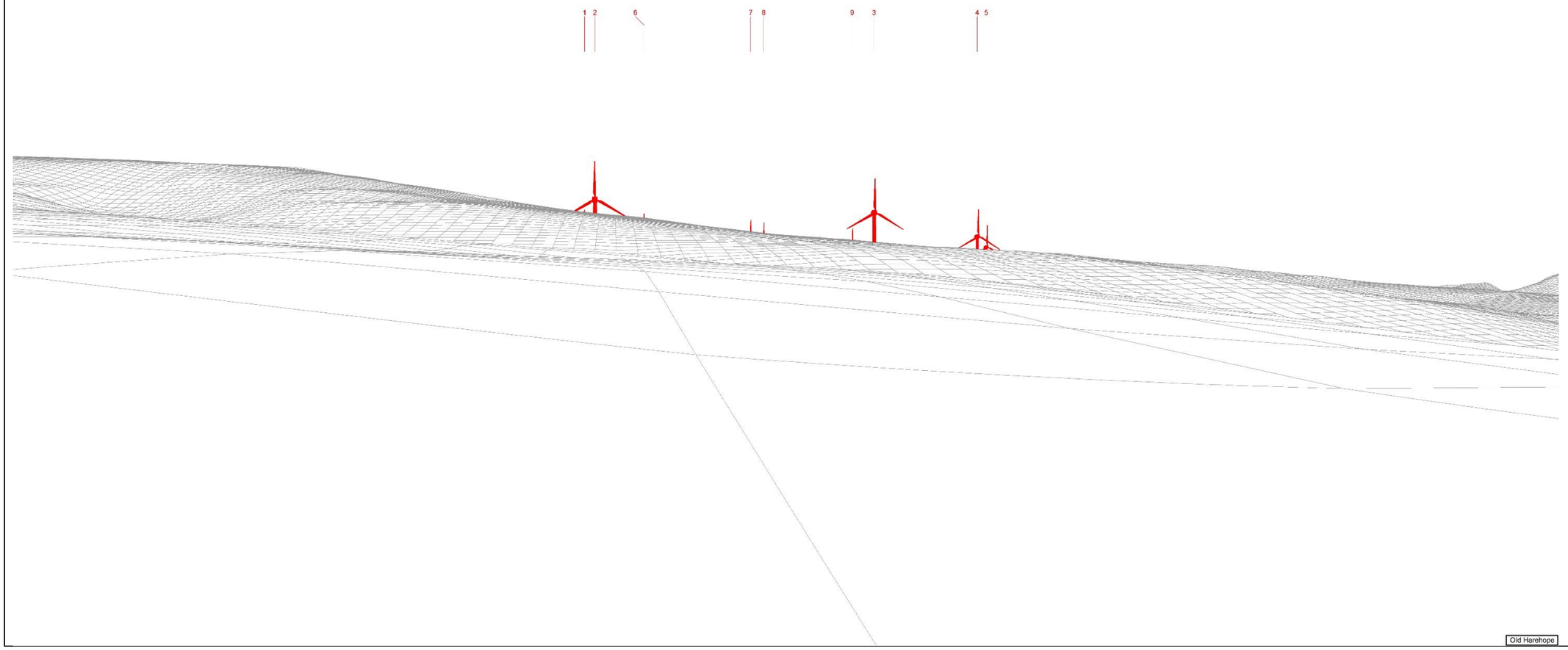


Figure A5.3.P4	P4: Harehope Cottage	Produced with 90° FOV

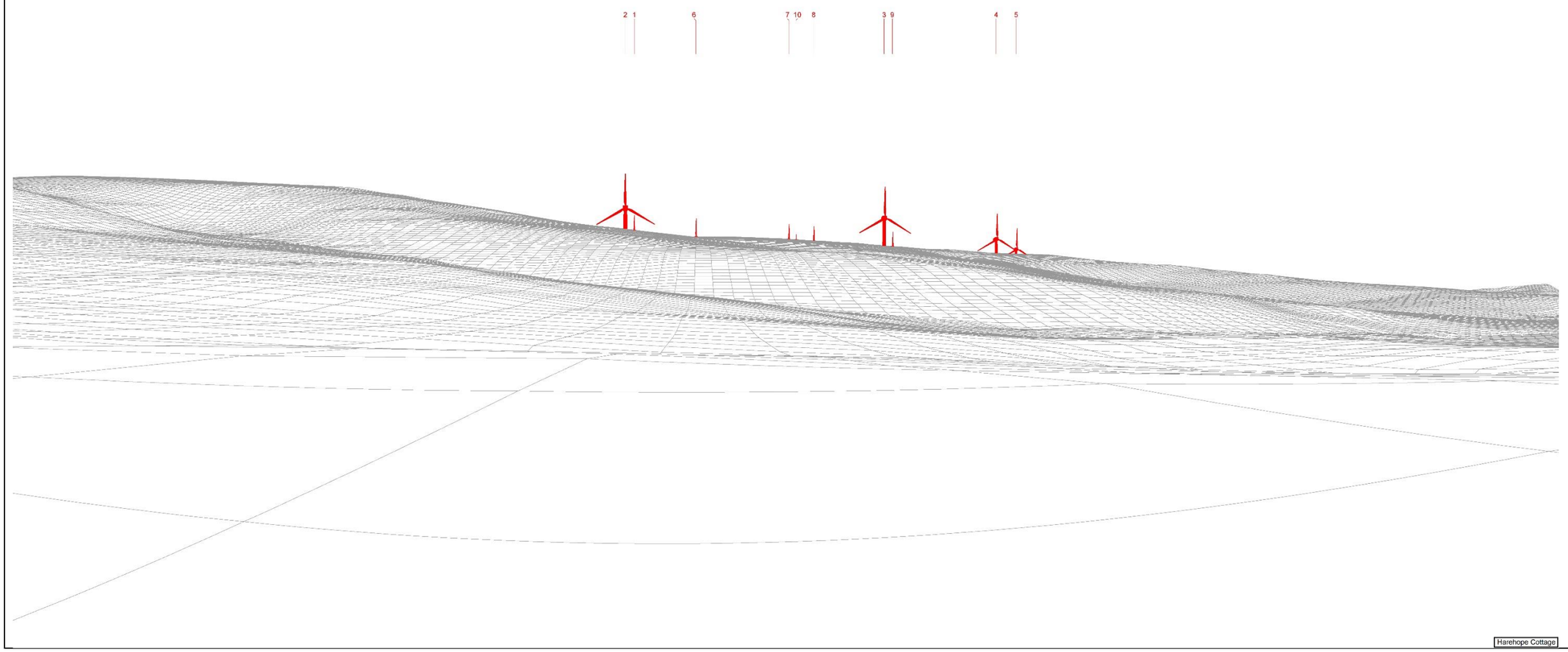


Figure A5.3.P5	P5: Upper Stewarton	Produced with 90° FOV

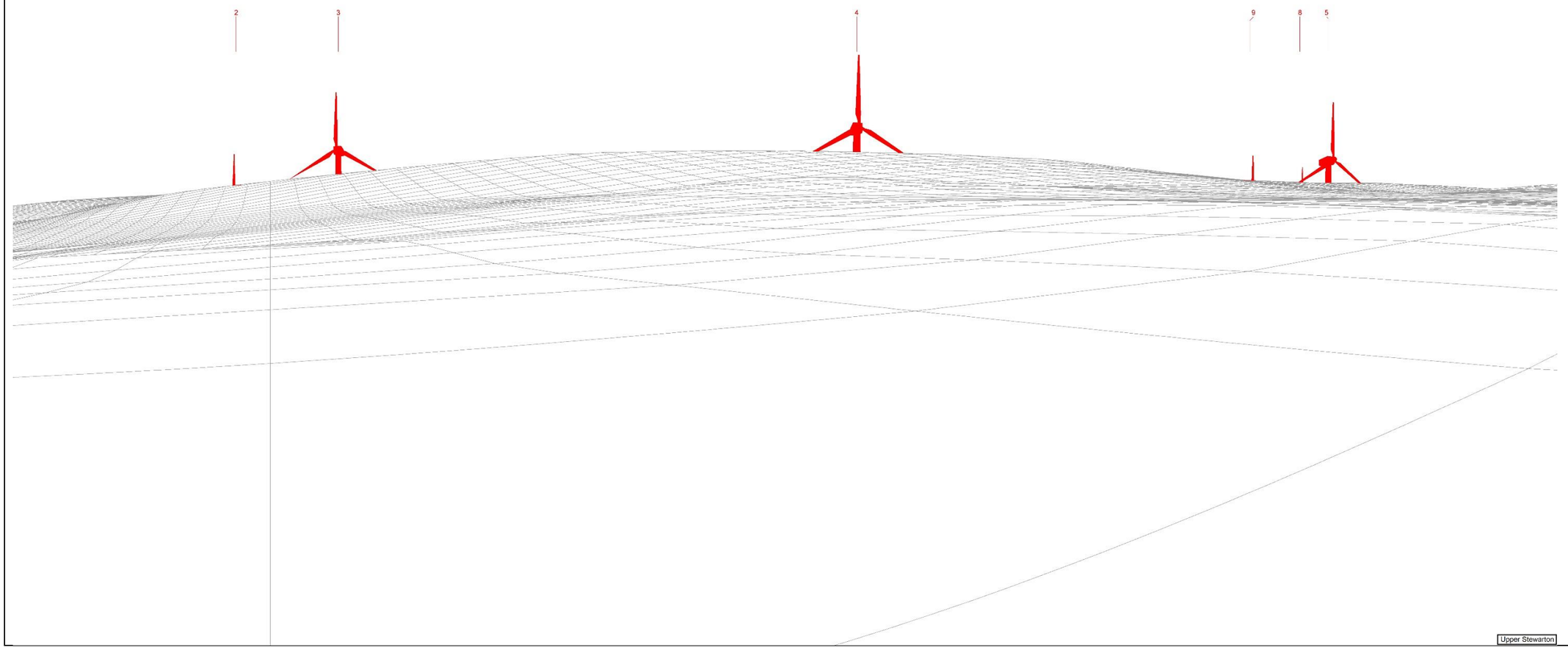


Figure A5.3.P6	P6: Nether Stewarton	Produced with 90° FOV

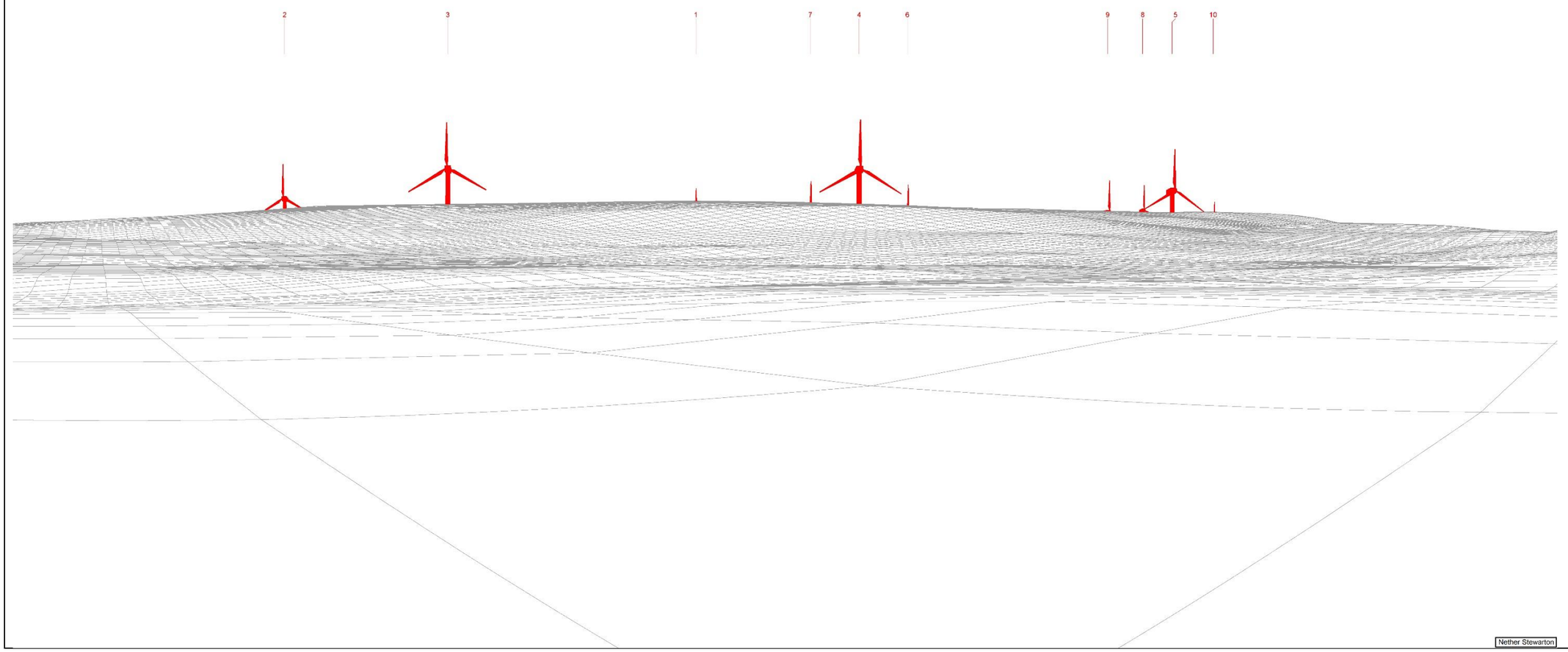


Figure A5.3.P7	P7: Stewarton House	Produced with 90° FOV

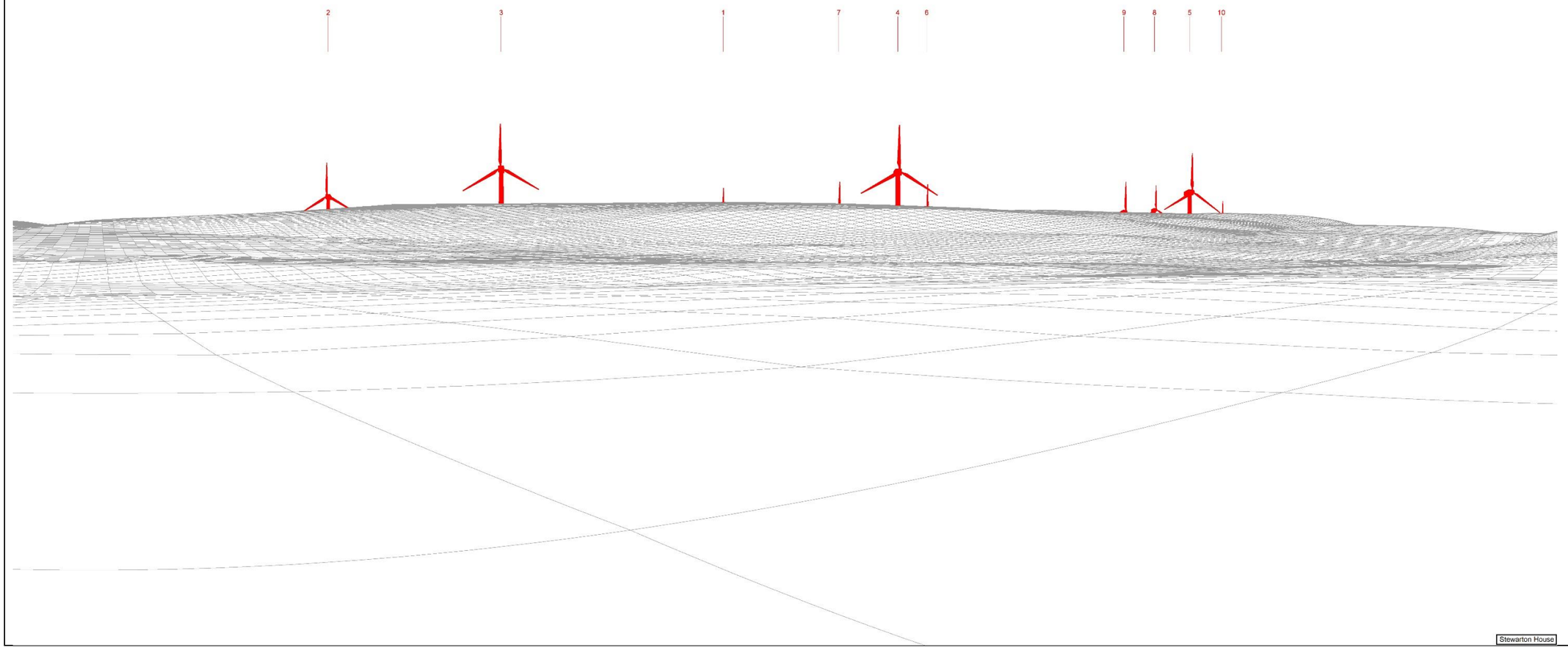


Figure A5.3.P8	P8: Stewarton Toll	Produced with 90° FOV

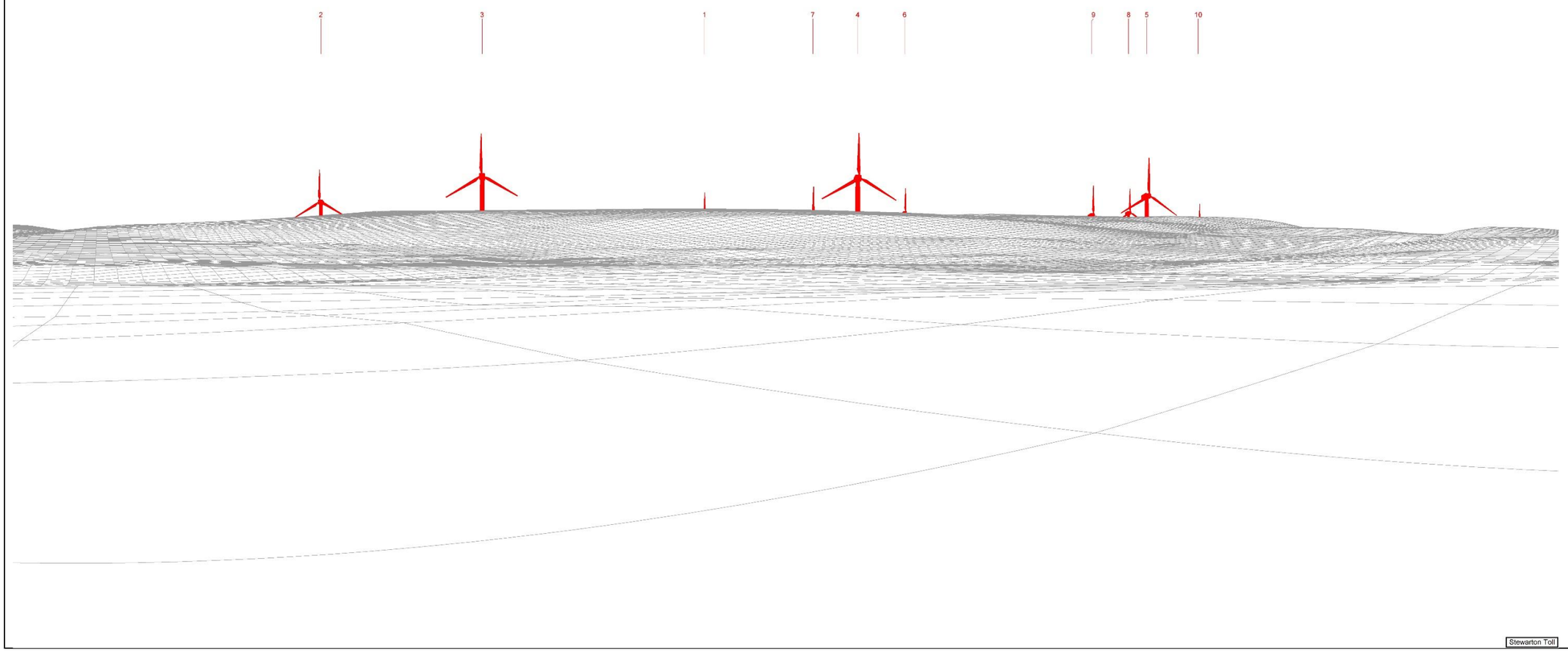


Figure A5.3.P9	P9: Stewarton Lodge	Produced with 90° FOV

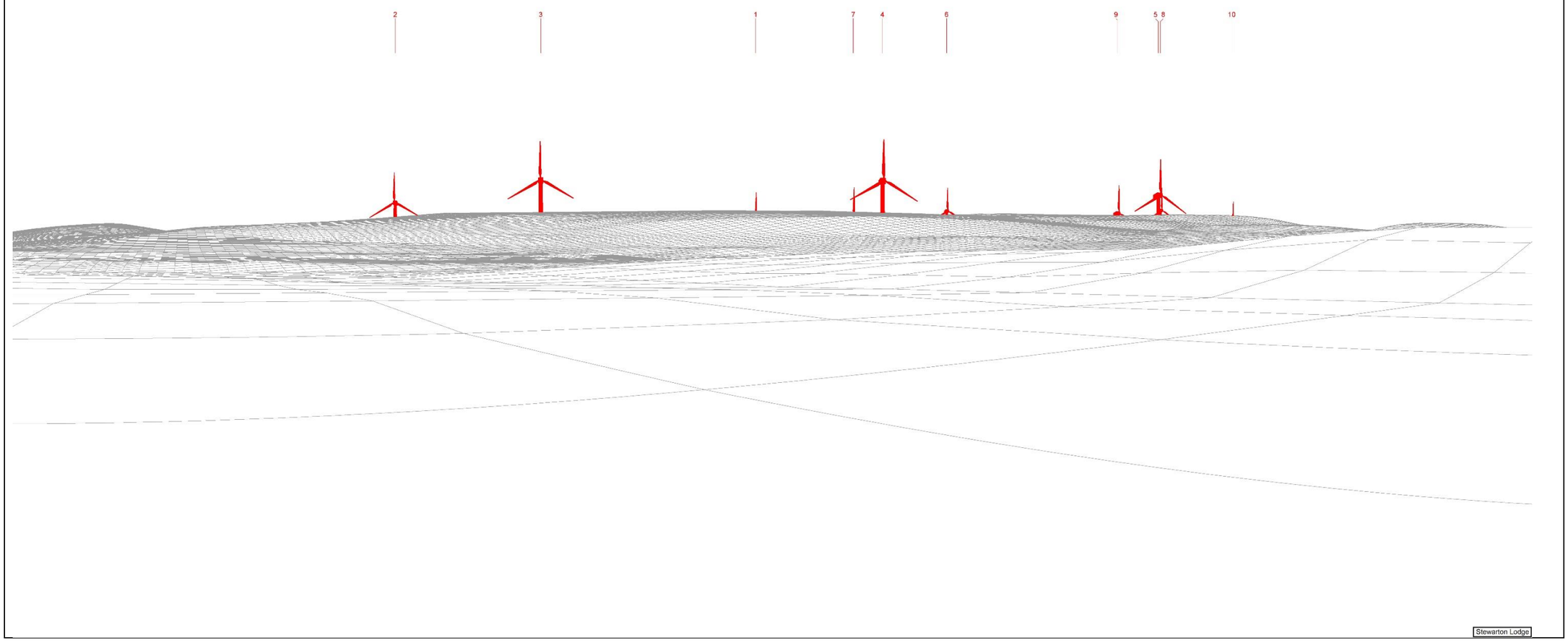


Figure A5.3.P10	P10: Cloich Farm	Produced with 90° FOV

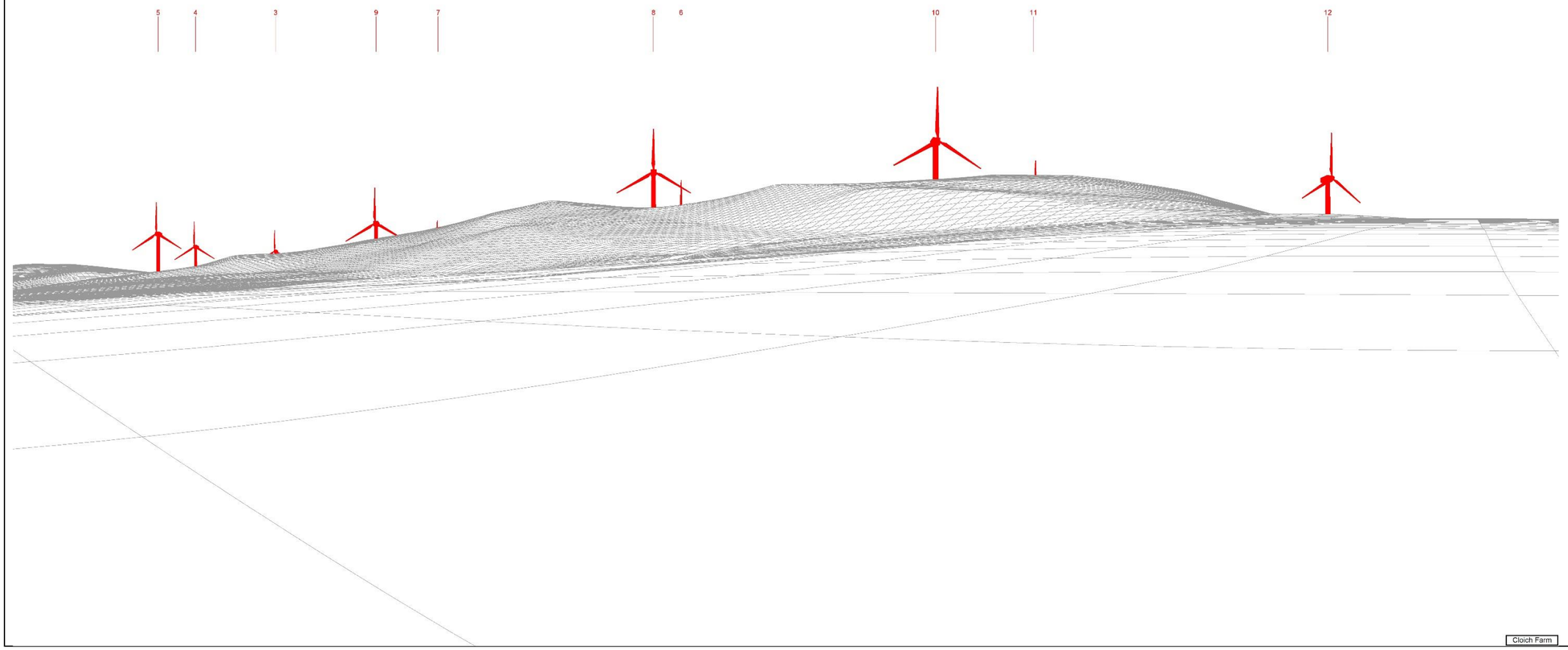


Figure A5.3.P11	P11: Earlyburn	Produced with 90° FOV

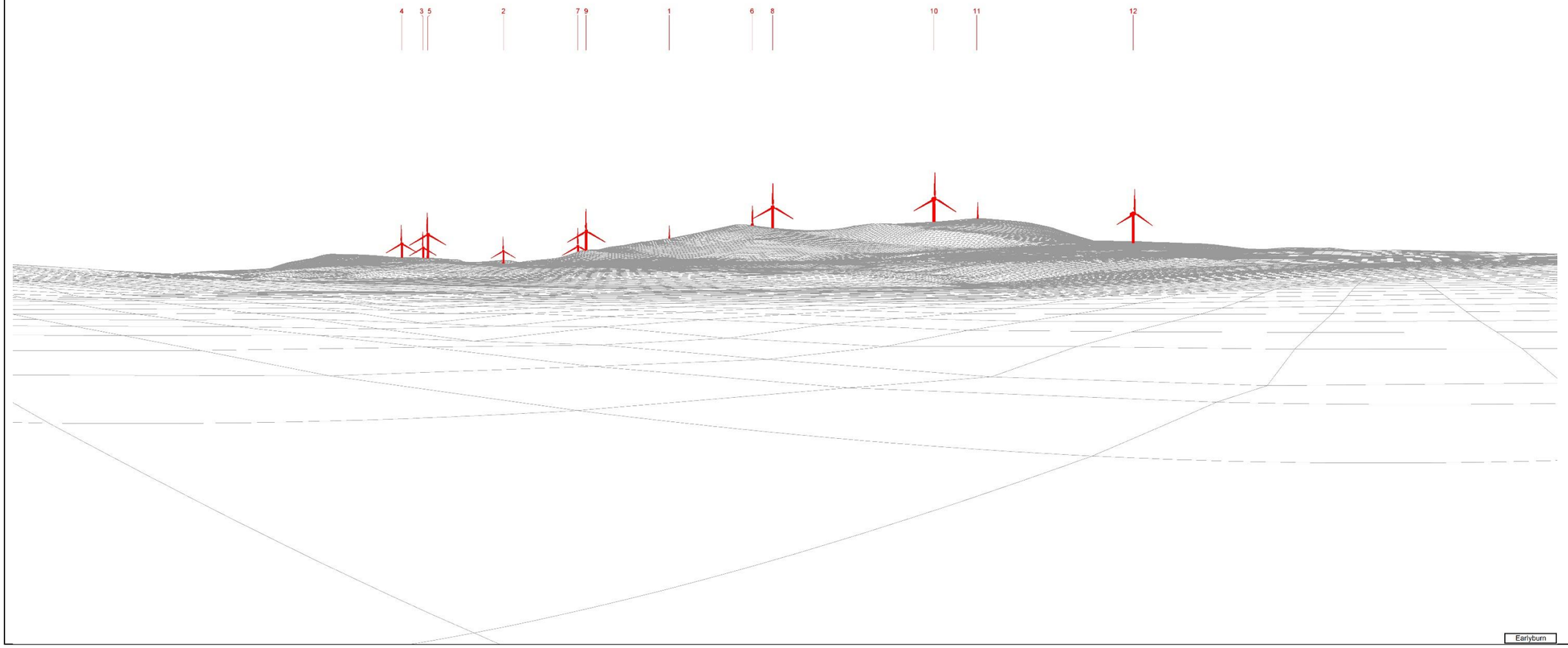
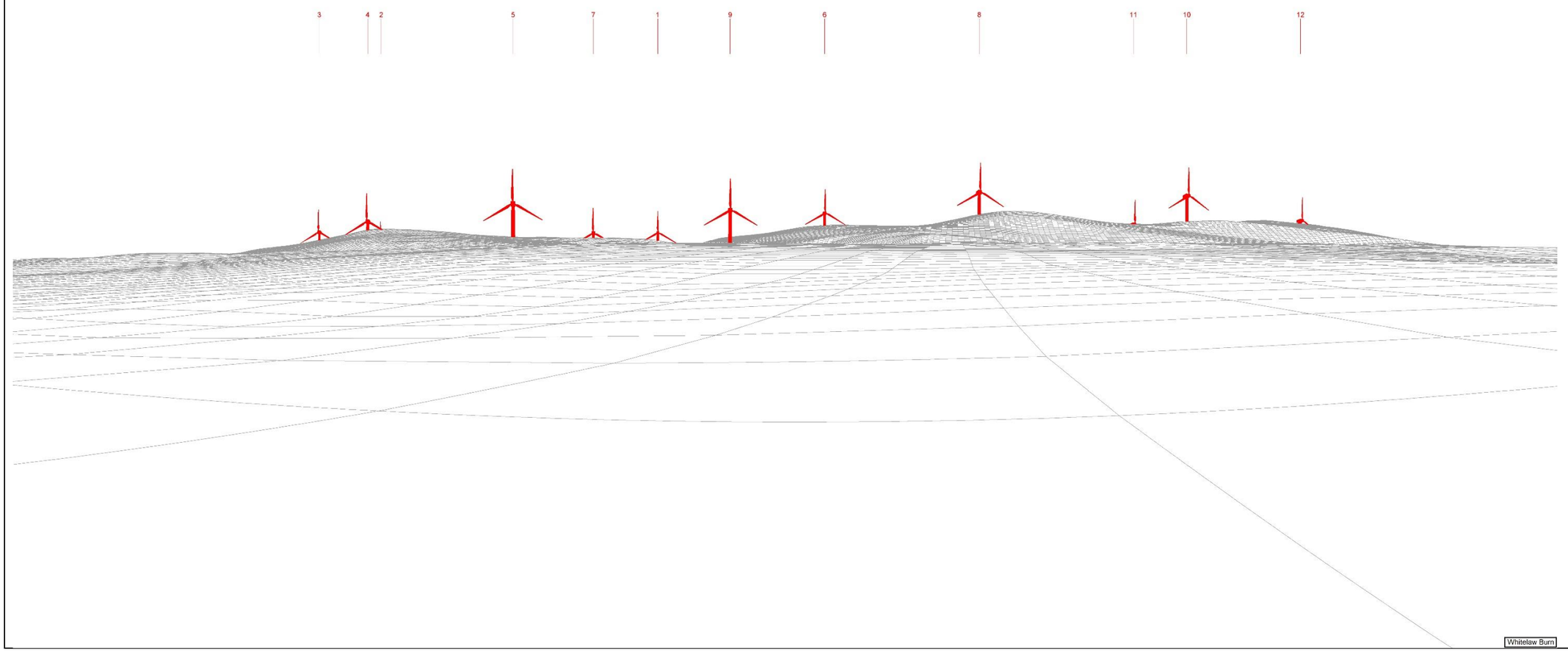
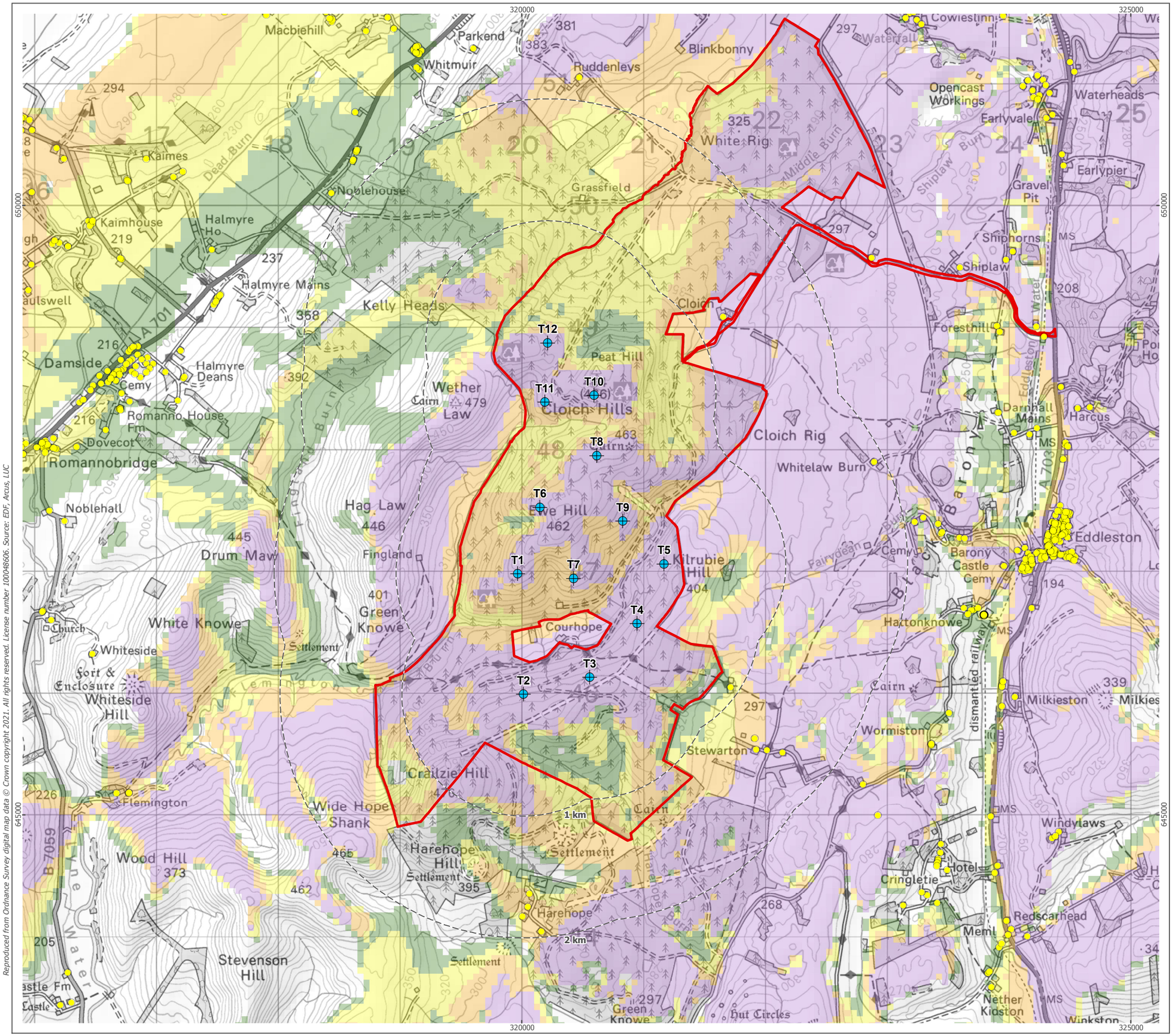


Figure A5.3.P12	P12: Whitelaw Burn	Produced with 90° FOV





Notes
The ZTV is calculated to turbine tip height (149.9 m) from a viewing height of 2 m above ground level.
The terrain model assumes bare ground and is derived from OS Terrain 50 height data (obtained from Ordnance Survey in July 2019).
Earth curvature and atmospheric refraction have been taken into account.
The ZTV was calculated using ArcMap 10.5.1 software.

1:30,000 Scale @ A3

0 0.55 1.1 km

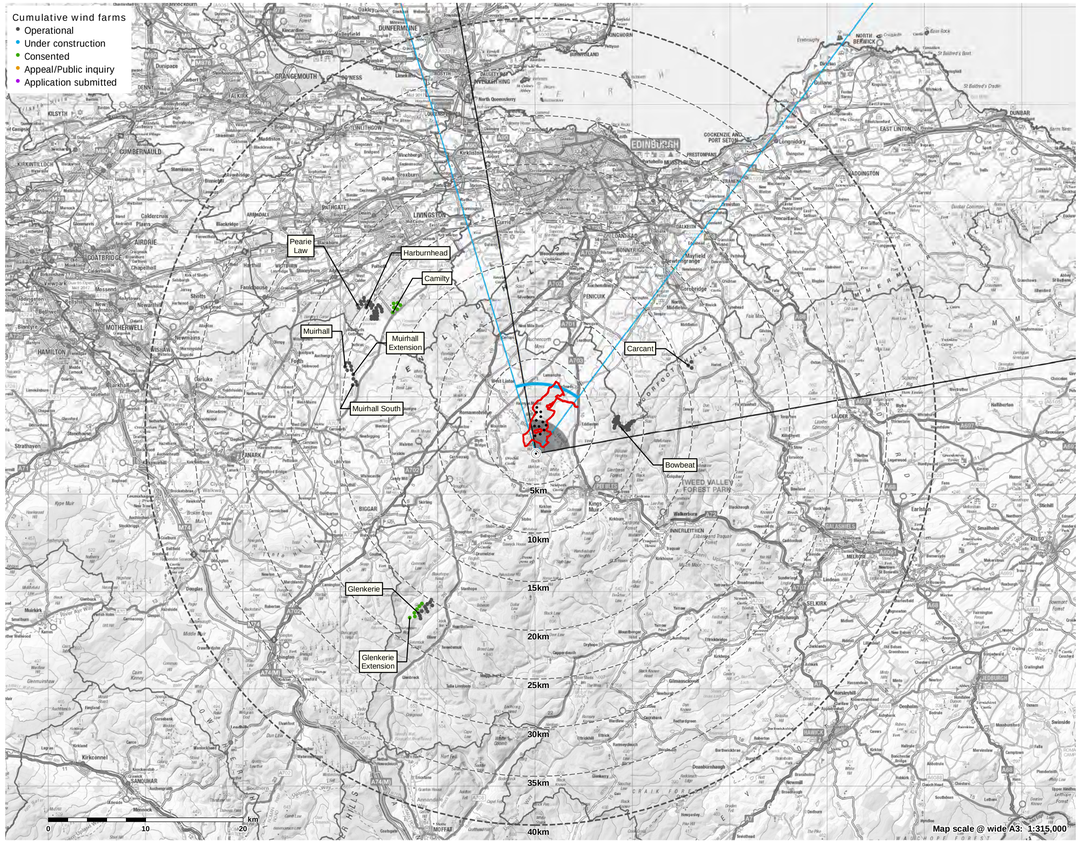
NORTH

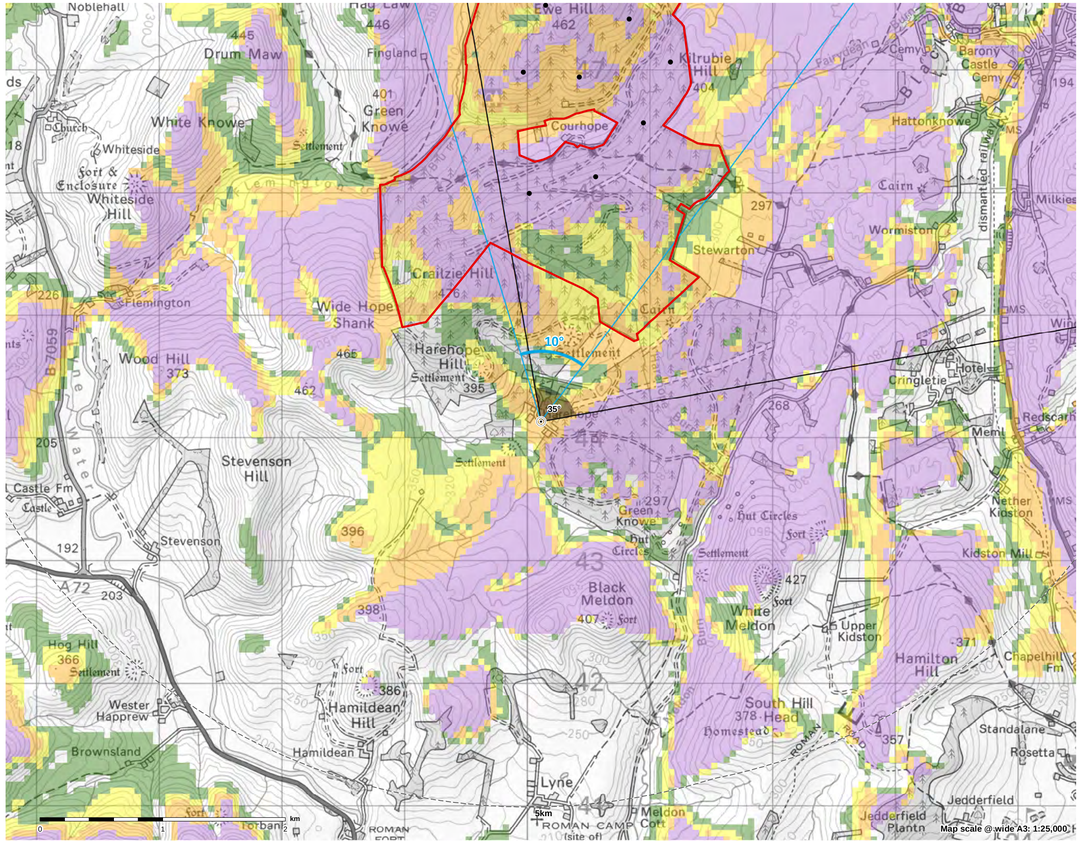
Produced By: EL	Ref: Pr No.-REP-Dr. No.
Checked By: LC	Date: 07/05/2021

Blade Tip Height (149.9 m) ZTV and Residential Properties (2km)
Figure 5.3.1

Cloich Forest Wind Farm EIA Report

S:\10800\10801 Cloich WF LVIA\GIS\MXD\Report\LVIA_Final_v1\FIG5-3-1_r2_ZTVtip_Resi2km_VP_A3L.mxd





Site boundary
Turbine location
5km intervals from outermost turbines
40km study area
Viewpoint

Theoretical turbine tip visibility
1-3 Turbines are visible
4-6 Turbines are visible
7-9 Turbines are viible
10-12 Turbines are visible

53.5° Field of view
90° Field of view

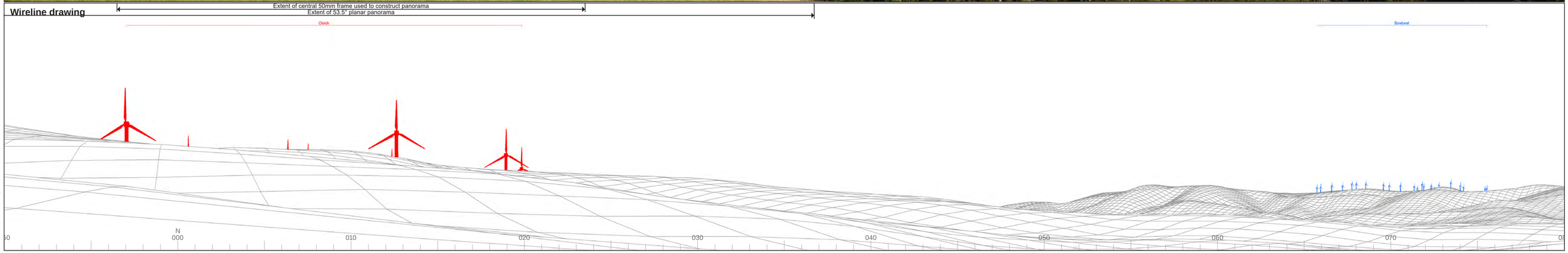
Notes
Cumulative wind farms based on information available to LUC on 09/02/2021.

The ZTV is calculated to turbine tip height (149.9 m) from a viewing height of 2 m above ground level. The terrain model assumes bare ground and is derived from OS Terrain 50 height data (obtained from Ordnance Survey in July 2019).
Earth curvature and atmospheric refraction have been taken into account. The ZTV was calculated using ArcMap 10.5.1 software.

Produced By: EL	Ref: Pr No.-REP-Dr. No.
Checked By: LC	Date: 04/06/2021

Viewpoint RVAS1:
Harehope
Figure 5.3.2

Cloich Forest Wind Farm
EIA Report



OS reference:	320111E 644133N	Horizontal field of view:	90° (cylindrical projection)	Camera:	Nikon D600	Photography Date:	01/10/2020
AOD:	302 m	Principal distance:	522 mm	Lens:	50mm Fixed Focal Length	Photography Time:	14:25
Direction of view:	35°	Paper size:	841 x 297 mm (half A1)	Camera height:	1.5 m		
Nearest turbine:	1.86 km	Correct printed image size:	820 x 260 mm				

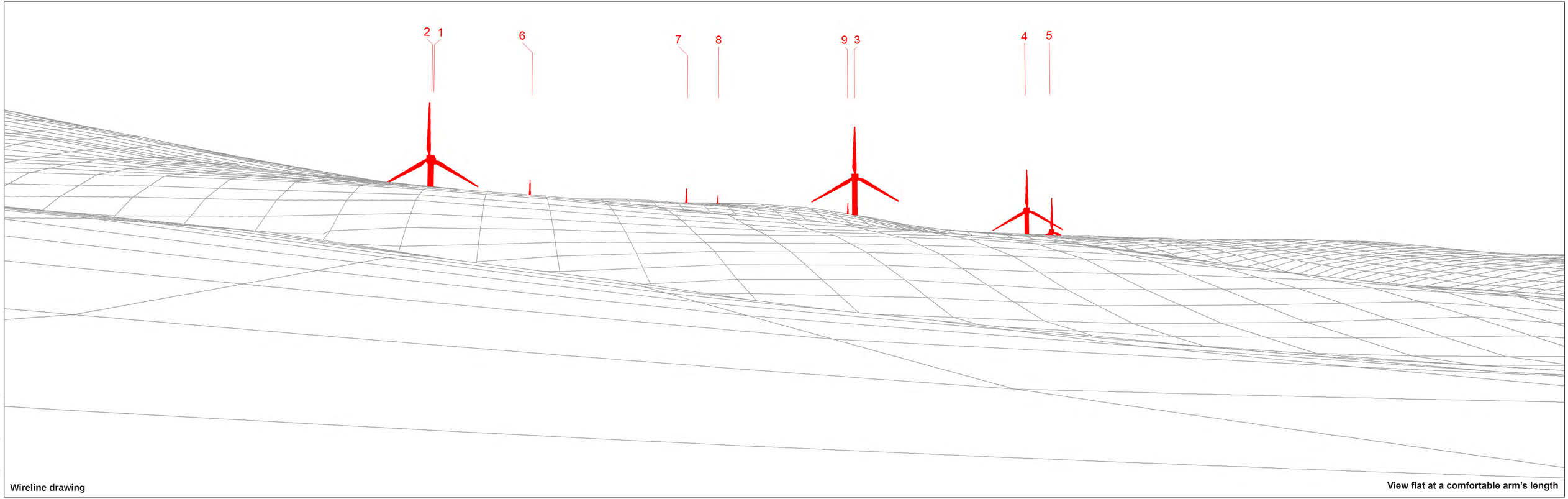
Wind Farm Developments key (by status):

- Proposed scheme
- Operational
- Under construction
- Consented
- Application
- Scoping
- Appeal/PLI

Cloich

Figure: 5.3.2a

Viewpoint RVAS1: Harehope



Wireline drawing

View flat at a comfortable arm's length

LUC

OS reference:	320111E 644133N	Horizontal field of view:	53.5° (planar projection)
AOD:	302 m	Principal distance:	812.5 mm
Direction of view:	10°	Paper size:	841 x 297 mm (half A1)
Nearest turbine:	1.86 km	Correct printed image size:	820 x 260 mm

Wind Farm Developments key (by status):
- Proposed scheme
- Operational
- Under construction

Cloich

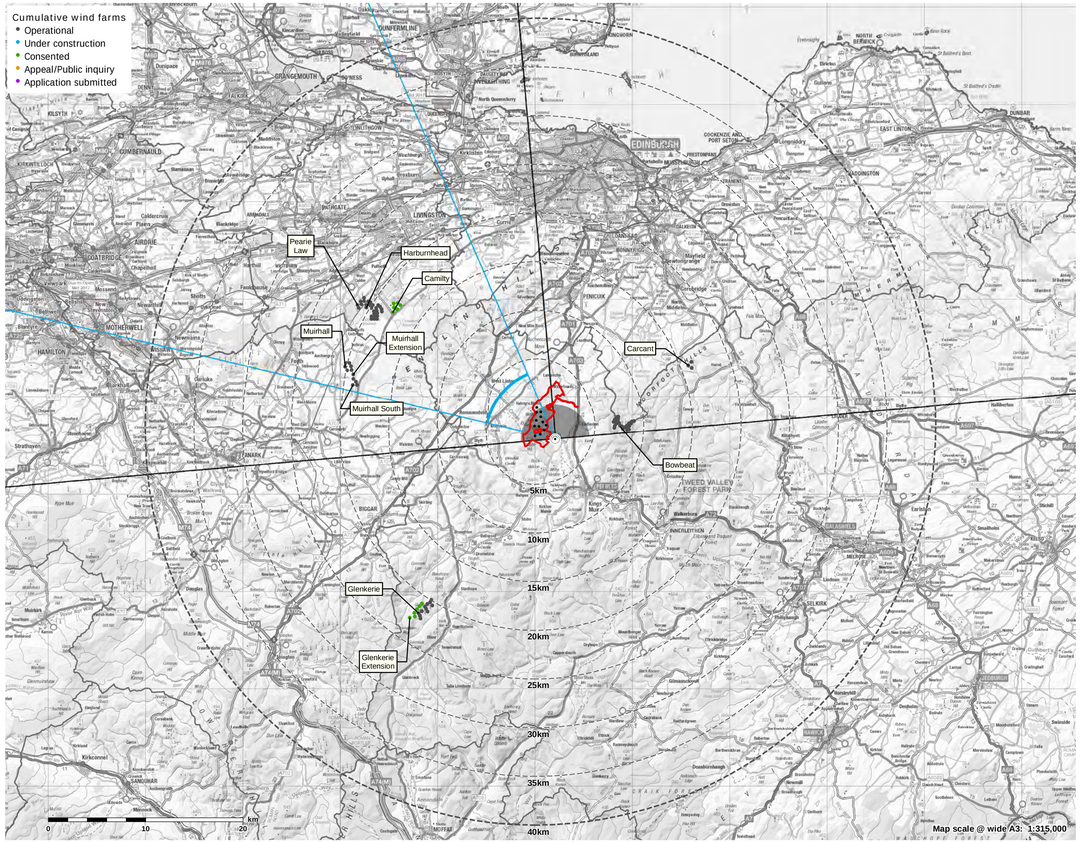
Figure: 5.3.2b
Viewpoint RVAS1: Harehope

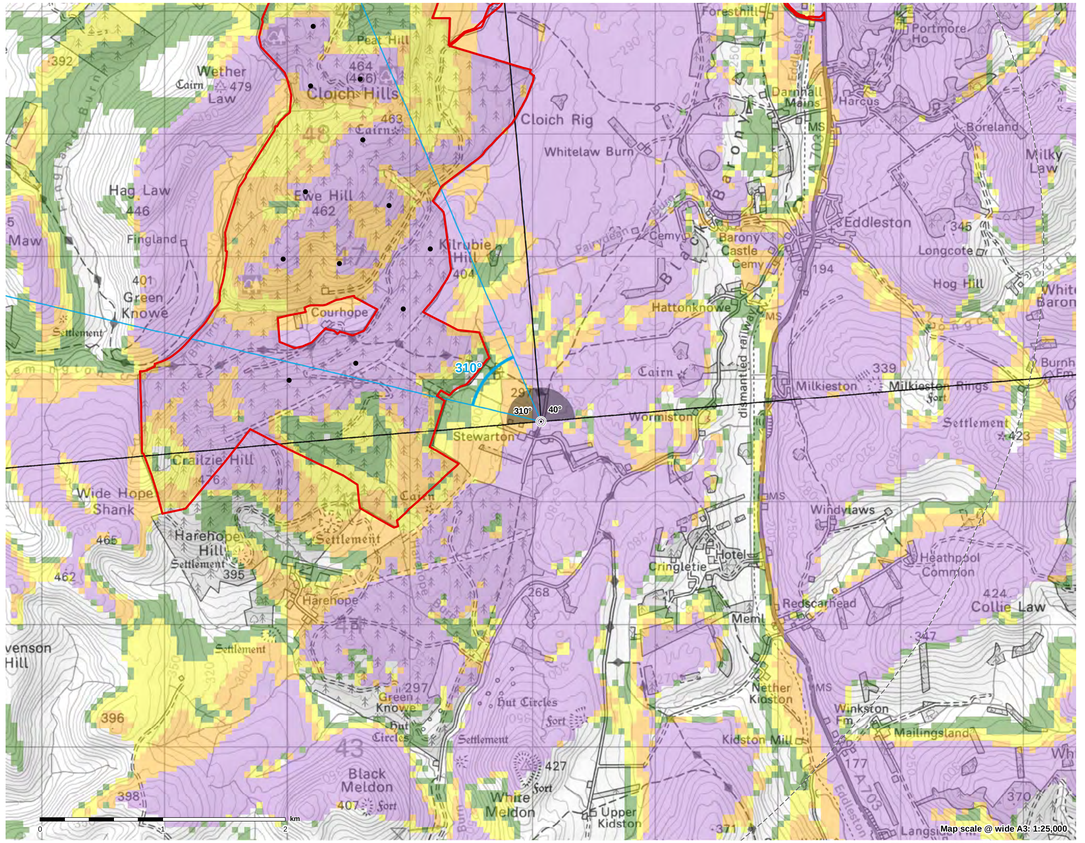
OS reference:	320111E 644133N	Horizontal field of view:	53.5° (planar projection)	Camera:	Nikon D600	Photography Date:	01/10/2020
AOD:	302 m	Principal distance:	812.5 mm	Lens:	50mm Fixed Focal Length	Photography Time:	14:25
Direction of view:	10°	Paper size:	841 x 297 mm (half A1)	Camera height:	1.5 m		
Nearest turbine:	1.86 km	Correct printed image size:	820 x 260 mm				

Cloich

Figure: 5.3.2c

Viewpoint RVAS1: Harehope





CB:EL E:\Bendak_e LUC FIGS-2x_r1_10801_VPoverviews 04/06/2021
Source: EDF, LUC

Site boundary
Turbine location
5km intervals from outermost turbines
40km study area
Viewpoint

Theoretical turbine tip visibility
1-3 Turbines are visible
4-6 Turbines are visible
7-9 Turbines are viible
10-12 Turbines are visible

53.5° Field of view
90° Field of view

Notes
Cumulative wind farms based on information available to LUC on 09/02/2021.

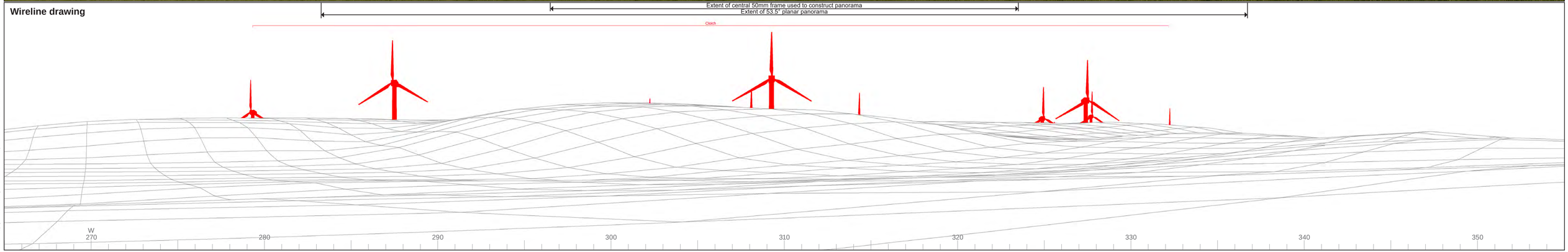
The ZTV is calculated to turbine tip height (149.9 m) from a viewing height of 2 m above ground level. The terrain model assumes bare ground and is derived from OS Terrain 50 height data (obtained from Ordnance Survey in July 2019).
Earth curvature and atmospheric refraction have been taken into account. The ZTV was calculated using ArcMap 10.5.1 software.

NORTH

Produced By: EL	Ref: Pr No.-REP-Dr. No.
Checked By: LC	Date: 04/06/2021

Viewpoint RVAS2:
Nether Stewarton
Figure 5.3.3

Cloich Forest Wind Farm
EIA Report



LUC

OS reference: 322068E 645654N
AOD: 286 m
Direction of view: 310°
Nearest turbine: 1.44 km

Horizontal field of view: 90° (cylindrical projection)
Principal distance: 522 mm
Paper size: 841 x 297 mm (half A1)
Correct printed image size: 820 x 260 mm

Camera: Nikon D600
Lens: 50mm Fixed Focal Length
Camera height: 1.5 m

Photography Date: 18/09/2020
Photography Time: 16:35

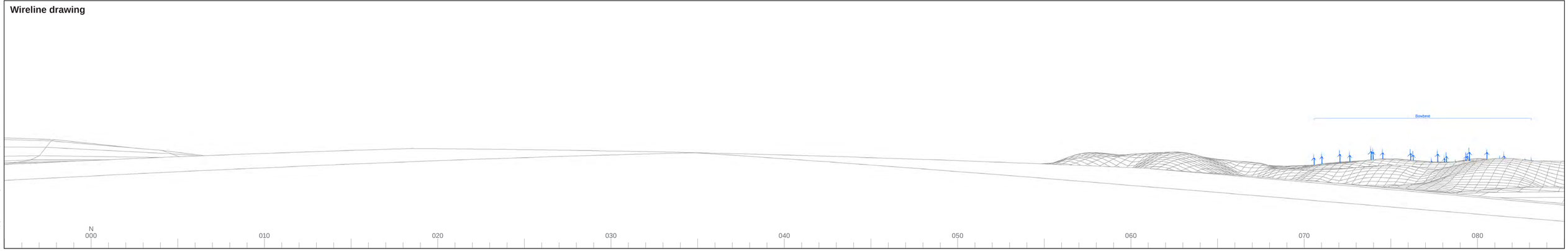
Wind Farm Developments key (by status):

- Proposed scheme
- Application
- Operational
- Scoping
- Under construction
- Appeal/PLI
- Consented

Cloich

Figure: 5.3.3a
Viewpoint RVAS2: Nether Stewarton

Wireline drawing



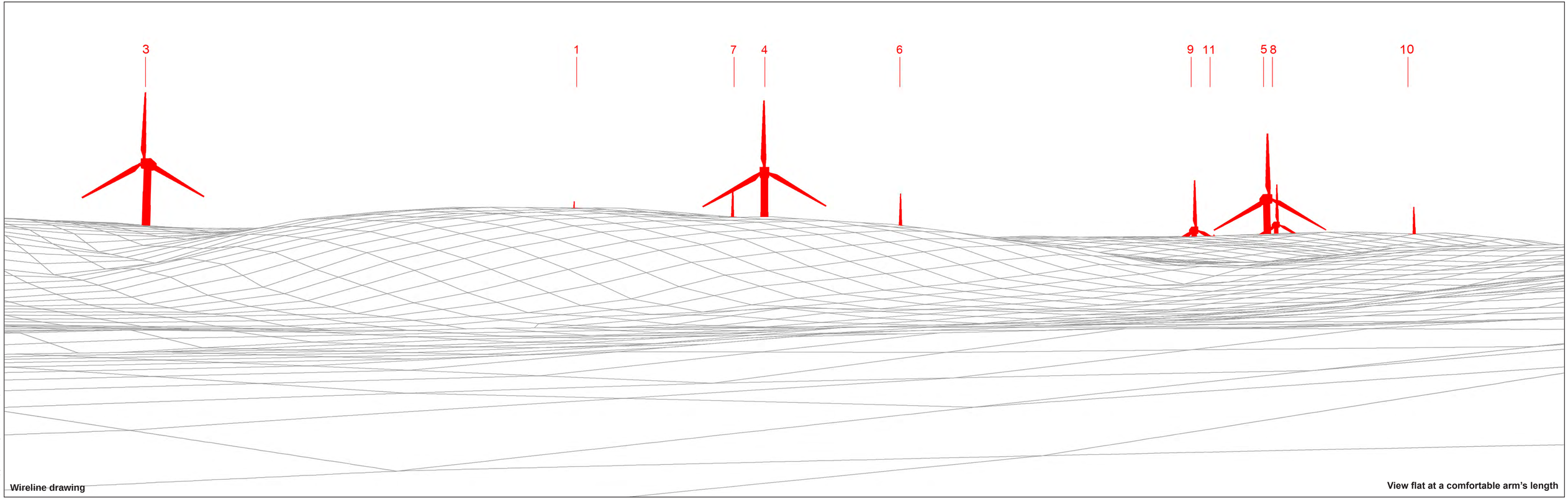
LUC

OS reference:	322068E 645654N	Horizontal field of view:	90° (cylindrical projection)	Camera:	Nikon D600	Photography Date:	18/09/2020	Wind Farm Developments key (by status):	Proposed scheme, Application, Operational, Scoping, Under construction, Appeal/PLI, Consented
AOD:	286 m	Principal distance:	522 mm	Lens:	50mm Fixed Focal Length	Photography Time:	16:35		
Direction of view:	40°	Paper size:	841 x 297 mm (half A1)	Camera height:	1.5 m				
Nearest turbine:	1.44 km	Correct printed image size:	820 x 260 mm						

Cloich

Figure: 5.3.3b

Viewpoint RVAS2: Nether Stewarton



Wireline drawing

View flat at a comfortable arm's length

LUC

OS reference:	322068E 645654N	Horizontal field of view:	53.5° (planar projection)
AOD:	286 m	Principal distance:	812.5 mm
Direction of view:	310°	Paper size:	841 x 297 mm (half A1)
Nearest turbine:	1.44 km	Correct printed image size:	820 x 260 mm

Wind Farm Developments key (by status):
- Proposed scheme
- Operational
- Under construction

Cloich

Figure: 5.3.3c

Viewpoint RVAS2: Nether Stewarton

OS reference:	322068E 645654N	Horizontal field of view:	53.5° (planar projection)	Camera:	Nikon D600	Photography Date:	18/09/2020
AOD:	286 m	Principal distance:	812.5 mm	Lens:	50mm Fixed Focal Length	Photography Time:	16:35
Direction of view:	310°	Paper size:	841 x 297 mm (half A1)	Camera height:	1.5 m		
Nearest turbine:	1.44 km	Correct printed image size:	820 x 260 mm				

Cloich

Figure: 5.3.3d

Viewpoint RVAS2: Nether Stewarton

ARCUS

CLOICH FOREST WIND FARM

VOLUME 3: TECHNICAL APPENDICES

TECHNICAL APPENDIX A6.1: DESK-BASED ASSESSMENT

JUNE 2021

CLOICH FOREST WIND FARM
ARCHAEOLOGICAL DESK-BASED ASSESSMENT

CULTURAL HERITAGE REPORT NUMBER: 20139

SEPTEMBER 2020

Prepared By:

Arcus Consultancy Services

7th Floor
144 West George Street
Glasgow
G2 2HG

T +44 (0)141 221 9997 | **E** info@arcusconsulting.co.uk
w www.arcusconsulting.co.uk

Registered in England & Wales No. 5644976

TABLE OF CONTENTS

DATA ENTRY FORM

PROJECT INFORMATION	
Project title	Cloich Wind Farm
Description	Wind farm development and ancillary infrastructure
Report	Desk Based Assessment
Contractor name	Arcus Consultancy Services Ltd.
Client	Cloich Wind Farm LLP
SITE LOCATION INFORMATION	
Council	Scottish Borders Council
Area	1,080 hectares
Grid References	(NGR) 320514, 647492
PROJECT BIBLIOGRAPHY	
Type of publication	Unpublished document/manuscript
Title	Cloich Wind Farm Archaeological Desk-Based Assessment
Author	Olivia Watt and Heather Kwiatkowski
Date	September 2020

SUMMARY

An archaeological desk-based assessment has been undertaken by Arcus Consultancy Services Limited ('Arcus') for land located at Cloich Forest, approximately 5.5 km north-west of Peebles in the Scottish Borders. The purpose of this archaeological Desk-Based Assessment (DBA) is to establish the known and potential archaeological resource baseline and inform the design for the proposed Cloich Forest Wind Farm (herein referred to as 'the Development'). An Environmental Impact Assessment (EIA) will utilise the baseline within this DBA to fully assess any potential effect to archaeological resource within a separate EIA Report Chapter.

For the purposes of this DBA, the Core Study Area (CSA) includes the site boundary at Scoping and covers approximately 1,080 hectares (ha), centred on National Grid Reference (NGR) 320514 647492), with the extents and location shown on Figure 1. This CSA consists of commercial forestry in various states of felling and regrowth, as shown on Plates 1 and 2. The CSA is the area in which direct effects to archaeology may occur. A 1 km study area, forming a 1 km radius around the centre of the CSA, was used to aid the assessment of potential unknown archaeology that may survive within the CSA.

The data collection exercise identified 18 archaeological records within the CSA as shown on Figures 2 and 3. This includes three scheduled monuments comprising of ring enclosures (SM2756), a cairn (SM2755) and a settlement (SM3998) dating from the prehistoric period. The remaining 15 undesignated heritage assets, which predominantly included prehistoric enclosures and isolated undesignated buildings associated with post medieval agriculture, were identified through analysis of datasets including the HER and Canmore records, the cartographic record, and available aerial photography. One modern feature was identified within the CSA.

A total of 108 additional heritage features were identified within the 1 km study area including seven Scheduled Monuments, three Listed Buildings, one Garden and Designed Landscape and 97 undesignated archaeological records (Figures 2 and 3). The undesignated remains are predominantly settlement and agricultural features, dating from the prehistoric to present day and are mostly found on the south-eastern slopes of the Cloich Hills leading towards the Eddleston Valley or in and around Meldon Valley.

Within the CSA, there are 13 features identified as prehistoric in date. Three of these are scheduled monuments: Whaup Law Cairn (SM 2755), Kilrubie Hill ring enclosures (SM 2756) and Nether Stewarton settlement (SM 3998) with the other ten undesignated records representing settlement evidence in the form of find spots, cairns, burnt mounds and field systems.

Within the 1 km Study Area, there are a further 26 features identified as prehistoric in date, predominately relating to settlement and agriculture. This is evidence of a rich prehistoric landscape with elevated hillforts and settlement within the valleys so that the archaeological potential to encounter further unknown prehistoric features is considered high. However due to the modern forestry plantation that covers the CSA, there is a strong possibility that many archaeological sites may have been damaged or destroyed reducing the potential to encounter discrete prehistoric archaeological remains.

Evidence of patterns of land use during the prehistoric period indicates that there is a strong trend of hillforts with supporting settlement and agricultural land use along the lower elevations and waterways especially on the south-eastern slopes of the Cloich Hills towards Eddleston and Meldon Valleys as well as Flemington Burn.

Later settlements formed within the wider area from the early medieval to medieval periods onwards, such as Peebles to the south-east with evidence of a drove road, settlement and rig and furrow recorded within the CSA. The archaeological potential of the CSA for unknown medieval remains to survive is considered moderate and these are likely to be

features related to agricultural use. However due to the modern forestry plantation that covers the CSA, there is a possibility that many archaeological sites may have been damaged or destroyed.

During the post-medieval period, historic mapping indicates that the CSA was still primarily rough upland grazing land with whinstone quarrying and sheepfold enclosures recorded within the 1 km Study Area. This is supported by the Statistical Accounts in Section 4.7 where much coverage was given to agricultural practices. This period also saw the addition of stately homes and estates along the valleys with Portmore House (GDL 00318, and LB 2037 and LB 2038) to east the CSA. There is good cartographic coverage of the area during this period and any substantial post-medieval remains will have likely been recorded. As such, the potential for any unknown post-medieval remains to survive within the CSA are considered low.

The latter half of the twentieth century saw the change of use of the Cloich Hills from primarily rough upland grazing to modern commercial forestry operations. Due to introduction of forestry, there is very low potential for unknown modern remains of significance to exist within the CSA.

In conclusion, it is recommended that known records within the CSA be avoided during design. It is also likely that any work undertaken within the CSA may have potential to affect previously undiscovered archaeological remains though forestry operations are likely to have affected the survival of discrete archaeological deposits, where these are present. The purpose of this DBA is to inform the Development layout, which is still being refined. Consideration of potential direct effects as a result of the final Development layout will be presented within the EIA Report.

There is also the potential for changes to setting that may affect the cultural significance of designated heritage assets both in the CSA and the wider area. Consideration of changes to setting will be reported on fully in the EIA Report, taking into account the way in which the Development may affect the cultural significance of nationally important sites.

1 INTRODUCTION

An archaeological desk-based assessment has been undertaken by Arcus Consultancy Services Limited ('Arcus') for land located at Cloich Hills, approximately 5.5 km north-west of Peebles in the Scottish Borders. The purpose of this archaeological Desk-Based Assessment (DBA) is to establish the known or potential archaeological resource baseline and provide design advice for the siting of infrastructure associated with the Cloich Forest Wind Farm (herein referred to as 'the Development'). An Environmental Impact Assessment (EIA) will utilise the baseline within this DBA to full assess any potential effect to the archaeological resource within a separate EIA Report chapter.

1.1 The Development

The Development is likely to consist of up to 14 turbines with a maximum height to blade tip of 149.9 metres (m) and a total generating capacity exceeding 50 MW as detailed within the Scoping Report (October 2019). Ancillary infrastructure will also be required as part of the Development and may include a substation, external transformers, new access tracks and site entrance, temporary construction compound, crane hardstandings and a permanent meteorological mast as well as the option for battery storage. The turbine numbers and ancillary infrastructure proposed may change as the final parameters of the Development are identified throughout the iterative EIA process.

1.2 Study Areas

To assess the potential for on-site archaeology, two study areas were defined based upon the likelihood of potential significant effects upon archaeology and cultural heritage.

The Core Study Area (CSA) was defined by the site boundary at Scoping and covers approximately 1,080 hectares (ha), centred on National Grid Reference (NGR) 320514 647492 with the extents and location shown on Figure 1. This CSA consists of coniferous plantation, at various stages of growth and feeling with small areas of improved upland pasture in the south around the Courhope area (not within the Site Boundary) as shown in Plates 1-6. The Core Study Area, excluding Courhope (Plate 3), is the area in which direct effects to archaeology may occur.

A 1 km study area, forming a 1 km radius around the centre of the CSA (Figure 1), was used to establish the type of known archaeology within proximity to the CSA in order to inform the potential for unknown archaeology to survive within the CSA.

2 LEGISLATION, POLICY AND GUIDANCE

The assessment has been undertaken taking into account relevant heritage legislation and guidance as outlined below.

2.1.1 Legislation

The assessment of impacts to the historic environment falls under The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017, and this DBA forms the baseline against which this assessment will occur. This DBA is a technical appendix to the EIA Report that will accompany the application for consent.

Statutory protection for archaeology is principally outlined in the Ancient Monuments and Archaeological Areas Act (1979)[1], as amended by the National Heritage Act (1983),[2] and

[1] UK Government (1979) *Ancient Monuments and Archaeological Areas Act*. Available at www.legislation.gov.uk/ukpga/1979/46 [Accessed on Accessed 16/4/20]

[2] UK Government (1983) *National Heritage Act.* Available at http://www.legislation.gov.uk/ukpga/1983/47 [Accessed on Accessed 16/4/20]

nationally important sites are listed in a Schedule of Monuments. The 1979 Act makes no reference to the settings of Scheduled Monuments.

Listed Buildings and Conservation Areas receive protection under the Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997[3], as amended by the Enterprise and Regulatory Reform Act (2013)[4]. The 1997 Act places a duty on the local planning authority with respect to Listed Buildings and Conservation Areas, and their settings. Section 59 of the 1997 Act states (in part):

"*In considering whether to grant planning permission for development which affects a listed building or its setting, a planning authority or the Secretary of State… shall have special regard to the desirability of preserving the building or its setting or any features of special architectural or historic interest which it possesses.*"

Section 64 states:

"In the exercise, with respect to any buildings or other land in a conservation area, of any powers under any of the provisions in subsection (2), special attention shall be paid to the desirability of preserving or enhancing the character or appearance of that area."

The Historic Environment Scotland Act 2014 defines the role of Historic Environment Scotland (HES) and the processes for the designation of heritage assets, consents and rights of appeal.

2.1.2 Policy

Scottish Planning Policy[5] (SPP) is the statement of the Scottish Government's policy on nationally important land use planning matters. Circulars, which also provide statements of the Scottish Government's policy, contain guidance on policy implementation through legislative or procedural change.

In the SPP, the historic environment is defined as "*the physical evidence for human activity that connects people with place, linked with the associations we can see, feel and understand*" and includes "*individual assets, related settings and the wider cultural landscape*"[6]. As stated in paragraph 137:

"The planning system should:

Promote the care and protection of the designated and non-designated historic environment (including individual assets, related settings and the wider cultural landscape) and its contribution to sense of place, cultural identity, social well-being, economic growth, civic participation and lifelong learning; and

Enable positive change in the historic environment which is informed by a clear understanding of the importance of the heritage assets affected and ensure their future use. Change should be sensitively managed to avoid or minimise adverse impacts on the fabric and setting of the asset, and ensure that its special characteristics are protected, conserved or enhanced."

[3] UK Government (1997) *(Listed Buildings and Conservation Areas) (Scotland) Act 1997.* Available at http://www.legislation.gov.uk/ukpga/1979/46/pdfs/ukpga_19790046_en.pdf [Accessed on Accessed 16/4/20]

[4] UK Government (2013) *Enterprise and Regulatory Reform Act 2013.* Available at http://www.legislation.gov.uk/ukpga/2013/24/contents/enacted [Accessed 16/4/20]

[5] Scottish Government (2014) Scottish Planning Policy [Online] Available at https://beta.gov.scot/publications/scottish-planning-policy/ [Accessed 16/4/20]

[6] Scottish Government (2014) Scottish Planning Policy. Paragraph 137 [Online] Available at https://beta.gov.scot/publications/scottish-planning-policy/ [Accessed 16/4/20]

In regards to designated heritage assets, the SPP[7] states:

Regarding developments affecting listed buildings, "special regard must be given to the importance of preserving and enhancing the building, its setting and any features of special architectural or historic interest";

Proposals "which will impact on its appearance, character or setting [of a conservation area], should preserve or enhance the character and appearance of the conservation area";

"where there is potential for a proposed development to have an adverse effect on a scheduled monument or on the integrity of its setting, permission should only be granted where there are exceptional circumstances";

"where a development proposal has the potential to affect a world heritage site, or its setting, the planning authority must protect and preserve its outstanding universal value";

"planning authorities should protect and, where appropriate, seek to enhance gardens and designed landscapes included in the inventory of gardens and designed landscapes and designed landscapes of regional and local importance"; and

"planning authorities should seek to protect, conserve and, where appropriate, enhance the key landscape characteristics and special qualities of sites in the inventory of historic battlefields".

The SPP also requires planning authorities to protect archaeological sites and monuments, preserving them *in situ* or otherwise ensuring *"appropriate excavation, recording, analysis, publication and archiving before and/or during development"*[8]*. "Non-designated historic assets and areas of historical interest, including historic landscapes, other gardens and designed landscapes, woodlands and routes such as drove roads"* should also be preserved in situ wherever feasible[9].

'Our Place in Time: The Historic Environment Strategy for Scotland'[10] presents the Scottish Government's strategy for the protection and promotion of the historic environment. The Historic Environment Policy for Scotland[11] (HEPS) and the Historic Environment Scotland Circular[12] complement the SPP and provide further policy direction. In particular, HEPS provides more detailed policy on historic environment designations and consents.

Regarding local policy, the Scottish Border Council Local Development Plan is relevant, which will be considered within the Planning Statement which will accompany the application.

2.1.3 Guidance

Planning Advice Note 2/2011: Planning and Archaeology[13] provides advice on dealing with archaeological remains. Whilst it covers a range of issues, of particular relevance is the planning balance associated with the preservation of archaeological remains and the benefits of development; the circumstances under which developers may be required to provide further information or field evaluation to inform decisions; and measures that can be taken to mitigate adverse effects.

[7] Scottish Government (2014) Scottish Planning Policy. Paragraph 141-149 [Online] Available at https://beta.gov.scot/publications/scottish-planning-policy/ [Accessed 16/4/20]

[8] Scottish Government (2014) Scottish Planning Policy. Paragraph 150 [Online] Available at https://beta.gov.scot/publications/scottish-planning-policy/ [Accessed 16/4/20]

[9] Scottish Government (2014) Scottish Planning Policy. Paragraph 151 [Online] Available at https://beta.gov.scot/publications/scottish-planning-policy/ [Accessed 16/4/20]

[10] *Our Place in Time: The Historic Environment Strategy for Scotland*, 2015, Historic Environment Scotland

[11] *The Historic Environment Policy for Scotland*, 2019, Historic Environment Scotland

[12] *Historic Environment Scotland Circular,* 2019, Historic Environment Scotland

[13] The Scottish Government (2011) Planning Advice Note 2/2011. Available at http://www.gov.scot/Resource/Doc/355385/0120020.pdf [Accessed 16/4/20]

Designation Policy and Selection Guidance (DPSG, 2019) accompanies HEPS and details the policy and selection guidance used by Historic Environment Scotland when designating heritage assets of national importance.

Guidance on how to apply the policies set out in the SPP is set out in Historic Environment Scotland's 'Managing Change in the Historic Environment Series', of which their guidance on 'Setting'[14] is particularly relevant.

In addition, HES in conjunction with NatureScot (formerly Scottish Natural Heritage) have produced the EIA Handbook[15] which provides guidance on the information to be included in an EIA Report and how it should be assessed within Section C of the handbook with further specifics relative to cultural heritage impact assessment in regards to changes to cultural significance found in Appendix 1.

Cognisance has been given to the Standards and Guidance published by the Chartered Institute for Archaeologists (CIfA) in preparing this DBA, in particular the 'Standard and guidance for commissioning work or providing consultancy advice on archaeology and the historic environment[16]' and the 'Standard and guidance for historic environment desk-based assessment'[17].

3 AIMS, METHODOLOGY AND SOURCES

3.1 Aims

The aim of this DBA is to:

- Establish the baseline information regarding archaeology within the CSA and 1 km Study Areas;
- To establish the archaeological potential for unknown buried archaeology to survive within the CSA;
- To identify heritage assets that may be impacted by the Development and for which further design consideration and assessment may be required; and
- Where appropriate, make design recommendations to mitigate effects to archaeological and heritage assets.

3.2 Methodology

The following methodology gives cognisance to the guidelines as outlined in the EIA Handbook[18] Section C.6 and Appendix 1 Baseline Studies and Baseline Reporting as well as the Chartered Institute for Archaeologists' Standard and Guidance Paper for historic environment desk-based assessment[19].

The DBA comprises of a written report including a description of the baseline heritage resource and archaeological potential of the defined study areas (e.g. the CSA and 1 km

[14] Historic Environment Scotland, 2016, *Managing Change in the Historic Environment: Setting*. [Online] Available at: https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=80b7c0a0-584b-4625-b1fd-a60b009c2549 [Accessed 16/04/20]

[15] SNH and HES (April 2015) EIA Handbook, Version 5. Available at https://www.nature.scot/sites/default/files/2018-05/Publication%202018%20-%20Environmental%20Impact%20Assessment%20Handbook%20V5.pdf [Accessed 16/4/2020]

[16] Chartered Institute for Archaeologists (2014) *Standard and Guidance for Commissioning work or providing consultancy advice on archaeology and the historic environment*, Published December 2014, [Online]Available at: https://www.archaeologists.net/sites/default/files/CIfAS&GCommissioning_1.pdf

[17] Chartered Institute for Archaeologists (2017) *Standard and Guidance for Historic Environment Desk-Based Assessment*, Published December 2014, Updated January 2017 [Online]Available at: http://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_3.pdf [Accessed 16/04/20]

[18] SNH and HES (April 2015) EIA Handbook, Version 5. Available at https://www.nature.scot/sites/default/files/2018-05/Publication%202018%20-%20Environmental%20Impact%20Assessment%20Handbook%20V5.pdf [Accessed 16/4/2020]

[19] Chartered Institute for Archaeologists (2017) *Standard and Guidance for Historic Environment Desk-Based Assessment*, Published December 2014, Updated January 2017 [Online]Available at: http://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_3.pdf [Accessed 16/04/20]

Study Area), a description of the area's historic character, the archaeological and historical baseline's cultural significance, the potential effect of the Development upon the outlined archaeological and historical resource, and possible mitigation strategies. The following section outlines the methodology used to fulfil the aims of the assessment stated in Section 3.1 above.

To inform the DBA, an archival search was undertaken in order to identify records of known archaeological features which have the potential to be affected by the Development. This archive search also collected data falling within the 1 km study area to inform the assessment of the physical and ground-based archaeological potential of the Core Study Area.

The following sources were consulted in accordance with the best practice guidelines laid down by the Institute for Archaeologists (CIfA).

- Historic Environment Scotland Datasets including;
  - Canmore Archaeological Records;
  - Database of World Heritage Sites;
  - Database of Scheduled Monuments;
  - Database of Listed Buildings;
  - Database of Inventoried Garden and Designed Landscapes; and
  - Database of Inventoried Battlefields.
- Aerial Photography and Lidar;
- Cartographic evidence;
- The Scottish Border Council Environmental Record (HER) consulted 31 January 2020; and
- The Statistical Accounts for Scotland.

These resources have been collated and examined alongside the results of any fieldwork.

To accompany this consultation, a site walkover was conducted on 16 May 2020 to verify the written records, to assess the character of the site, and to note any archaeological features not previously identified. Any previously unknown sites were recorded by use of digital photography and an appropriate scale. Access was limited due to areas of the site being actively being felled so that portions of the southern site were not accessible.

The results of this work have informed the archaeological baseline and archaeological potential of the CSA with design recommendation to avoid and reduce effects upon the archaeological resource.

4 RESULTS

Within the CSA, the data collection exercise identified three Scheduled Monuments and 15 undesignated heritage assets.

Within the 1 km Study Area, 108 additional heritage features were identified including seven Scheduled Monuments, three Listed Buildings, one Garden and Designed Landscape and 97 undesignated archaeological records (Figures 2 and 3).

4.1 Core Study Area Description

The CSA is located 5.5 km north-west of Peebles as shown on Figure 1.

The CSA comprises of commercial forestry in various states of felling and regrowth with an abandoned farmstead at Courhope (not within the Site Boundary).

The topography of the CSA and immediate vicinity is complex, with elevation ranging from approximately 280 m Above Ordnance Datum (AOD) in the north-east part of the CSA to approximately 476 m AOD at the peak of Crailzie Hill in the south. Vegetation across the

CSA largely consists of commercial forestry with small areas of open moorland found around the now abandoned Courhope farmstead in the south. The CSA encompasses the rolling Cloich Hills, including Peat Hill (466m AOD), Ewe Hill (462m AOD), White Rig (325m AOD), and Crailzie Hill (476m AOD). The hills are dissected by a number of watercourses including Middle Burn, Flemington Burn, Martyr's Dean, and Harehope Burn.

Middle Burn flows from the north-east into smaller tributaries that eventually reach Early Burn outwith the CSA to the east. Middle Burn continues on its main path through the centre of the CSA before bifurcating into Flemington Burn which meanders from the centre-south of the CSA into the west of the CSA and Martyr's Dean which meanders from the centre-south of the CSA into the south-east of the CSA. Martyr's Dean transforms into Courhope Burn from the east-south-east of the CSA across to the west-south-west of the CSA. A tributary named as 'Muirhope Glen' branches off from Courhope Burn towards the north of the CSA. Finally, Harehope Burn is within the south of the CSA.

The majority of the CSA bedrock geology is recorded as 'Kirkcolm Foundation- Wacke' which is a sedimentary bedrock. No superficial deposits were recorded for this bedrock, however towards the centre-north of the CSA, a superficial deposit of peat is recorded overlying the 'Kirkcolm Foundation-Wacke' bedrock. Surrounding the CSA, the superficial deposit is recorded as 'Till-Devensian' [20]. As such within the CSA the bedrock remains stable, however on the elevated slopes there is no superficial geology, while in the centre-north where the gradient slopes down to the north there are deposits of peat recorded, while on the gradient slopes down towards the far north of the CSA, the south, east and west the superficial deposits are recorded as Till.

Two Landscape Character Types (LCT) are recorded within the CSA. LCT92 'Plateau Outliers' is described as *an upland plateau landscape, characterised by hills and ridges covered by a mosaic of coarse grassland, heather and forestry and is clearly separated from adjoining types by major river valleys*[21]. LCT92 covers the main area of the CSA. LCT114 'Pastoral Upland Valley' is located towards the eastern slopes of the CSA and into the 1 km Study Area. LCT114 is characterised by *open, medium to large scale valleys with moderately sloping sides, incised by narrow tributary valleys and enclosed by rolling dissected plateau uplands. Land cover of permanent pastures on valley floor with frequent woodlands merging with unimproved grassland and heather on upper slopes with scattered farms and villages*[22].

4.2 Designated Assets

4.2.1 Core Study Area

There are no World Heritage Sites, Listed Buildings, Inventoried Battlefield or Garden and Designed Landscapes within the CSA.

Within the CSA, there are three prehistoric Scheduled Monuments as shown on Figure 3. These include:

- Whaup Law Cairn (SM2755);
- Ring enclosures 550m and 595m WNW of Kilrubie Hill (SM2756); and
- Nether Stewarton Settlement (SM3998).

[20] Geology of Britain (BGS) viewer (Online). Available at. https://mapapps.bgs.ac.uk/geologyofbritain/home.html. Accessed 05.03.2021

[21] SNH National Landscape Character Assessment, Landscape Character Type 92, Plateau Outliers. Available at. https://www.nature.scot/sites/default/files/LCA/LCT%20092%20-%20Plateau%20Outliers%20-%20Final%20pdf.pdf. Accessed 12.04.2021

[22] SNH National Landscape Character Assessment, Landscape Character Type 114, Pastoral Upland Vally. Available at. https://www.nature.scot/sites/default/files/LCA/LCT%20114%20-%20Pastoral%20Upland%20Valley%20-%20Final%20pdf.pdf. Accessed 12.04.2021

These are shown in Figure 3 and are discussed in Section 5. Full details of these can be found in the Heritage Gazetteer in Section 9.

4.2.2 1 km Study Area

There are no World Heritage Sites, Inventoried Battlefields or Conservation Areas within the 1 km Study Area.

Within the 1 km Study Area, there is one Garden and Designed Landscape Portmore Gardens (GDL00318) located on eastern side of the Eddleston Valley, as shown on Figure 3. Portmore lies within the Scottish Border Council (SBC) Designed Landscapes Group 9, while the SBC Designed Landscape for Barony Castle is identified to the north-eastern border of the 1 km Study Area. Barony Castle associated Listed Buildings lie outwith the 1 km Study Area to the east (Figure 3).

There are a further seven scheduled monuments within the 1 km Study Area as shown on Figure 3. These include:

- Green Knowe Two Ring Enclosure (SM2734);
- Harehope, palisaded settlement 730m NNE of (SM2759);
- Harehope Rings, fort, Harehope Hill (SM2677);
- Drum Maw, settlement 780m SE of (SM2732);
- Romanno Hope, barrow & enclosures S of (SM2733);
- Wether Law, cairn (SM2738); and
- Harehope, earthwork 550m NNE of (SM3790).

There are three listed buildings within the 1 km Study Area as shown on Figure 3. These include:

- Category A Portmore House (LB 2037) and Category C Portmore Lodge (LB 2038) both located within Portmore Gardens (GDL00318) 2 km east of the CSA; and
- Category C Harehope House (LB 2039) located 1 km south of the CSA.

These are shown in Figure 3 and are discussed in Section 5. Full details of these can be found in the Heritage Gazetteer in Section 9.

4.3 Undesignated Asset Records (HER and Canmore)

4.3.1 Core Study Area

Within the CSA, there are 15 archaeological records identified from the HER and Canmore records as detailed in Table 1. These are shown on Figure 2 and full details can be found in the Heritage Gazetteer in Section 9.

Table 1: HER and Canmore Records within the Core Study Area

HER / Canmore Ref	Name	Description	Period	X	Y
51406	Peat Hill	Cairn (Period Unassigned)	Prehistoric-presumed	320630	648720
51413	Cloich Rig	Ring Enclosure(S) (Period Unassigned)	Prehistoric-presumed	321800	648290
51417	Early Burn	Ring Enclosure(S) (Period Unassigned)	Prehistoric-presumed	321500	647800
51418	Cloich	Cairns (two)	Prehistoric	322164	649965

HER / Canmore Ref	Name	Description	Period	X	Y
51424	Shiplaw	Findspot, Scraper (Tool) – location is approximate based on coordinates	Prehistoric	495	235
51667	Grassfield	Ring Enclosure (Period Unassigned)	Prehistoric	321150	650070
181784	Greenside	Field System(S) (Period Unassigned)	Prehistoric	320750	646450
296428	Eddleston	Burnt Mound	Prehistoric	321181	648717
343618	Cloich	Findspot, Scraper (Tool) (Prehistoric)	Prehistoric	322520	650050
343634	Greenside	Building	Post medieval	320200	646600
343657	Crailzie Hill	Quarry (Post Medieval)	Post-medieval	318880	645550
343658	Upper Stewarton	Road (Post Medieval)	Post-medieval	321760	646070
343662	Greenside or Courhope	Village (Medieval)	Medieval	320314	646400
343792/ 343790	Drove Road	Road (Period Unassigned)	Medieval - presumed	318920	646105
4030014	Cloich	Three funerary ring ditches	Prehistoric	321600	647900

4.3.2 1 km Study Area

Within the 1 km Study Area, there are further 97 archaeological records which range from Prehistoric to Modern in date and include:

- 26 Prehistoric records which comprise of:
  - Six Burnt Mounds
  - Seven Cairns;
  - Two Enclosures;
  - Eight Findspots;
  - Two Ring Enclosures; and
  - One series of Pits.
- One potential Iron-Age Boundary enclosure;
- 30 Medieval records which comprise of:
  - One Boundary Dyke;
  - One Buildings with Enclosures;
  - One Cairn or potential field marker;
  - Five Enclosures;
  - One set of Cultivation Terraces;
  - One Earthwork;
  - Two Drove Roads;
  - Six Farmsteads;
  - Two Houses;

  - Seven series of Rig and Furrow;
  - Two potential Sheepfolds; and
  - One Settlement.
- 35 Post Medieval records which comprise of:
  - One Building;
  - Four Enclosures;
  - Five Farmsteads;
  - Two Field Systems;
  - Two Head Dyke's;
  - One Mill Pond;
  - Seven Quarries;
  - One Railway Bridge;
  - One Road;
  - Eight Stock Enclosures; and
  - Three potential Sheepfolds.
- Four Modern Buildings; and
- One undated section of the Drove Road across Flemington Burn.

These are shown on Figure 2 and are discussed in Section 5. Full details of these can be found in the Heritage Gazetteer in Section 9.

4.4 Cartographic Analysis

The following maps regarding both the CSA the 1 km Study Area were consulted as listed below:

- **OS Second Edition Six Inch 1888-1913 (Figure 4)**

  On this map within the northern half of the CSA, 'White Rig' is recorded.

  Within the centre of the northern half of the CSA, a small enclosure of woodland is recorded as 'Clove Stell'. When the forest was later planted this enclosure was assimilated into the forest, however it is still recorded on current OS Mapping. The grassy landscape within the north of the CSA is also recorded as 'Cala Law' on the second edition map, which is the first record of this portion of the landscape being named. Within this second edition map, 'Peat Hill' is recorded below the Cairn HER 19475 (Canmore 74925).

  Within the centre of the CSA, on the second edition map 'Whaup Law' and Cairn SM2755 are recorded, however this is also the first time that the current spelling of Whaup Law is recorded. To the east of Whaup Law Cairn 'Foreside Plantation' is recorded the first time, which also still recorded on current mapping and became assimilated into the wider Cloich forestry plantation. To the eastern periphery of the CSA lies 'Bank Plantation'. This area is also recorded for the first time, indicating a wider pattern of plantation/woodland growth from the second edition map, however Bank Plantation is no longer recorded within current mapping and also appears to be fully assimilated into the Cloich forestry plantation.

  Within this second edition map there is little to record regarding the burn names, with the exception of Courhope Burn which is identified as 'Flemington Mill Burn' around the Courhope enclosure. The Courhope enclosure and buildings have remained the same between the first and second edition maps, with little further recorded within the southern portion of the map.

- **The 'Bartholomew Half Inch-1897-1907**

  The 'Bartholomew Half Inch-1897-1907[23]' is even more sparse within this cartographic time period. There is less detail on this map, with sepia colouring used to depict gradient and sloping. Whaup Law Cairn is not noted however 'fort' HER 19875 (Canmore 56920) is still apparent.

- **OS 1958 (Figure 5)**

  This map has no recorded changes from the Second Edition map. The Third edition map has got better detail regarding the gradients and the use of technicolour to identify burns, tributaries and gradient slopes. As such it has greater technical detail, despite no significant changes within the recorded features.

  The 'Old Drove Road' HER 24812/24811 is clearly identified on this map, unlike the previous editions, however the wider landscape is still depicted as grassy with areas of named plantations.

- **Bartholomew Half Inch 1940-1947**

  Within this period the Bartholomew Half Inch 1940-1947[24] also does not provide new or changed information, however it presents the landscape simply using sepia colours to portray the gradients across the landscape and depict the major tracks and burns across the landscape.

- **OS Fourth edition 1949-1970[25]**

  This map is the final OS series prior to the current mapping used. Within this map the most significant aspect recorded is the forestry plantation which now extends from the eastern side of the CSA and the southern half of the CSA with little change or additional features noted.

No additional heritage features were identified from historic mapping regression.

4.5 Aerial Photography and Lidar

Aerial photography of the area was accessed through the National Library of Scotland National Collection of Aerial Photography. Photographs for the area around the CSA were consulted, as listed below:

- Sortie: ASS/50788; Frame 0031; Dated 21 May 1988; Location: Ewe Hill, Eddleston. The photograph shows the central portion of the CSA, where the turbines are located, which is under forestry plantation.
- Sortie: 106G/Scot/UK/0081; Frame 4183; Dated 10 May 1946; Location: Stewarton, Eddleston. The photograph shows the south-east portion of the CSA. The area at this time is free of forestry plantation and appears to be agricultural fields.
- Sortie: 106G/Scot/UK/0077; Frame 4405; Dated 10 May 1946; Location: Crailzie Hill, Eddleston. The image shows the south-west portion of the CSA as agricultural fields.

[23] Bartholomew Half Inch 1897-1907. Available at. https://maps.nls.uk/geo/explore/side-by-side/#zoom=14&lat=55.69717&lon=-3.27679&layers=156&right=ESRIWorld. Accessed 05.03.2021

[24] Bartholomew Half Inch 1940-1947. Available at. https://maps.nls.uk/geo/explore/side-by-side/#zoom=13&lat=55.70367&lon=-3.27440&layers=192&right=ESRIWorld. Accessed 05.03.2021

[25] OS Fourth Edition 1949-1970. Available at. https://maps.nls.uk/geo/explore/side-by-side/#zoom=13&lat=55.70367&lon=-3.27440&layers=193&right=ESRIWorld. Accessed 05.03.2021

- Sortie: 106G/Scot/UK/0009; Frame 7382; Dated 15 April 1946; Location: Cloich; Eddleston. The image shows the north portion of the CSA with the buildings at Cloich present (HER 343663).

LiDAR data is currently available for the CSA as shown on Figure 6. The LiDAR showed a rounded rectangular shape approximately 500 m south-west of HER 51418 within the CSA. When compared to satellite imagery, this shape corresponds to a felled area of forestry plantation.

No additional heritage features were identified on aerial photographs or LiDAR data.

4.6 Walkover Survey

A site visit was undertaken 16 May 2020 to identify and (where possible) record any previously unrecorded cultural heritage features within the CSA. A general walkover of the area around the Development infrastructure and known archaeological sites was conducted where forestry plantation permitted as some areas were too densely planted to allow ingress whilst other areas were being actively felled (Plates 1-2 and 4-6). Ground visibility was good in forestry rides and alongside the access tracks but disturbed within forestry due to plantings or felling decomposition amongst the trees. No additional heritage features were identified during the walkover survey.

4.7 Statistical Accounts

The CSA 'Cloich Hills' is not mentioned within the Statistical Accounts of Scotland (SAoS) and none of the Hills or Burns around Eddleston with the exception of Dundroich are recorded.

Within the SAoS 1791-1845[26] there are two recorded entries for the Parish of Eddleston within the County of Peebles.

The earlier account which dates from 1796 and was written by the Reverend Mr Patrick Robinson[27], who was the Parish Minister. It focuses on the socio-historical values of the area. The CSA lies 3 km to the west of the village of Eddleston in an upland environment distinctly different from the settled valley. The Reverend Robinson goes into considerable detail describing the day-today- household workings and financial conduct of the parishioners, including their farming capacity and records that Black Cattle are the main source of income, enabling many tenant farmers to become wealthy. However, he also recorded that there was a thriving wool industry within the region, as such Ewe Hill within the CSA could be named after this practice with grazing in the upland moorland. Regarding the cultural heritage of the area, within the concluding statement the Reverend highlights '*the ve(f)stiges of two circular encampments, vulgarly called rings'.* These potentially refer to Canmore 88793 Wormiston Rings and Canmore 10863 Milkieston Rings which lie c3km to the east of the CSA.

The later account within the SAoS dates from 1845 and was written by the Reverend Mr Patrick Robertson[28]. Reverend Robertson focussed much of his writing on the Topography and History of the Parish, however only focuses his attention on 'Dundroich' or Druid's Hill 5 km to the north-east of the CSA. The Reverend Robertson notes the *'ruins of three ancient camps'* and assigns them to a Danish Origin. It is likely these ruins the heritage features identified 3 km to the east of the CSA at Wormiston and Milkieston However, the

[26] SAoS (Online). Available at. https://stataccscot.edina.ac.uk/static/statacc/dist/parish/Peebles/Eddlestone. Accessed 09.03.2021

[27] Eddleston, County of Peebles, OSA, Vol. XVII, 1796, Rev Mr Patrick Robinson. Available at. https://stataccscot.edina.ac.uk/static/statacc/dist/viewer/osa-vol17-Parish_record_for_Eddlestone_in_the_county_of_Peebles_in_volume_17_of_account_1/. Accessed 09.03.2021

[28] Eddleston, County of Peebles, NSA, Vol III, 1845, Rev. Mr Patrick Robertstone. Available at. https://stataccscot.edina.ac.uk/static/statacc/dist/viewer/nsa-vol3-Parish_record_for_Eddlestone_in_the_county_of_Peebles_in_volume_3_of_account_2/. Accessed 09.03.2021

Reverend Robertson goes onto note that a finding of a gold and silver coin hoard was uncovered in 1794 at Kingside Farm, and to the north of Kingside Farm, in 1828 a farmer excavated a funerary assemblage including cremation within a stone coffin and assorted weapons.

4.8 National Archives of Scotland

A search of the National Archives recorded no records relating to:

- Cloich Hills
- Courhope
- Crailzie Hills
- Ewe Hill
- Harehope
- Hogg Wood
- Romannobridge and
- White Rig.

There is one reference to a family in Eddleston (NRAS2306) 'The Plenderleith Family'[29].

4.9 Previous Archaeological Investigations within the Study Areas

In October 2012 Environmental Statement (ES) Chapter 8: Cultural Heritage and Archaeology for the Cloich Forest Wind Farm was produced by 'Partnerships for Renewables; A Carbon Trust Enterprise'. The landscape was summarised as being rich historic upland to the south of Cloich Forest, containing substantial quantities of Prehistoric to Roman assets while the few designed landscapes and major country houses dating from the 17th century are low-lying within the landscape and screened by vegetation. The concluding setting is described as '*the construction of a wind farm in an area of modern conifer forestry represents a natural synergy in keeping with the wider historical narrative of gradual changes in the use and character of the upland landscape'.* However, the ES chapter notes that there would be effects on the overall historic landscape with changes to setting on individual assets, predominantly to do with aesthetic and wide views.

There are no known previous archaeological excavations within the CSA and five within the 1 km Study Area as shown on Figure 7 and detailed below:

- 1977-1978 excavation at Green Knowe unenclosed platform settlement and Harehope cairn 0.1 km south-east of CSA. Two structural phases of the cairn were confirmed with fragments of human bone, Beaker pottery, V-bored buttons and belt-ring, flint and a necklace.[30]
- 2000 excavation at Shiplaw Farm (HER SMR4030121) 0.9 km north-east of CSA. A small Mesolithic scatter was identified and identified as a potential prehistoric transitory camp.
- 2011 Kilrubie Survey Project 0.4 km east of the CSA. A limited metal detector survey was undertaken at the remains of an early farmstead at Kilrubie. A steel engraved copper alloy shoe buckle dating to 1690-1790 and two cartridges were discovered.
- 2011 Watching Brief at Cowieslinn Quarry, 0.5 km east of the CSA. Topsoil stripping was undertaken in advance of an extension to Cowieslinn Quarry. A small area of rig and furrow was noted close to the quarry face and an area of small quarry pits, thought to be of 19th century origin were detected.

[29] The National Register of Archives for Scotland (online). Available at. http://catalogue.nrscotland.gov.uk/nrasregister/details.aspx?reference=NRAS2306&st=1&ob=1&tc=y&tl=n&tn=y&tp=n&k=Eddlestone&ko=a&r=&ro=m&df=&dt=&di=y. Accessed 09.03.2021

[30] G Jobey, *Green Knowe unenclosed platform settlement and Harehope cairn, Peeblesshire*, Proc Soc Antiq Scot, 110, (1978-80), pp.72-113.

- 2016 excavation at Halmyre, West Linton (HER SMR100186) 50 m north of the access track area of the CSA. Two trenches were dug through two cropmarks within the area of Halmyre. No archaeological features were discovered and it is thought that the cropmarks are likely natural deposits or relate to modern farming techniques.[31]

5 BASELINE INTERPRETATION

The following section gives a brief description of the wider study area's archaeological and historical sites within the context of the area's background history, presented by period. The features referred to are detailed in the Heritage Gazetteer in Section 9 and shown in Figures 2 and 3.

5.1 The Prehistoric Period

There are three prehistoric Scheduled Monuments within the CSA as shown on Figure 3. These include:

- Whaup Law Cairn (SM2755) on the southern slopes of Peat Hill;
- Ring enclosures 550m and 595m WNW of Kilrubie Hill (SM2756) on the south-eastern slopes of Ewe Hill; and
- Nether Stewarton Settlement (SM3998) within the south of the CSA.

There are a further 10 prehistoric undesignated records indicative of land use within the CSA including find spots and settlement remains (e.g. burnt mound, enclosures).

Within the wider 1 km Study Area, there are 22 prehistoric records based generally around the south-eastern slopes of the Cloich Hills close to the local watercourses.

The distribution and pattern of the prehistoric records indicate intensive usage of the area dating from the Mesolithic to the Bronze-Age with much of the archaeological assets being recorded on the south-east facing slopes of the Cloich Hills within the agricultural landscape of the Meldon and Eddleston Valleys which supported the numerous hillforts in the area. These conclusions are supported by the findings from the previous ES Chapter (2012) for the consented Cloich Wind Farm[32] which states:

The earliest known archaeological remains from the area date from the Mesolithic period from records of evidence for stone tool-making, either in the form of sources of chert - outcrops/screes and a possible quarry site, including lithic scatters of microliths. These sites are typically located in the valleys and close to sources of water.

The remains of confirmed Neolithic assets are largely confined to a scatter of arrowheads and polished axes. These finds are also grouped in the surrounding valleys, with a possible major late Neolithic palisaded site existing at Meldon Burn and Lyne Water (SM no.3269), indicating the wider region around the Cloich Hills to be a significant social and political centre. Further evidence for this comes from the excavations carried out on Early Bronze Age hut platforms and burial cairns at Green Knowe in the Upper Meldon Valley in 1977 and 1978. Green Knowe comprises at least 9 hut platforms, two burial cairns and traces of clearance cairns/field boundaries on the lower western slopes of the valley. Further afield, more scattered examples have been identified across the upland to the north, with two sites in the valley of Flemington Burn immediately west of Cloich Forest, one of which is associated with two adjacent burial cairns.

There are three possible hut circle sites within the FCS forest, however with these sites as with many others of this type, the interpretation of their date and function is open to question as they resemble post-medieval sheepfolds and it is often impossible to tell the difference without excavation.

[31] GUARD Archaeology, Kelly Heads, Halmyre, West Linton, Data Structure Report, Project 4315 (2016), p.7

[32] Le Querne, C. 2012. Cloich Wind Farm, ES Chapter 8 Cultural Heritage and Archaeology.

A further group of cairns lie in the valley of the Flemington Burn to the west of Cloich Forest indicating the likely presence of significant Bronze Age settlement in this area. In the valley of Eddleston Water to the east of the hills, there is a rough east-west alignment of cairns on the undulating higher ground to the west of the burn. Approximately 1.5km further north, there are a group of Middle Bronze Age cist burials immediately north of Eddleston village. These funerary monuments provide reminders that this prime cultivatable land in the valley is also likely to have seen extensive settlement in the second millennium BC.

The overall picture from this exceptionally rich group of Bronze Age sites is of a significant centre of population in the Meldon Valley going back as far as the Late Neolithic period. There are also strong indicators that this settlement extended into the valley of Flemington Burn, immediately to the west of Cloich Forest, and into Eddleston Valley to the east. There is a noticeable distribution bias in the settlement evidence towards south-east facing slopes.

There may have been a significant east-west routeway through Courhope Valley connecting Flemington Burn and the Eddleston Valley, to the south of Ewe Hill, even at this early date.

Within the wider area there are several prehistoric features concentrated on higher elevations with White Meldon (SM 114) and Black Meldon (SM 2703) hill forts 2 km south of the CSA and a concentration of several hill forts around Whitehill and Crochil Hill to the west of the CSA. In June 2020, a Bronze Age hoard was found near Peebles south of the CSA, which contained a complete horse harness, a rattle pendant and a sword with scabbard. It has previously been described as a 'nationally significant find' by the Treasure Trove Unit.

The prehistoric archaeological features are largely concentrated on higher elevations, in the form of forts or funerary monuments, or along lower waterways and south facing slopes, such as Green Know ring enclosures and barrow (SM 2734). Due to the number of prehistoric features within the CSA, the archaeological potential to encounter unknown prehistoric features is considered high though any surviving deposits, if present, are likely to be disturbed as a result of forestry operations throughout the modern period.

5.2 Romano-British Period

There are no known Romano-British features the CSA, however 497 m south of the CSA, within the 1 km Study Area lies a potential Iron-Age boundary (SMR 4030063), indicating potential agricultural usage of the southern landscape into this period.

Approximately 4 km to the south of the CSA, along the A72 and Lyne Water there is a concentration of Roman sites. These consist of a Roman fort annexes and fortlet (SM 1492), a Roman fort (SM 1493) and a Roman camp (SM 1494). The camp was a temporary camp to serve as overnight or short-term accommodation and likely served to monitor the tribes that occupied the Tweed Valley and surrounding valleys. The Roman Road of Dere Street, which ran from Corbridge in England along the Tweed and on to Crammond, is also located approximately 20 km east of the CSA. It is likely that this area, especially, the key lowland corridors, was on a route which led to the Antonine Wall.

Romano-British features are likely to exist in the area along accessible routes which would provide access north to the Antonine Wall. Due to the steep terrain within areas of the CSA, and the lack of known features within the CSA, the archaeological potential of the CSA for unknown Romano-British remains to survive is assessed as very low.

5.3 Medieval Period

Within the CSA, there are three medieval records: rig and furrow (HER 334115) on the western boundary of the CSA, a village (HER 343662) in the southern portion of the CSA, and a drove road (HER 343792/ 343790) that bisects the southern portion of the CSA in an east/west direction.

Within the 1 km Study Area, there are two rig and furrow features (HER 334109) 560 m west of the CSA and (HER 343607) 350 m north of the CSA. In addition, there are five medieval farmsteads (HER 343663) 50 m east of the CSA, (HER 343664) 90 m north of the access track of the CSA, (HER 343665) 500 m east of the CSA and (HER 363667) 600 m south-east of the access track of the CSA. The pattern within the medieval period is similar to that of the prehistoric where the settlement nuclei fall within the south-eastern slopes around the Cloich Hills around waterways and more conducive agricultural land with likely transhumance grazing at higher, more exposed elevations.

Within the wider area, there is an early Christian stone incised with a cross which was incorporated into a garden wall within Peebles approximately 5 km south-east of the CSA. The settlement of Peebles was made a royal burgh by King David I in 1152 and throughout the medieval period was visited by several monarchs showing the area's importance in medieval Scottish society.[33] On Drochil Hill, 3 km south-west of the CSA, is Drochil Castle (SM 1495) which was built as the fourth Earl of Morton, Regent of Scotland, during the sixteenth century. It is thought that the castle would have been at the centre of an extensive wider landscape of terraces and gardens although this may never have been completed due to the Earl's death.[34]

Evidence is shown that the CSA and the 1 km Study Area was comprised of farmsteads and agricultural use during the medieval period with known substantial settlements such as Peebles located within the wider area. The archaeological potential of the CSA for unknown medieval remains to survive is considered moderate, primarily agricultural, though modern forestry operations will likely have caused some level of disturbance or destruction.

5.4 Post-Medieval Period

Within the CSA, there are three post-medieval features: a whinstone quarry (HER 343657) to the east of the CSA centre, a road (HER 343658) traversing the south-west and a stock enclosure (HER 343661) to the north of the CSA. These depict a wider range of land usage, where by the moorland was used for pastoral grazing, most likely to be sheep and Black Cow as recorded within Section 4.7 Statistical Accounts. The development of roads and trackways across the CSA landscape highlights how the easiest route from the settlement of Eddleston across the Romanno Bridge and the route to Edinburgh was by crossing the CSA.

Within the 1 km Study Area, there are 15 features which are Post-Medieval in date. To the north-east of the CSA is the Garden and Designed Landscape of Portmore (GDL 00318) in which the category A Portmore House (LB 2037), category C Portmore Lodge and Gatehouse (LB 2038) and glasshouse (HER 299262) are located. These date to the nineteenth century with the mature woods, park and garden forming the setting of the mansion house. This is indicative of a wider pattern of land use in the Scottish Borders with country houses and estates formed within the valleys. The category B Harehope House (LB 2039) is located 1 km south of the CSA and dates to the eighteenth century. There are three whinstone quarries (HER 343657, HER 343659, HER 343849) and four agricultural enclosures (HER 181815, HER 343605, HER 343625, HER 49969). In addition, there is a mill pond (HER 343660) approximately 30 m east of the CSA, a head dyke (HER 181786) 200 m east of the CSA and a railway bridge (HER 145450) 600 m north of the access road within the CSA.

During the post-medieval the area was still primarily agricultural use with the introduction of quarrying of whinstone. Settlement is concentrated within the towns and villages with more rural settlement in the form of rural farmsteadings and larger stately estates such as

[33] Extract from Brown and Lawson, History of Peebles 1850 – 1990, Available at http://www.peebles-theroyalburgh.info/history-of-peebles [accessed 03/09/20]

[34] Historic Environment Scotland entry for Drochil Castle (SM 1495), Available at http://portal.historicenvironment.scot/designation/SM1495 [accessed 3/9/20]

Portmore House (LB 2037). From the existence of sheepfolds and enclosures, the area of the CSA was most likely utilised for transhumance grazing during this period. There is good cartographic coverage of the area during this period and any post-medieval remains will have likely been recorded. As such the potential for any unknown post-medieval remains to survive within the CSA is considered low.

5.5 Modern Era

There is one known modern feature of significance within the CSA; a dovecot (HER 343811).

The latter half of the twentieth century saw the change of land use of the CSA from upland moorland grazing to large forestry plantations as identified through cartographic, aerial photography and satellite imagery. Due to the introduction of forestry, there is very low potential for unknown modern remains to exist within the CSA.

6 ARCHAEOLOGICAL POTENTIAL

The archaeological potential across the CSA ranges from high to very low as detailed in Section 5 with Table 2 providing a summary of the archaeological potential of the CSA.

Table 2: Summary of Archaeological Potential of the CSA

Period	Visibility within CSA and 1 km study area	Presence or Absence of sites within CSA and 1 km study area	Likelihood of further Discoveries within the CSA
Prehistoric	Present within the CSA and 1 km Study Area. Archaeological features include cairns, ring enclosures and barrows.	High presence with a concentration around waterways to the south-east of the CSA.	High though likely affected by forestry operations
Romano-British	None within study areas.	None within study areas. Concentration 4 km south of CSA along Lyne Water.	Very Low
Medieval	Agricultural and settlement remains within study areas.	Prevalent in the form of farmsteads and field systems around the south-eastern slopes of the CSA.	Moderate though likely affected by forestry operations
Post-Medieval	Agricultural remains still present with good cartographic coverage. Introduction of quarries within 1 km Study Area. Stately homes to the north-east and south of the CSA.	Present within 1 km Study Area. Settlement exists in the form of farmsteadings along existing tracks. Grander homes are located within valley regions, screened by substantial vegetation.	Low
Modern	One notable modern feature within study areas in the form of a dovecot which was identified by the HER as modern.	Limited presence, any modern archaeological remains would likely still be extant and visible.	Very Low

7 POTENTIAL IMPACT FROM THE DEVELOPMENT

The following section outlines the potential effects from the Development to archaeological remains with recommendations for design considerations.

7.1 Direct Effects and Design Recommendations

Direct impacts are physical alterations which may affect either known sites or currently unknown buried and otherwise unrecorded archaeology. Direct or physical impacts may damage or destroy archaeological features and are usually permanent and irreversible. These effects are likely to occur during construction or decommissioning of a site.

Direct effects are limited to the Development footprint where associated earthmoving and excavation occur and not to the full extent of the CSA. Excavations for the turbine foundations are anticipated to reach a depth between 2-4 m with bedrock encountered at depths below 3 m. Excavation depths for cable runs and access tracks are anticipated to reach c. 500-750 mm. It is therefore unlikely that any archaeology situated at a depth of more than 1 metre has the potential to receive a direct impact, other than at the turbine locations.

It is recommended for the finalised Development footprint to avoid all known remains with adequate separation distance from designated heritage assets. There is a high potential for unknown archaeology to exists across the CSA due to the number and proximity of known prehistoric features within the area and moderate level to encounter medieval agricultural remains; however, the introduction of modern forestry operations is likely to have affected surviving remains through disturbance or destruction. The direct effects as a result of the finalised Development footprint will be assessed within the EIA Report.

7.2 Potential Mitigation

It is considered that preservation *in situ* is the preferred method of mitigation for known archaeological remains. However, where this is not possible, or where there is a likelihood of encountering locally important unknown subsurface archaeological remains, a programme of archaeological works leading to preservation by record maybe appropriate though disturbance from forestry operations is likely to be high.

Due to the potential for further unknown significant archaeological remains within the CSA, it is proposed that the following steps are undertaken to reduce the potential impact:

- Avoidance of known records and siting of infrastructure along waterways where archaeological potential is highest; and
- Programme of archaeological work to secure preservation by situ (if required).

7.3 Changes to Setting

The Development has the potential to cause indirect effects as a result of changes to setting of designated cultural heritage assets within and beyond the study area of this desk-based assessment. Due to the height and visibility of the turbines, it is considered that these indirect effects have the potential to be significant (i.e., they may have the potential to so alter the settings of some cultural heritage assets that their cultural significance is affected). An initial area covering a 15 km radius of the CSA boundary has been selected to undertaken an initial sieving exercise to determine which designated heritage assets have the potential to receive a change in setting. The final list of assets will be selected based on theoretical visibility of the Development, association of the cultural significance with the wider landscape, and professional judgement. These effects will be assessed and reported in full within the EIA Report.

8 CONCLUSION

The data collection exercise identified 18 archaeological records within the CSA as shown on Figures 2 and 3. This includes three scheduled monuments comprising of ring enclosures (SM2756), a cairn (SM2755) and a settlement (SM3998) dating from the prehistoric period. The remaining 15 undesignated heritage assets, which predominantly included prehistoric enclosures and isolated undesignated buildings associated with post medieval agriculture, were identified through analysis of datasets including the HER and Canmore records, the cartographic record, and available aerial photography. One modern feature was identified within the CSA. In conclusion, it is recommended that known records within the CSA be avoided during design.

Many of these to prehistoric settlement, defensive structures and funerary practices as well as medieval to post-medieval agricultural activities. As such the potential to encounter further unrecorded archaeological remains is considered high within the CSA in regards to Prehistoric remains and moderate for Medieval agricultural remains, with Low to Very Low potential for Romano Iron-Age, Post-Medieval and Modern periods, though forestry operations are likely to have affected the survival of discrete archaeological deposits, where these are present. The purpose of this DBA is to inform the Development layout, which is still being refined. Consideration of potential direct effects as a result of the final Development layout will be presented within the EIA Report.

There is also the potential for changes to setting that affect cultural significance for designated heritage assets within the CSA and wider area. Consideration of these will be reported on fully in the EIA Report, taking into account the way in which the Development may affect the setting and cultural significance of nationally important sites.

9 GAZETTEER OF ARCHAEOLOGICAL SITES

9.1 Designated Assets within Core Study Area

The following gazetteer summarises the results of the DBA of the designated heritage assets within the CSA. These are shown on Figure 3.

Type	Ref	Name	Description	Period	X	Y
SM	SM2755	Whaup Law, cairn	Prehistoric ritual and funerary: cairn (type uncertain)	Prehistoric	320840	648009
SM	SM2756	Courhope, ring enclosures 750m NE of Greenside	Prehistoric ritual and funerary: enclosure (ritual or funerary)	Prehistoric	320861	647090
SM	SM3998	Nether Stewarton, settlement 850m W of	Prehistoric domestic and defensive: settlement	Prehistoric	321084	645564

9.2 Undesignated Heritage Assets within Core Study Area

The following gazetteer summarises the results of the DBA of the undesignated heritage assets within the CSA. These are shown on Figure 2.

Type	Ref	Name	Description	Period	X	Y
Canmore	51406	Peat Hill	Cairn	Prehistoric	320630	648720
Canmore	51413	Cloich Rig	Ring Enclosure(S)	Prehistoric	321800	648290
Canmore	51417	Early Burn	Ring Enclosure(S)	Prehistoric	321500	647800
HER	51417	Early Burn	Ring Enclosure	Prehistoric	478	215
Canmore	51418	Cloich	Cairn(S)	Prehistoric	322100	649900
HER	51424	Shiplaw	Findspot, Scraper (Tool)	Prehistoric	495	235
Canmore	51667	Grassfield	Ring Enclosure	Prehistoric	321150	650070
Canmore	181784	Greenside	Field System(S)	None assigned	320750	646450
Canmore	296428	Eddleston	Burnt Mound	Prehistoric	321181	648717
Canmore	343618	Cloich	Findspot, Scraper (Tool)	Prehistoric	322520	650050
Canmore	343634	Greenside	Building	Post medieval	320200	646600
Canmore	343657	Crailzie Hill	Quarry	Post medieval	318880	645550
HER	343658	Upper Stewarton	Road	Post medieval	46070	21760
Canmore	343662	Greenside or Courhope	Village	Medieval	320314	646400
Canmore /HER	343790	Drove Road	Road	Medieval	318920	646105

Type	Ref	Name	Description	Period	X	Y
SMR	4030014	Cloich Farm	Three funerary ring ditches, now destroyed at Cloich Farm.	Prehistoric	321600	647900

9.3 Designated Heritage Assets within 1 km Study Area

The following gazetteer summarises the results of the DBA of the designated heritage assets within the 1 km study area. These are shown on Figure 3.

Type	Ref	Name	Description	Period	X	Y
SBC G&DL	36	Barony Castle	SBC Designated Landscape	Medieval	323620	647282
GDL	GDL00318	Portmore	Portmore GDL	Post-Medieval	325183	649693
LB	LB2037	Category A Listed Portmore House		Post-medieval	325044	648832
LB	LB2038	Category C Listed Portmore Lodge and Gateway		Post-medieval	324426	648511
LB	LB2039	Category B Listed Harehope House		Post-medieval	320017	644176
SM	SM2677	Harehope Rings, fort, Harehope Hill	Prehistoric domestic and defensive: fort (includes hill and promontory fort)	Prehistoric	319632	644574
SM	SM2732	Drum Maw, settlement 780m SE of	Prehistoric domestic and defensive: settlement	Prehistoric	318188	646496
SM	SM2733	Romanno Hope, barrow & enclosures S of	Prehistoric ritual and funerary: barrow	Prehistoric	318539	646701
SM	SM2734	Green Knowe, two ring enclosures & barrow 550m SSE of	Prehistoric ritual and funerary: barrow	Prehistoric	319192	646349
SM	SM2738	Wether Law, cairn	Prehistoric ritual and funerary: cairn (type uncertain)	Prehistoric	319465	648376
SM	SM2759	Harehope, palisaded settlement 730m NNE of	Prehistoric domestic and defensive: palisaded settlement	Prehistoric	320337	644850
SM	SM3790	Harehope, earthwork 550m NNE of	Prehistoric domestic and defensive: enclosure (domestic or defensive)	Prehistoric	320173	644696

9.4 Undesignated Heritage Assets within 1 km Study Area

The following gazetteer summarises the results of the DBA for the undesignated heritage assets within the 1 km study area. These are shown on Figure 2.

Type	Ref	Name	Description	Period	X	Y
Canmore	49962	Fingland	Sheepfold	Prehistoric	319180	646770
Canmore	49969	Flemington Burn	Sheepfold	Prehistoric	319060	646200
Canmore	49984	Drum Maw	Sheepfold	Medieval	318200	646100
Canmore	49985	Drum Maw	Building(S) Enclosure(S) Sheepfold	Medieval	318400	646100
Canmore	49986	Drum Maw	Enclosure	Medieval	318400	646300
Canmore	51402	Hatton Knowe	Cairn	Prehistoric	322480	646120
Canmore	51415	Darnhall Moss	Findspot, Socketed Axehead (Bronze)	Prehistoric	324000	648000
Canmore	51416	Nether Stewarton	Cairn	Prehistoric	321410	645130
HER	51418	Cairn	Cairn	Prehistoric	499	221
Canmore	51422	Darnhall	Findspot, Microlith(S)	Prehistoric	324000	648100
Canmore	51424	Shiplaw	Findspot, Microlith(S)	Prehistoric	323500	649500
Canmore	51557	Harehope	Enclosure	Medieval	320170	644650
Canmore	51561	Harehope Burn	Cairn	Prehistoric	321150	644940
Canmore	51563	Nether Stewarton	Ring Enclosure	Prehistoric	321750	644890
Canmore	51566	Harehope	Cairn	Prehistoric	321640	644180
Canmore	51567	Harehope	Cairn	Prehistoric	321270	644690
Canmore	51600	Harehope Burn	Ring Enclosure(S)	Prehistoric	321250	644200
Canmore	51606	Millhope Burn	Sheepfold	Medieval	321180	644380
HER	51610	Harehope House	House	Medieval	44176	20017
HER	51666	Shiphorns	Cairn	Prehistoric	5034	2415
Canmore	53952	Flint	Findspot, Scraper (Tool) (Flint)	Prehistoric	320200	644000
Canmore	73334	Harehope	Gravel Pit (19-20th Century)	Modern	320400	644700
Canmore	78721	Stewarton Cottage	Cairn Feed Bin Stance, Rig and Furrow Sheepfold	Medieval	322200	646000
Canmore	78722	Stewarton Cottage	Rig And Furrow	Medieval	322130	646190

Type	Ref	Name	Description	Period	X	Y
Canmore	78862	Shiplaw Burn	Rig And Furrow	Medieval	323100	650200
Canmore	81357	Kilrubie Hill	Pit(S) Inorganic Material (Chert)	Prehistoric	321600	647000
Canmore	81358	Pratstile Rig	Site	Medieval	321900	646500
Canmore	98042	Wester Deans	Farmstead	Post-medieval	321608	651743
Canmore	108280	Harehope	Burnt Mound	Prehistoric	319000	644000
Canmore	145450	Earlypier, Railway Bridge	Railway Bridge (19th Century)	Post-medieval	324345	649982
Canmore	154551	Wide Hope Shank	Burnt Mound(S)	Prehistoric	319000	644750
Canmore	160170	Gallow Bank	Cultivation Terrace(S)	Medieval	324400	649500
HER	160170	Gallow Bank	Cultivation Terrace(S)	Post-medieval	495	244
Canmore	181775	Rough Cleugh	Field System	Post-medieval	318400	645550
Canmore	181783	Harehope Forest	Enclosure	Medieval	320890	644750
Canmore	181785	Foresthill	Farmstead	Post-medieval	323910	649000
Canmore	181786	Cloich Rig	Head Dyke	Post-medieval	322120	647750
HER	181787	Fairydean Burn	Head Dyke	Post-medieval	4712	2254
Canmore	181788	Pratstile Rig	Field System	Post-medieval	321750	646750
Canmore	181815	Rough Cleuch	Enclosure	Post-medieval	317880	646040
Canmore	181850	Ruddenleys	Building	Post-medieval	320590	651110
Canmore	206197	Fingland Farm	Farmstead	Post-medieval	319180	647116
Canmore	206494	Blinkbonny	Farmstead	Post-medieval	321279	651280
Canmore	273234	Harcus	Farmstead	Post-medieval	324630	648370
Canmore	273237	Pratstile Rig	Enclosure Sheepfold(S)	Post-medieval	322230	646580
Canmore	299262	Portmore House, Garden	Glasshouse (19-20th Century), Walled Garden	Modern	325068	648958
Canmore	312990	Kilrubie	Boundary Dyke, Enclosure Farmstead, Rig and Furrow	Medieval	321724	646796
Canmore	320640	Cowieslinn Quarry	Quarry	Post-medieval	323290	650590
Canmore	334109	Drum Maw	Rig And Furrow	Medieval	318300	646730
Canmore	334115	Wether Law	Rig And Furrow	Medieval	319680	647920

Type	Ref	Name	Description	Period	X	Y
Canmore	343605	Harehope Burn	Enclosure	Post-medieval	321400	644100
Canmore	343607	Cowlieslinn Quarry	Rig And Furrow	Medieval	323300	650800
Canmore	343608	Shiplaw Burn	Rig And Furrow	Medieval	323300	650400
Canmore	343619	Earlyburn	Findspot, Unidentified Flint	Prehistoric	322650	650000
Canmore	343621	Shiplaw Burn	Findspot, Leaf Arrowhead	Prehistoric	323650	650820
Canmore	343622	Shiplaw Burn	Findspot, Flake(S)	Prehistoric	323220	650050
Canmore	343623	Kilrubie Wood	Burnt Mound	Prehistoric	322050	647150
Canmore	343624	White Law	Burnt Mound	Prehistoric	322180	647090
Canmore	343625	Pratstile Rig	Stock Enclosure	Post-medieval	322150	646650
Canmore	343626	White Law	Stock Enclosure	Post-medieval	322450	647450
Canmore	343627	White Law	Stock Enclosure	Post-medieval	322370	647300
Canmore	343628	White Law	Stock Enclosure	Post-medieval	322310	647250
Canmore	343630	Shiplaw Burn	Burnt Mound	Prehistoric	322680	649400
Canmore	343631	Cloich Rig	Stock Enclosure	Post-medieval	322200	648650
Canmore	343632	Cloich Rig	Stock Enclosure	Post-medieval	322200	648480
Canmore	343644	Cloich	Enclosure	Medieval	321960	649140
Canmore	343658	Upper Stewarton	Road	Post-medieval	321760	646070
Canmore	343659	Loch Pots	Quarry	Post-medieval	322200	645600
Canmore	343660	Upper Stewarton	Mill Pond	Post-medieval	321670	646140
Canmore	343661	Upper Stewarton	Stock Enclosure	Post-medieval	321460	645950
Canmore	343663	Cloich	Farmstead	Medieval	321640	649080
Canmore	343664	Shiplaw	Farmstead	Medieval	323550	649500
Canmore	343665	Nether Stewarton	Farmstead	Medieval	321900	645500
Canmore	343667	Harcus	Farmstead	Medieval	324560	648330
HER	343792	Road	Main Drove Road	Medieval	49600	16370
Canmore	343811	Grassfield	Dovecot	Modern	320500	650050
Canmore	343812	Ruddenleys	Farmstead	Modern	320470	651040
Canmore	343818	Fingland	Rig And Furrow	Medieval	319100	647000
Canmore	343847	Green Knowe	Quarry	Post-medieval	319200	646590
Canmore	343848	Hag Law	Quarry	Post-medieval	319100	647530
Canmore	343849	Hag Law	Quarry	Post-medieval	319160	647640
Canmore	343850	Green Knowe	Quarry	Post-medieval	319300	647760
Canmore	344985	Drum Maw	Stock Enclosure	Post-medieval	318323	646274

Type	Ref	Name	Description	Period	X	Y
Canmore	348026	Cowieslinn Quarry	Quarry Scoop(S) (P, Rig and Furrow	Post-medieval	323409	650711
Canmore	354171	Fingland	Farmstead	Medieval	319000	646900
Canmore	355131	Halmyre, Kelly Heads	Enclosure?	Post-medieval	318870	649090
SMR	4030003	Drove Road	Drove Road	Multi-period	318920	646105
SMR	4030049	Nether Stewarton	Sheepfold	Post-medieval	321746	644935
SMR	4030063	Harehope	Boundary	Iron-Age	319	644
SMR	4030086	Harehope Burn	Sheepfolds.	Post-medieval	321190	644375
SMR	4030099	Upper Stewarton	Earthwork	Medieval	322100	646000
SMR	4030119	Cloich	Flint Scraper (Or Knife)	Prehistoric	322520	650050
SMR	4030127	Pratstile Rig	Enclosure	Unclassified	322200	646550
SMR	4030163	Wide Open Shank	Burnt Mound,	Bronze age	319050	644650
SMR	4032001	Harehope	On Pont's Map as Harupt.	Medieval	320050	644200
SMR	4032005	Pratstile Rig	Farmstead Earthworks	Medieval	321690	646780
SMR	4080085	Enclosure	Enclosure	Medieval	320	643
SMR	4090003	Road	Extension Of Drove Road	Medieval	318	646

10 PLATES

Plate 1: (HER 51667) in northern portion of CSA looking west showing felled forestry and level of disturbance

Plate 2: Eastern portion of CSA at side of access track facing south

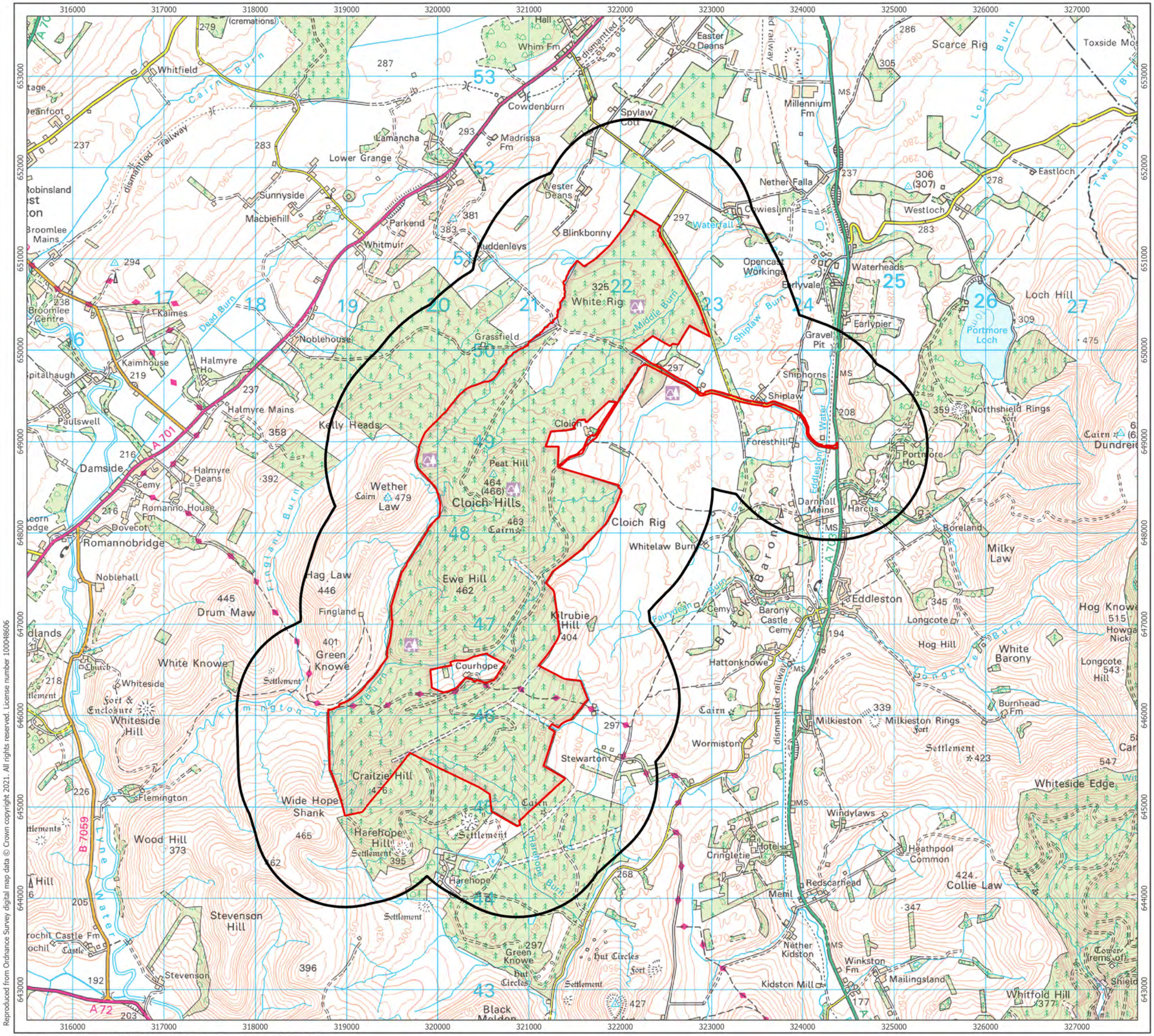
Plate 3: Courhope (not within Site Boundary)

Plate 4: Active felling and brush in south-east of the CSA

Plate 5: Dense tree planting in south-east of CSA

Plate 6: Dense tree planting in south-west of CSA

11 FIGURES



Core Study Area

1 km Study Area

1:40,000 Scale @ A3

0 0.75 1.5 km

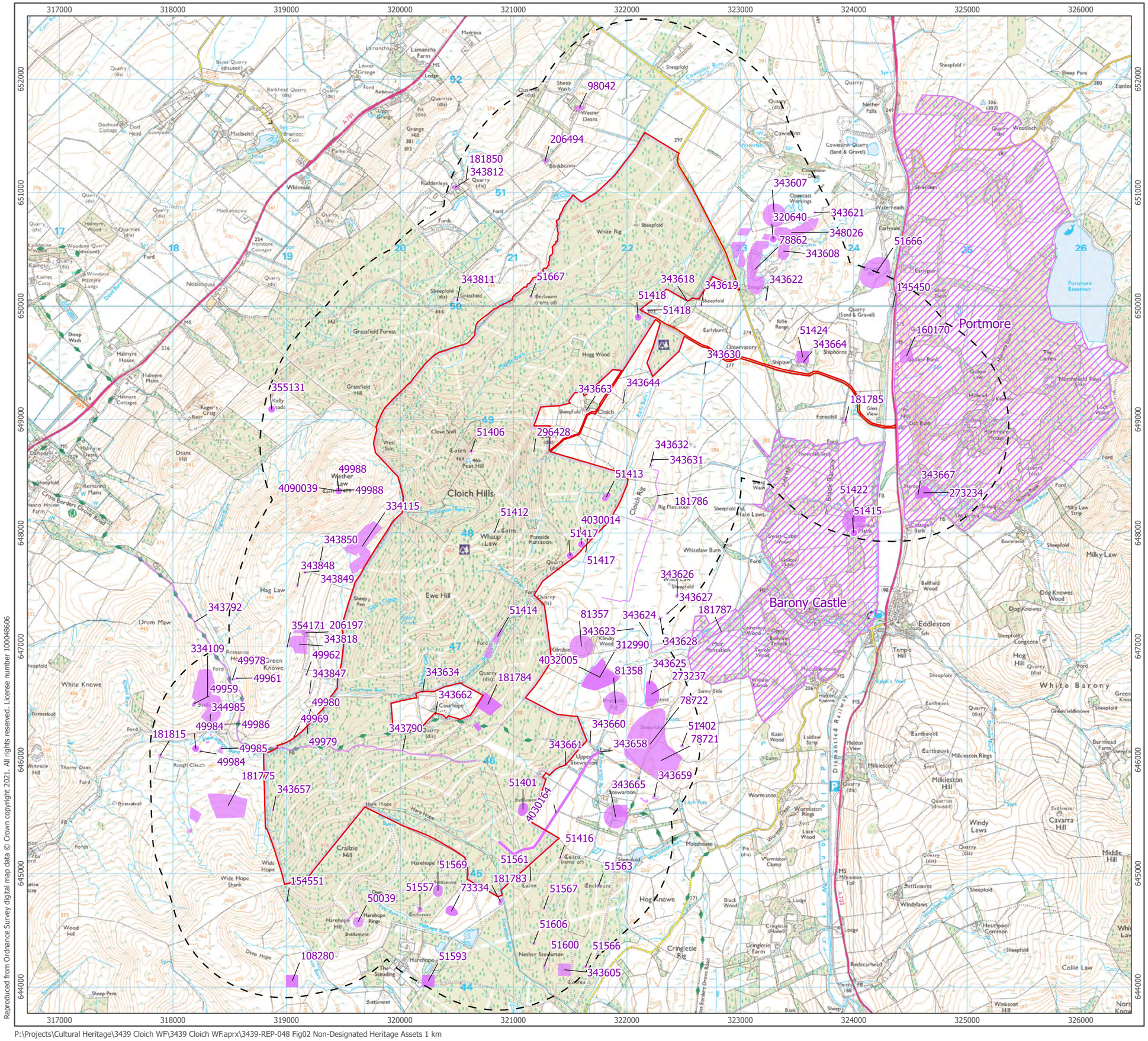
NORTH

Produced By: OW	Ref: 3439-REP-047
Checked By: SC	Date: 11/06/2021

Study Areas
Figure 1

Cloich Forest Wind Farm
Desk-based Assessment

P:\Projects\Cultural Heritage\3439 Cloich WF\3439 Cloich WF.aprx\3439-REP-047 Fig01 Study Areas



P:\Projects\Cultural Heritage\3439 Cloich WF\3439 Cloich WF.aprx\3439-REP-048 Fig02 Non-Designated Heritage Assets 1 km

eDF renewables

ARCUS

- Core Study Area
- 1 km Study Area
- Non-Designated Heritage Asset
- Non-Designated Heritage Asset
- Non-Designated Heritage Asset
- Non-Designated Landscape

1:32,000 Scale @ A3

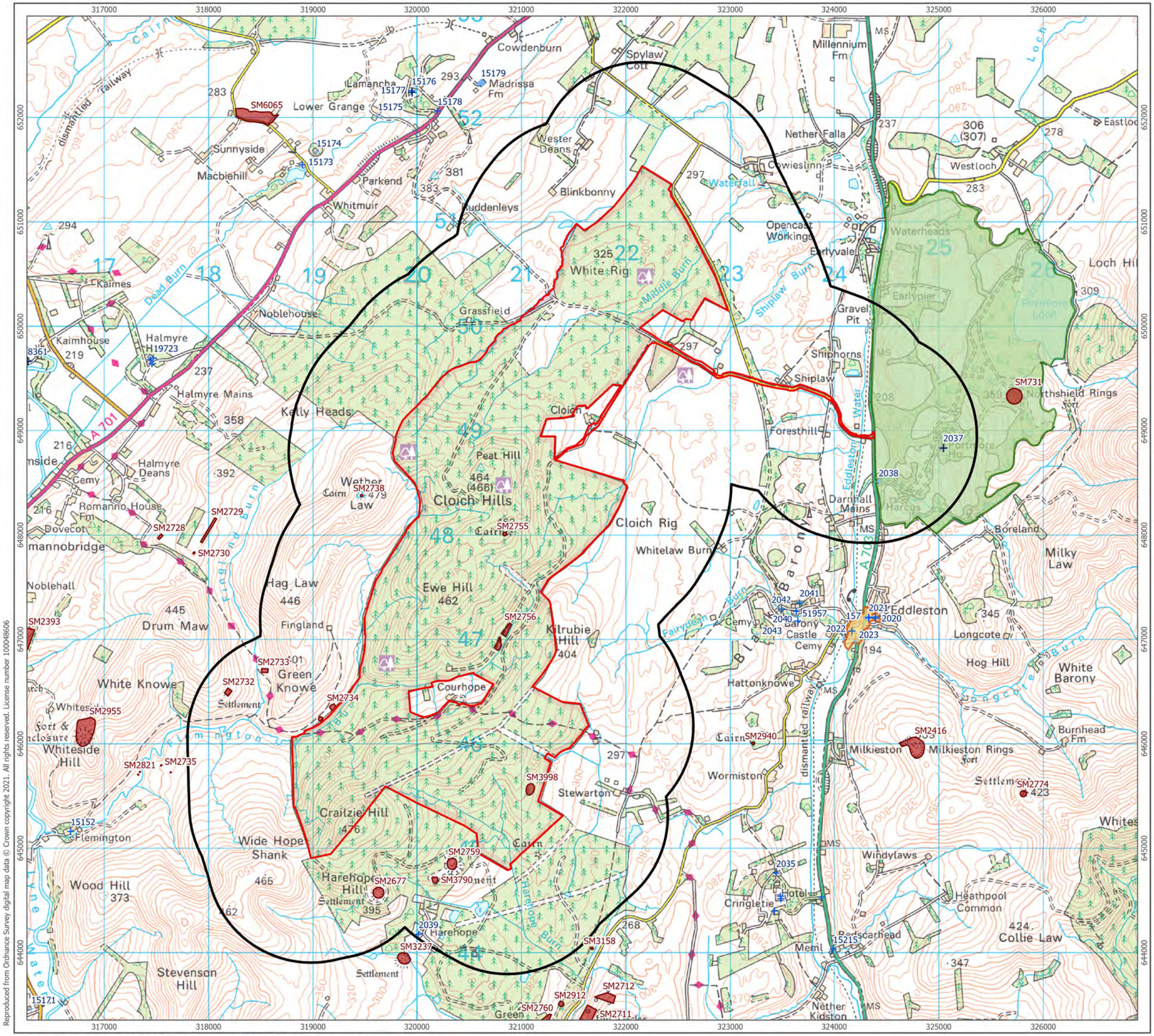
0 0.5 1 km

NORTH

Produced By: OW	Ref: 3439-REP-048
Checked By: HK	Date: 16/06/2021

Non-designated Heritage Assets 1 km
Figure 2

Cloich Forest Wind Farm Desk-based Assessment

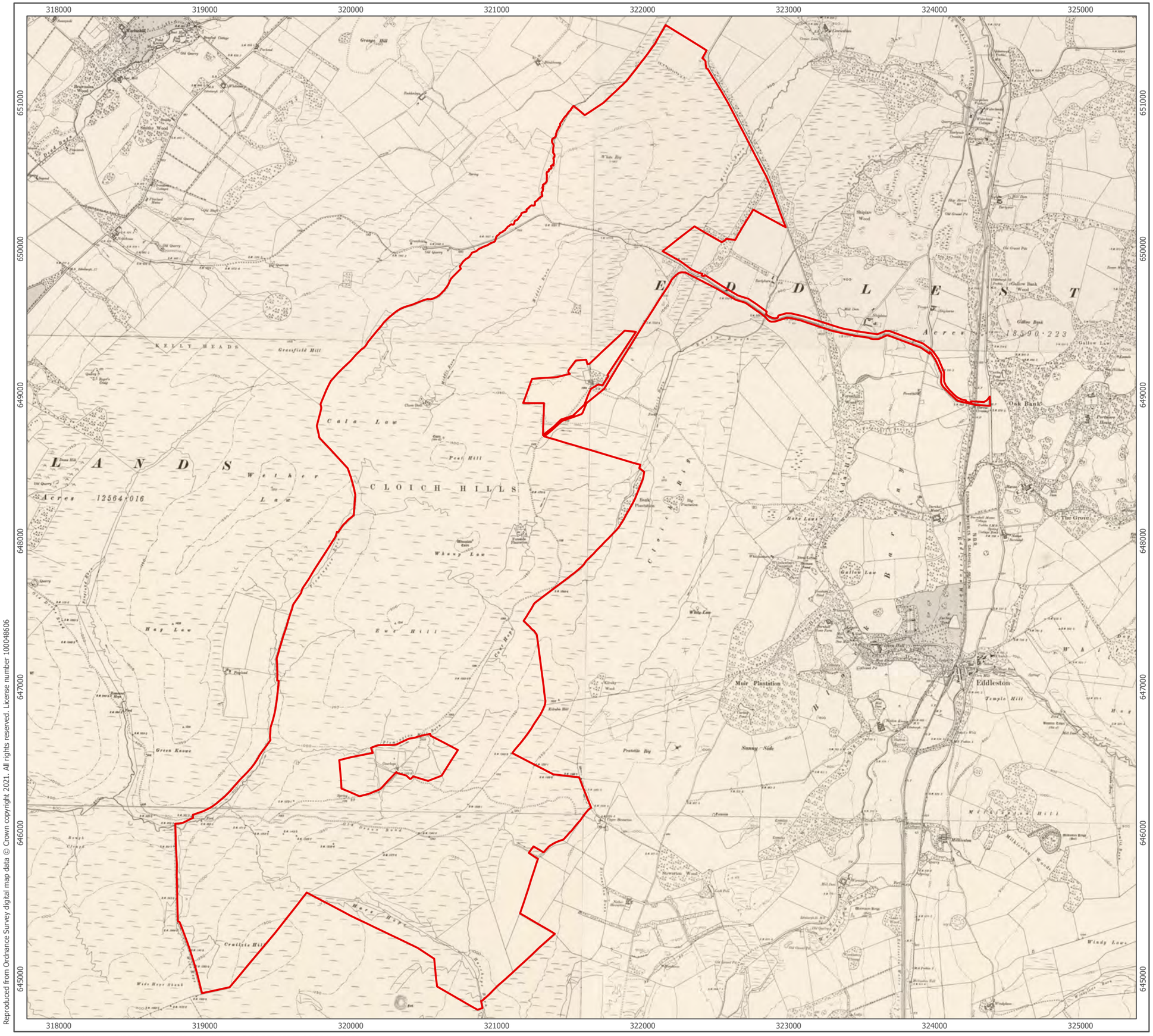


P:\Projects\Cultural Heritage\3439 Cloich WF\3439 Cloich WF.aprx\3439-REP-049 Fig03 Designated Heritage Assets 1 km

Produced By: OW	Ref: 3439-REP-049
Checked By: SC	Date: 11/06/2021

Designated Heritage Assets 1 km
Figure 3

Cloich Forest Wind Farm
Desk-based Assessment



P:\Projects\Cultural Heritage\3439 Cloich WF\3439 Cloich WF.aprx\3439-REP-050 Fig04 OS Map 1859

Core Study Area

1:25,000 Scale @ A3

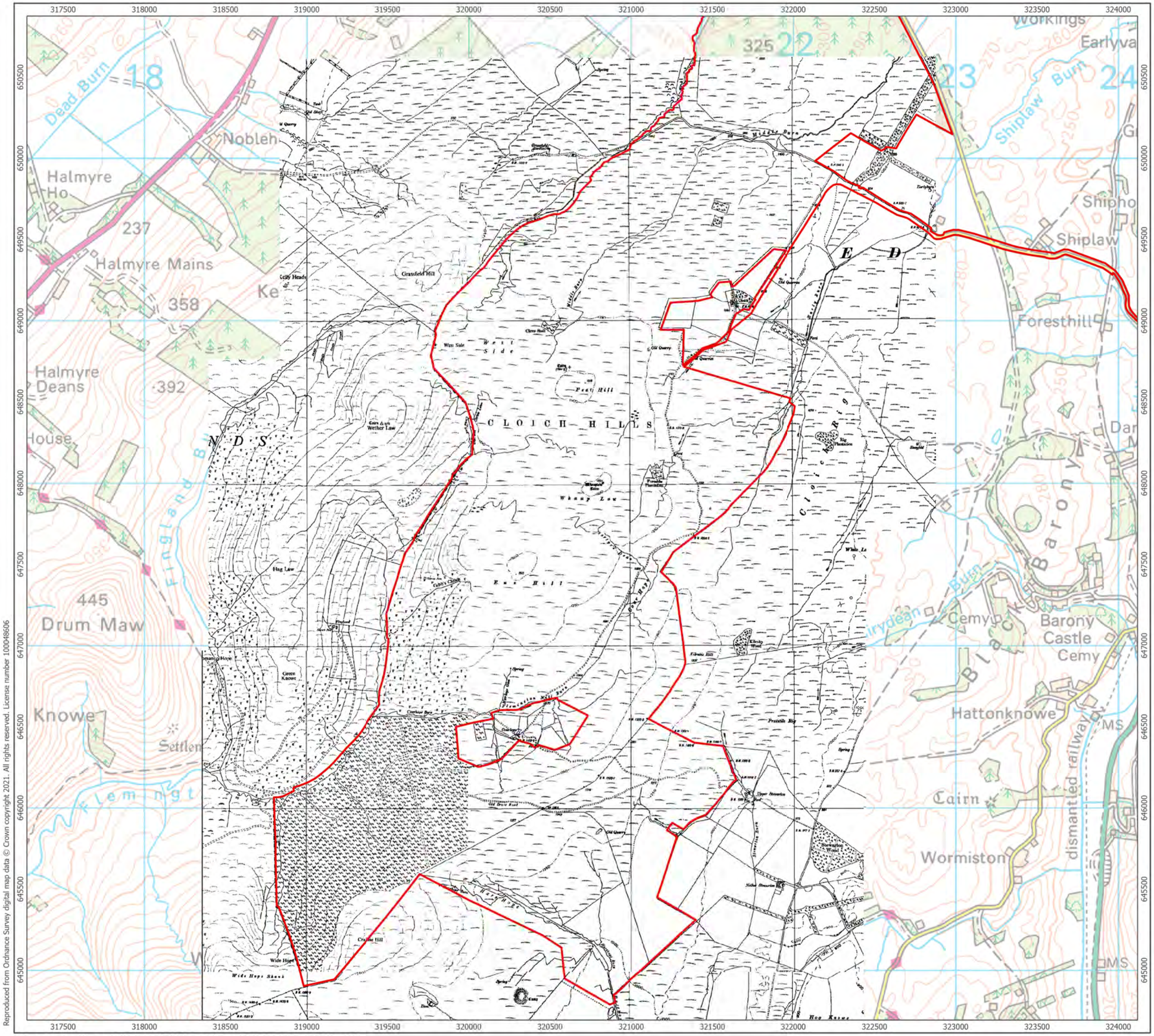
0 0.5 1 km

NORTH

Produced By: OW	Ref: 3439-REP-050
Checked By: SC	Date: 16/06/2021

OS Map 1888
Figure 4

Cloich Forest Wind Farm
Desk-based Assessment



Reproduced from Ordnance Survey digital map data © Crown copyright 2021. All rights reserved. License number 100048606

P:\Projects\Cultural Heritage\3439 Cloich WF\3439 Cloich WF.aprx\3439-REP-051 Fig05 OS Map 1958

eDF renewables

ARCUS

Core Study Area

1:22,500 Scale @ A3

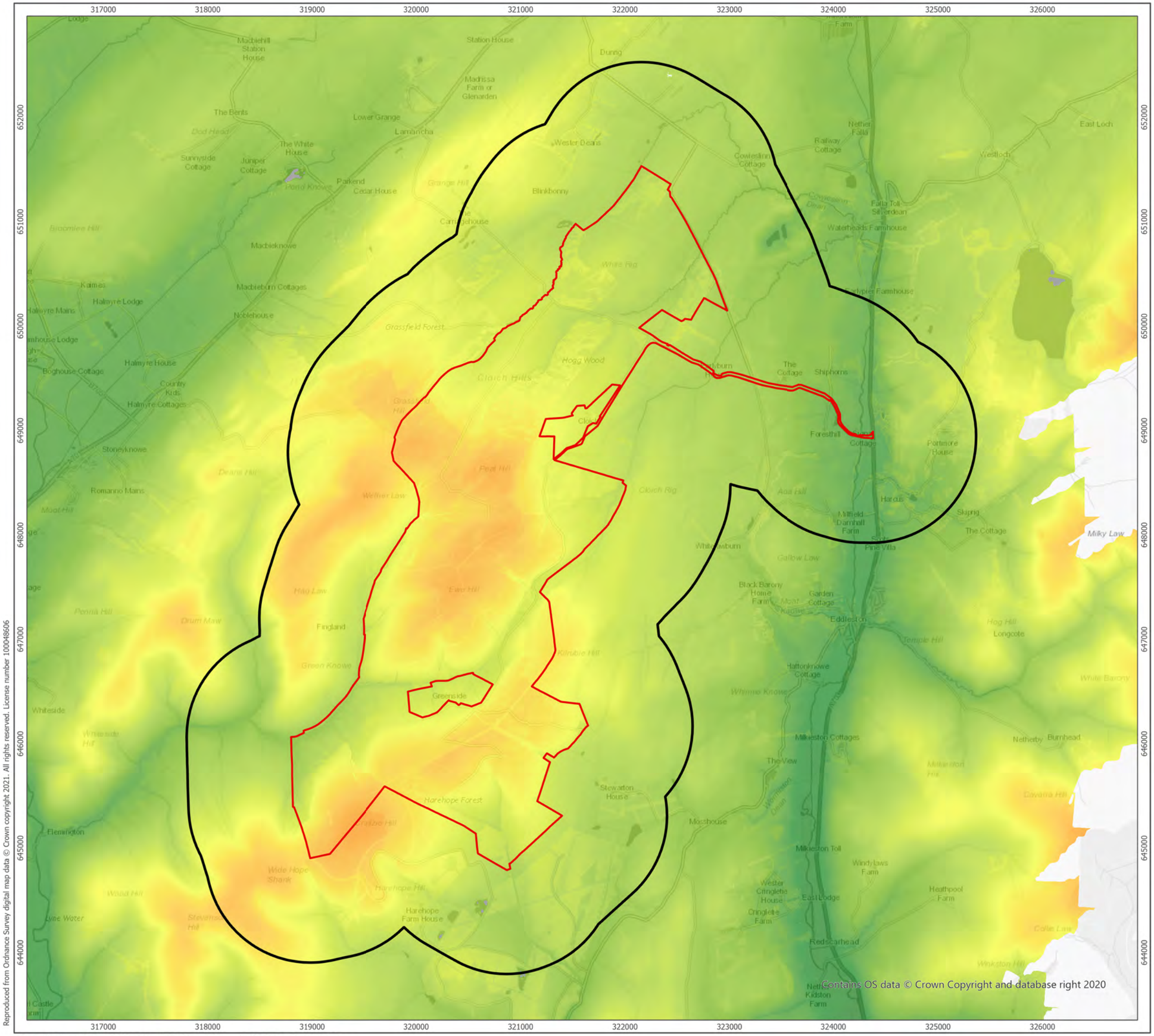
0 0.5 1 km

NORTH

Produced By: OW	Ref: 3439-REP-050
Checked By: SC	Date: 11/06/2021

OS Map 1958
Figure 5

Cloich Forest Wind Farm
Desk-based Assessment



Reproduced from Ordnance Survey digital map data © Crown copyright 2021. All rights reserved. License number 100048606

ARCUS

Core Study Area

Cultural Heritage Study Area

LiDAR Data (mAOD)

650

139

1:35,000 Scale @ A3

0 0.75 1.5 km

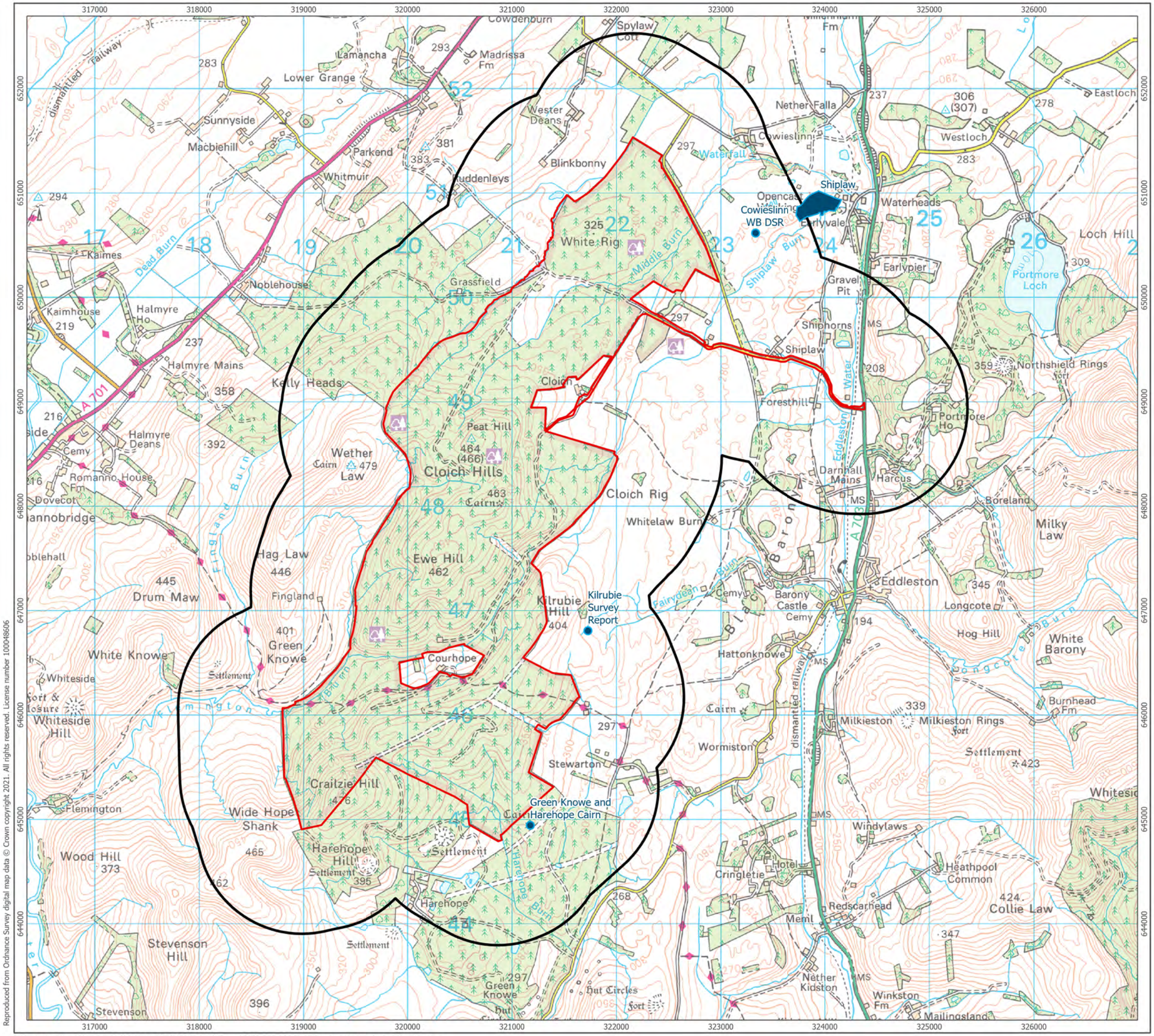
NORTH

Produced By: AT	Ref: 3439-REP-052
Checked By: SC	Date: 11/06/2021

LiDAR Data
Figure 6

Cloich Forest Wind Farm
Desk-based Assessment

P:\Projects\Cultural Heritage\3439 Cloich WF\3439 Cloich WF.aprx\3439-REP-052 Fig06 LiDAR Data



P:\Projects\Cultural Heritage\3439 Cloich WF\3439 Cloich WF.aprx\3439-REP-069 Fig07 Previous Archaeological Investigations

Produced By: OW	Ref: 3439-REP-069
Checked By: SC	Date: 11/06/2021

Previous Archaeological Investigations
Figure 7

Cloich Forest Wind Farm
Desk-based Assessment

CLOICH FOREST WIND FARM

VOLUME 3: TECHNICAL APPENDICES

TECHNICAL APPENDIX A6.2: PRE-APPLICATION CONSULTATION AND RESPONSES

JUNE 2021

Prepared By:

Arcus Consultancy Services

7th Floor
144 West George Street
Glasgow
G2 2HG

T +44 (0)141 221 9997 l **E** info@arcusconsulting.co.uk
w www.arcusconsulting.co.uk

Registered in England & Wales No. 5644976

Historic Environment Scotland &
Scottish Borders Council Archaeologist

Via email: HMConsultations@hes.scot, archaeology@scotborders.gov.uk

11 February 2021

Dear Sir/Madam,

Cloich Wind Farm Consultation (Energy Consent Unit Ref: ECU00001956; HES Ref: 300039684)

In the Historic Environment Scotland (HES) scoping response dated 01 November 2019 (HES Ref: 300039684), it was noted that the scheduled hillforts of Black and White Meldon were most likely to be significantly affected by the Development due to their proximity to the Development. HES also requested reference to views from other assets including Cademuir Hill and the Meldons from the Meldon Valley and consideration be given to Portmore house and its associated garden and designed landscape. The SBC has also requested a view from MacBeth's Castle. All of these heritage assets will be included in the EIA Report, and the following photomontages will be provided in the EIA Report:

- Black Meldon;
- Meldon Valley;
- Portmore;
- Cademuir Hill Fort;
- Milkieston Ring Forts;
- White Meldon;
- Easter Dawyck Fort and Settlement;
- Whiteside Hill Fort; and
- MacBeth's Castle.

Based on the assessment methodology presented in the scoping report; all designated heritage assets within 5 km will be included in the EIA Report. This includes 55 Scheduled Monuments, 68 Listed Buildings, one Garden and Designed Landscape, and one Conservation Area as detailed in tables 1.1-1.4 below.

Arcus has undertaking a sieving exercise for heritage assets between 5 – 10 km to determine which ones may receive a change in setting that affects their cultural significance as a result of the Development. The heritage assets chosen for consideration in the EIA have been selected based on their elevated positions either on hill tops or slopes of hills where long distance views potentially contribute to their cultural significance or where they are likely to have a greater connection to the wider landscape that contributes to their cultural significance. A full list of heritage assets between 5 – 15 km that will be included in the EIA is provided in tables 2.1-2.5 below.

Could you please reply to this letter by 19 February 2020 confirming if there are any additional assets within the 5 km – 10 km Study Area which you would require to be included in the indirect assessment?

Yours sincerely,

Olivia Watt
Graduate Heritage Consultant

Table 1.1: Scheduled Monuments within 5 km Study Area to be included in the EIA Report

HES Ref.	Title	X	Y	Study Area
SM114	Cairn and hill fort, White Meldon	321926	642836	5 km
SM1492	Lyne,Roman fort,annexes and fortlet	318792	640586	5 km
SM1493	Easter Happrew,Roman fort	319471	640106	5 km
SM1494	Lyne, Roman temporary camp	320070	640961	5 km
SM1495	Drochil Castle	316195	643489	5 km
SM2393	Terrace Wood,cultivation terraces	316249	647012	5 km
SM2416	Milkieston Rings,fort	324771	645971	5 km
SM2677	Harehope Rings,fort,Harehope Hill	319632	644574	5 km
SM2678	Old Deepsykehead,enclosed cremation cemetery 270m SSE of	317520	653639	5 km
SM2703	Black Meldon,fort	320632	642529	5 km
SM2711	White Meldon,platform settlement 640m NW of	321625	643372	5 km
SM2712	White Meldon,platform settlement 730m NNW of	321821	643569	5 km
SM2713	South Hill Head,homestead	322043	641619	5 km
SM2718	Sheriff Muir Cottages,standing stones 520m W of	320095	640058	5 km
SM2728	Romanno Mains,two barrows 550m SE of	317537	647983	5 km
SM2729	Romanno Mains,four barrows 910m ESE of	318001	648046	5 km
SM2730	Romanno Mains,barrow 910m SE of	317860	647828	5 km
SM2732	Drum Maw,settlement 780m SE of	318188	646496	5 km
SM2733	Romanno Hope,barrow & enclosures S of	318539	646701	5 km
SM2734	Green Knowe,two ring enclosures & barrow 550m SSE of	319192	646349	5 km
SM2735	Whiteside Hill,ring enclosures 820m SE of	317546	645793	5 km
SM2736	Hamildean,homestead 1140m NE of	319422	642387	5 km
SM2737	Black Meldon,settlement and scooped homestead 550m E of	321195	642553	5 km
SM2738	Wether Law,cairn	319465	648376	5 km
SM2755	Whaup Law, cairn	320840	648009	5 km
SM2756	Courhope, ring enclosures 750m NE of Greenside	320861	647090	5 km
SM2759	Harehope,palisaded settlement 730m NNE of	320337	644850	5 km

HES Ref.	Title	X	Y	Study Area
SM2760	Green Knowe,platform settlement	321198	643312	5 km
SM2774	Cavarra Hill,settlement	325810	645522	5 km
SM2777	Dundreich,cairn	327464	649091	5 km
SM2821	Flemington,ring enclosures 840m NE of	317326	645704	5 km
SM2840	Henderland Hill,fort	314958	645977	5 km
SM2912	Harehope,cairn 1510m ESE of	321382	643508	5 km
SM2940	Wormiston,cairn 360m NNW of	323221	646002	5 km
SM2944	Wester Happrew,fort 360m NW of	316821	642125	5 km
SM2955	Whiteside Hill,fort & enclosure	316819	646121	5 km
SM2956	Drochil Castle,fort & enclosure 1190m NNW of	315698	644672	5 km
SM2957	Hamildean Hill,fort	318732	641994	5 km
SM3010	Bordland Rings,fort,Bordlands Hill	315605	646333	5 km
SM3027	Tor Hill,fort 600m WNW of Torbank	317531	640931	5 km
SM3071	Newlands Church and graveyard, 50m SW of Newlands House	316112	646559	5 km
SM3074	Callands House,earthwork S of	315931	644839	5 km
SM3075	Upper Kidston,fort & settlement NNW of	322381	643246	5 km
SM3158	Green Knowe,cairn NE of	321677	644040	5 km
SM3165	White Meldon,enclosures W of	321421	642900	5 km
SM3171	Sheriff Muir, cairn	320168	640231	5 km
SM3212	South Hill Head,settlement WNW of	321471	641955	5 km
SM3237	Harehope,earthwork SW of	319876	643945	5 km
SM3269	Meldon Bridge,pit alignment 250m W of	320514	640454	5 km
SM3527	Jeffries Corse,cairn	328127	649539	5 km
SM3790	Harehope,earthwork 550m NNE of	320173	644696	5 km
SM3998	Nether Stewarton, settlement 850m W of	321084	645564	5 km
SM4624	Upper Whitfield,enclosures 375m SE and 350m ESE of	317745	653844	5 km
SM6065	Bents Quarry, lime kilns and quarry	318449	652010	5 km
SM731	Northshield Rings,fort,The Camps	325724	649329	5 km

Table 1.2: Listed Buildings within 5 km Study Area to be included in EIA Report

HES Ref	Name	Category	X	Y	Study Area
157	The Horse Shoe Inn, Eddleston	C	324304	647202	5 km
2020	Eddleston Parish Church And Graveyard	B	324396	647201	5 km
2021	Moredun, And Adjoining 2 Cottages (Glen Nevis And Old School House)	B	324330	647212	5 km
2022	Eddleston Village Nos. 1-23 And 2-22. Station Road	B	324170	647080	5 km
2023	Eddleston Bridge Eddleston	C	324201	646978	5 km
2035	Cringletie House, Including Lodges, Walled Garden, Sundial And Dovecot	B	323481	644540	5 km
2037	Portmore	A	325044	648832	5 km
2038	Entrance Gateway And Lodge, Portmore	C	324426	648511	5 km
2039	Old Harehope	B	320017	644176	5 km
2040	Black Barony Hotel	B	323639	647269	5 km
2041	Ice House, Black Barony.	B	323670	647351	5 km
2042	Summerhouse, Black Barony	B	323490	647289	5 km
2043	Bellevue Temple In Former Policies Of Black Barony.	C	323256	647051	5 km
8334	Paulswell Farmhouse And Steading	C	315947	649308	5 km
8337	Castlecraig, Entrance Gates And Twin Lodges.	B	313917	644507	5 km
8361	Spitalhaugh House Including Stable And Bridge	A	316270	649662	5 km
13862	Newlands Parish Church	B	316137	646724	5 km
13863	Drochil Castle	A	316199	643480	5 km
13896	Hallyne House	B	319236	640541	5 km
13898	Smithy Cottages, Near Whim	C	321269	653097	5 km
15136	Newlands Manse	B	316135	646603	5 km
15137	Newlands Old Kirk	B	316124	646564	5 km
15138	Mackay Of Scotstoun Tomb In Kirkyard	B	316107	646550	5 km
15139	Bridgend Cottage And Camitswalls	B	316067	646676	5 km
15140	Newlands Bridge	B	316042	646650	5 km
15141	Old Romanno Bridge Over The Lynne Water	B	315954	647986	5 km
15142	The Steak House Romanno Bridge	B	316058	648043	5 km
15150	Cistern, In Policies Of Whim House	C	321426	653412	5 km
15151	Cowden Lodge At Drive Entrance To Whim House	B	321469	653326	5 km
15152	Flemington Tower	B	316680	645161	5 km
15166	Romanno Bridge Hotel And Adjoining House And Two Cottages	B	316089	648003	5 km
15169	Scotstoun House	B	314201	645415	5 km
15170	Stable Square, Scotstoun	C	314269	645324	5 km
15171	Drochil Castle Farm House	C	316303	643463	5 km
15172	Tarth Bridge Over Tarth Water	C	316406	642921	5 km

HES Ref	Name	Category	X	Y	Study Area
15173	Macbiehill Gateway And Lodge	B	318898	651543	5 km
15174	Beresford Burial Vault	C	319034	651670	5 km
15175	Lower Grange	C	319628	652019	5 km
15176	Lamancha	B	319949	652255	5 km
15177	Sundial, Lamancha	A	319954	652238	5 km
15178	Entrance Gateway, Lamancha	B	320198	652060	5 km
15179	Madrisa Farmhouse And Steading, Lamancha	C	320599	652317	5 km
15180	Whim House (Now The White House Hotel)	B	321353	653688	5 km
15181	Ice House, In Policies Of Whim House	B	321389	653513	5 km
15182	Dovecot, Whim House	C	321513	653447	5 km
15208	Edston Toll (Also Known As Lyne Toll)	C	321139	640106	5 km
15209	Rosetta House	B	324394	641403	5 km
15210	Rosetta, Walled Garden And Garden Building	C	324366	641341	5 km
15211	Chapelhill Farmhouse And Courtyard Farm Buildings	B	324528	642165	5 km
15212	Chapel Hill Bridge	B	324656	642187	5 km
15213	Winkston Farm House	B	324489	643051	5 km
15214	Winkston Tower House	B	324496	643070	5 km
15215	Redscarhead, George Meikle Kemp Memorial (At Moy Hall)	B	323990	644033	5 km
15357	Lyne Parish Church	B	319178	640524	5 km
15358	The Beggar Path Bridge	B	320126	640455	5 km
15375	Brownsland	C	316904	641342	5 km
19665	Lyne Viaduct	B	320946	640006	5 km
19717	Romanno Toll	B	316073	648013	5 km
19722	Romanno Post Office And Adjoining Range	B	316089	648072	5 km
19723	Halmyre House	B	317458	649640	5 km
19724	Court Of Offices, Whim House	A	321402	653578	5 km
19728	Rosetta Stables	B	324363	641453	5 km
19741	Lynesmill Bridge	B	320926	640096	5 km
19742	Five Mile Bridge	B	318589	640764	5 km
19744	Wester Happrew	C	317129	641818	5 km
48932	Standalane Cottage	C	324452	641633	5 km
51628	Spitalhaugh, Doocot House	C	316205	649693	5 km
51957	Barony Castle Hotel, The Great Polish Map Of Scotland	B	323653	647177	5 km

Table 1.3: Conservation Areas within 5 km Study Area to be included within the EIA Report

HES Ref	Name	X	Y	Study Area
CA603	Eddleston	324240	647124	2.81 km E

Table 1.4: Inventory Garden and Designed Landscape within 5 km Study Area to be included within the EIA Report

HES Ref	Name	X	Y	Study Area
GDL00318	Portmore	325183	649693	3.5 km E

Table 2.1: Scheduled Monuments between 5-10 km to be Included in Assessment

HES Ref	Name	X	Y	Distance and Direction
SM1157	The Gowk Stane 730m ENE of Auchencorth	320400	657642	6.5 km N
SM2441	Cademuir Hillfort	323009	637472	7.56 km SE
SM2681	Horsburgh Castle Farm, settlement 930m NNW of Castle Hill	329158	640068	9.43 km SE
SM2715	Cademuir Hillfort	322448	637084	7.99 km S
SM2787	Castlehill Tower	321425	635455	9.42 km S
SM2789	Old Deepsykehead long cairn	317977	654648	5.9 km NW
SM2905	Blyth cairn	312841	646749	6.5 km W
SM2950	Easter Dawyck, fort & settlement	319741	637288	8.9 km S
SM2990	Blyth Hillfort	312432	645756	6.6 km W
SM3039	Venlaw Castle Hotel settlement	325940	641654	5.96 km SE
SM3045	Bellanrig settlement, fort & enclosures	323545	637958	7.3 km S
SM3068	Syke Hill fort	320155	638064	7.29 km W
SM3247	Cock Rig to Linton Muir Roman road	314838	654162	7.4 km NW
SM3263	Hardgatehead Roman road and turnpike road	312556	649873	7.3 km W
SM5742	South Slipperfield, barrows	312672	649501	7.5 km

Table 2.2: Conservation Areas between 5-10 km to be Included in Assessment

HES Ref	Name	Listed Buildings	X	Y	Distance and Direction
CA622	Peebles Conservation Area	4 x Category A 58 x Category B 105 x Category C	325196	640356	5.67 km SE
CA631	West Linton Conservation Area	1 x Category A 5 x Category B 7 x Category C	314940	651682	6.34 km W
CA338	Howgate Conservation Area	1 x Category B 1 x Category C	324874	658053	7.25 km N
CA594	Carlops Conservation Area	17 x Category B 11 x Category C	316108	655901	7.32 km NW
CA344	Penicuik Conservation Area	8 x Category A 18 x Category B 25 x Category C	323658	659772	8.03 km N

Table 2.3: Category A Listed Buildings between 5-10 km to be Included in Assessment

HES Ref	Name	Category	X	Y	Distance and Direction
13857	Neidpath Castle, Entrance Gateway To Courtyard	A	323646	640512	5.16 km SSE
13857	Neidpath Castle, Courtyard Buildings (South Range)	A	323641	640484	5.16 km SSE
13857	Neidpath Castle	A	323618	640487	5.16 km SSE
13857	Neidpath Castle, Walled Garden	A	323722	640558	5.16 km SSE

Table 2.4: Category B Listed Buildings between 5-10 km to be Included in Assessment

HES Ref	Name	Category	X	Y	Distance and Direction
15348	Haswellsykes	B	320798	639302	5.71 km S
15361	Barns House	B	321628	639246	5.40 km S
15363	Barns Tower	B	321520	639133	5.40 km S
15368	Hallyards	B	321618	637563	7.45 km SE
15369	Hallyards, Sundial	B	321579	637584	7.45 km SE
15370	Hallyards, Statue	B	321647	637583	7.45 km SE
19729	Peebles, Edinburgh Road, Venlaw Castle Hotel	B	325287	641236	6 km SE

Table 2.5: Category C Listed Buildings between 5-10 km to be Included in Assessment

HES Ref	Name	Category	X	Y	Distance and Direction
15359	Kirkton Manor, Manor Parish Church	C	322022	637984	6.8 km SE

By email: HeatherK@arcusconsulting.co.uk

Heather Kwiatkowski
Principal Heritage Consultant
Arcus Consultancy Services Ltd
7th Floor
144 West George Street
Glasgow
G2 2HG

Longmore House
Salisbury Place
Edinburgh
EH9 1SH

Ruth.Cameron@hes.scot
T: 0131 668 8657

Our case ID: 300039684

01 March 2021

Dear Heather Kwiatkowski

Cloich Forest Wind Farm, Scottish Borders - Final selection of heritage assets to be included for indirect assessment

Thank you for consulting HES on the above. We have reviewed the details you provided, and our comments here focus on our historic environment interests. This covers scheduled monuments and their settings, category A listed buildings and their settings, Inventory battlefields, Inventory gardens and designed landscapes, World Heritage Sites, and marine archaeology.

If you have not already done so, we recommend also consulting with Scottish Borders Council on these details. Their archaeology and conservation services may also wish to offer advice, and this may include issues which are outwith our interests – such as category B and C listed buildings, or unscheduled archaeology.

We are generally content with the principle of selecting sensitive assets between 5 and 10 km for assessment of setting impacts. However, the list provided does not include some assets which we consider may be affected.

Specifically, there are a number of scheduled forts to the south of the development area on the south side of the Tweed running along the hills between Stobo and Cademuir. These may fall slightly beyond the 10km area of consideration. Whether or not this is the case, an assessment of impacts on them would be helpful for our interests.

The details of these scheduled monuments are as follows:

- Cademuir Hill, fort 1800m WSW of (SM 2715)
- Easter Dawyck, fort & settlement 730m ESE of (SM 2950)
- Woodhouse Hill, fort (SM 3051)
- Kerr's Knowe, fort (SM 3059)
- Syke Hill, fort (SM 3068)

At this stage, it appears that the impact of turbines behind the Meldons may disrupt the relationship between these forts and the Meldons. If there is any inter-visibility between

the smaller southern forts and the Meldons then it is likely that these forts made reference to them – and inform how they are understood, appreciated and experienced today.

Our search for additional sites has not been exhaustive and we would expect any monument in the 5-10km zone with inter-visibility with the wind farm to be considered. Impacts may not be focussed solely on the direct relationship between the individual monuments and the turbines but rather on the relationships with other sites between them and the turbines.

We hope that this advice is helpful to you. If you would like to discuss this letter, please contact Ruth Cameron, who is the case officer for this proposed development, and whose details are given above.

If you would like to submit any further details on this or any other proposed development, please use our consultations mailbox – hmconsultations@hes.scot.

Yours sincerely

Historic Environment Scotland

ARCUS

CLOICH FOREST WIND FARM

VOLUME 3: TECHNICAL APPENDICES

TECHNICAL APPENDIX A6.3: SETTING ASSESSMENT

JUNE 2021

Prepared By:

Arcus Consultancy Services

7th Floor
144 West George Street
Glasgow
G2 2HG

T +44 (0)141 221 9997 l **E** info@arcusconsulting.co.uk
w www.arcusconsulting.co.uk

Registered in England & Wales No. 5644976

TABLE OF CONTENTS

6 SETTING ASSESSMENT

6.1 INTRODUCTION

The Development represents a re-design of the consented Cloich Forest Wind Farm ('the Consented Scheme'), which was granted S36 consent and deemed planning permission following a Public Local Inquiry (PLI), on 8 July 2016 (Planning and Environmental Appeals Division (DPEA) Reference: WIN-140-1).

The assessment of indirect effects considers changes to setting to designated and regionally significant heritage assets within the Core Study Area (CSA), 5 km Study Area, and selected designated assets beyond 5 km.

Where appropriate, these have been assessed in groups based upon proximity as detailed in the relevant sections below and in Technical Appendix A6.3.

The assessment is presented in the following order:

- Designated Heritage Assets within the CSA as shown on EIA Report Figures 6.1 and 6.2;
- Scheduled Monuments within the 5 km Study Area as shown on EIA Report Figure 6.2;
- Selected Scheduled Monuments beyond the 5 km Study Area as shown on EIA Report Figure 6.3;
- Garden and Designed Landscapes as shown on EIA Report Figure 6.2;
- Listed Buildings and Conservation Areas within the 5 km Study Area as shown on EIA Report Figure 6.2; and
- Selected Listed Buildings and Conservation Areas beyond 5 km Study Area as shown on EIA Report Figure 6.3.

6.2 ASSESSMENT OF DESIGNATED HERITAGE ASSETS WITHIN THE CSA

Within the CSA, there are three prehistoric Scheduled Monuments as shown on EIA Report Figures 6.1 and 6.2 and detailed in Table A6.3.1. One significant effect has been identified at Whaup Law Cairn (SM2755) due to its elevated position within the site with no significant effects identified at the other scheduled monuments due to the limited contribution of setting, having been planted over with forestry.

Table A6.3.1: Designated assets within the CSA Assessment Summary

HES Ref.	Name	x	y	Sensitivity	Magnitude of Change	Significance of Effect
SM2755	Whaup Law, cairn	320840	648009	High	Moderate	**Moderate and Significant**
SM2756	Ring enclosures 550m and 595m WNW of Kilrubie Hill	320861	647090	High	Slight	Minor and Not Significant
SM3998	Nether Stewarton, settlement 850m W of	321084	645564	High	Negligible	Negligible and Not Significant

SM2755 Whaup Law, Cairn

SM2755 Whaup Law, Cairn					
Designation	Scheduled Monument	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	0.2 km E T8 (Figure 6.2)
Figure / Plate	Figures 6.1, 6.2, and 6.11, Plate 1				
Summary of Asset and Cultural Significance	The monument comprises of a round funerary prehistoric cairn, approximately 12 m in diameter and a height of 0.75 m on the summit of Whaup Law. At the summit, there is also a modern cairn marker which is presumed to have been built from stone from the monument. The monument is culturally significant as it has the potential to enhance our understanding regarding funerary and ritual practices during the prehistoric period. Whilst stones may have been borrowed for the modern cairn, it is still largely intact with probable associated funerary archaeological deposits.				
Definition of Setting and Contribution to Cultural Significance	The most important elements of setting for the cairn are its relationship with the surrounding landscape and likely contemporary prehistoric assets. The setting of the monument is its elevated position at the summit of Whaup Law with similar elevation of summits to the north (Peat Hill on which stands another cairn but undesignated and impacted by forestry), south (Ewe Hill) and west (Wether Law where another scheduled cairn is sited). Key setting views, if available without forestry, would be northwards and westwards towards other cairns with more uninterrupted long distance views eastwards across the lower elevations and tributaries leading down to Eddleston Water. These views and connections are no longer readily appreciable due to the surrounding commercial forestry plantation which hinders the cairn's connection with the wider landscape. Due to the introduction of modern forestry plantation combined with landscape changes during the post-medieval and modern periods, the monument's current setting has been greatly altered limiting to some extent the appreciation of the prehistoric landscape and connectivity to other prehistoric assets. The cairn is a substantial mound within a small clearance within the forestry with views in all directions screened by trees. As such, the contribution of setting to the cairn's cultural significance has been diminished as it is no longer a prominent feature in the modern landscape with views from the hill top obscured by forestry in various states of growth and felling which also limits views towards the cairn.				
Magnitude of Change to Cultural Significance	The Development, more specifically turbine 8 and track are located approximately 200 m west of the monument on the western side of the summit of Whaup Law. One of the key design considerations was ensuring that turbines were kept westwards of Peat Hill and Whaup Law, in line with the previously consented layout, to maintain the field of view between these two hill tops (even though this cannot currently be appreciated due to forestry). As a result of the Development, the proposed forestry restocking plan includes mitigation for the cairn which would open up the forestry at the top of Whaup Law towards T8 in order to re-establish the visual connection between the Whaup Law Cairn and Wether Hill Cairn as well as other prehistoric monuments in the Meldon Valley. Whilst opening up and not replanting this area is beneficial for understanding prehistoric land use and heritage asset distribution, it would still be seen in the context of surrounding commercial forestry with the addition of modern turbines. Whilst there are now fewer turbines in and around Whaup Law from the consented wind farm and no turbines in long distance views eastwards, the turbines are taller with T8 situated on the western summit of Whaup Law which would be visible within the open area and detract from the perceived dominance of the hill top and cairn. Whilst there would still be commercial forestry on the slopes of Whaup Law surrounding the monument, the height of the turbines would change the appreciation and experience of the monument with the benefit of a more open setting around the cairn but within the context of a modern wind farm. On balance, the magnitude of change to the cultural significance is considered moderate.				

SM2755 Whaup Law, Cairn	
Statement of Significance of Effect	As a heritage asset of high sensitivity with a moderate change to cultural significance, there is a moderate effect upon the heritage asset as a result of the Development. This is **significant** in terms of the EIA Regulations.

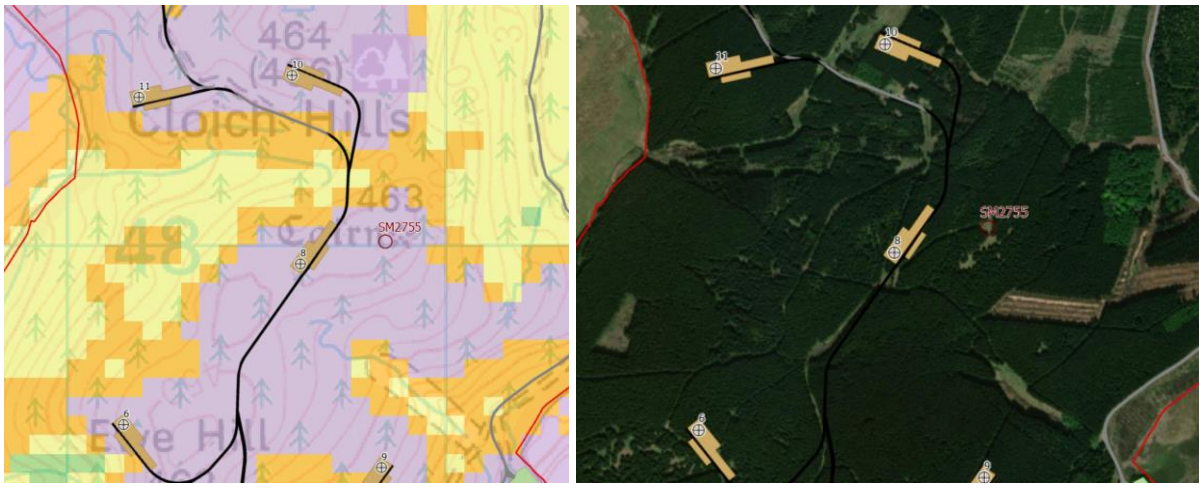


Plate 1: Close up of SM2755 from Figure 6.3 with infrastructure added on left with aerial photograph on right

SM2756 Ring enclosures 550m and 595m WNW of Kilrubie Hill

SM2756 Ring enclosures 550m and 595m WNW of Kilrubie Hill					
Designation	Scheduled Monument	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	0.2 km NW T5 (Figure 6.2)
Figure / Plate	Figures 6.1 and 6.2, Plate 2				
Summary of Asset and Cultural Significance	The monument comprises of three prehistoric ring enclosures currently visible as earthen banks located on the lower south-east slopes of Ewe Hill on the north side of Courhope Burn. The monument is culturally significant as it has the ability to enhance our understanding of prehistoric settlement and land use within Scotland.				
Definition of Setting and Contribution to Cultural Significance	The most important elements of setting for the ring enclosures would be its relationship with the surrounding landscape and likely contemporary prehistoric assets. The setting of the monument is its elevated position to the north, above Courhope Burn on the lower slopes of Ewe Hill. Due to the introduction of commercial forestry which surrounds the designation on all sides, there is currently no real connection between the heritage assets and the landscape or other prehistoric assets. The monument's setting has been detrimentally altered by being surrounding by plantation which extends into the designation boundary so that in its current state, setting makes little to no contribution to its cultural significance. In the absence of the forestry, key views would likely be north-east and south-west along the Courhope Burn due to rising topography on either side of the burn.				
Magnitude of Change to Cultural Significance	The Development would surround the scheduled monument with turbines at higher elevations on either side of Courhope Burn but at similar locations to the previously consented wind farm with the access track located on the opposite side of Courhope Burn following the existing track alignment. Whilst the Development turbines are taller, the nature of the forestry surrounding the ring enclosures and within the designation boundary means that there is a sense of enclosure with no appreciation or connection to the surrounding landscape so that there is limited change to the setting. As a result of the Development, the proposed forestry restocking plan includes mitigation for the ring enclosures which remove the trees from within the designation boundary and not have these replanted in order to halt forestry operations within the designation boundary. Whilst opening up and not replanting this area is beneficial for understanding prehistoric land use and heritage asset distribution, modern forestry would still be planted around the designation so that the benefit is a direct effect rather than one that makes an appreciable difference to the setting. This change would preserve the cultural significance through the removal of trees with turbines on either side of the monument on higher ground albeit within the context of modern forestry plantations. As such, the magnitude of change is considered slight.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with a slight change to cultural significance, there is a minor effect upon the heritage asset as a result of the Development. This is **not significant** in terms of the EIA Regulations.				

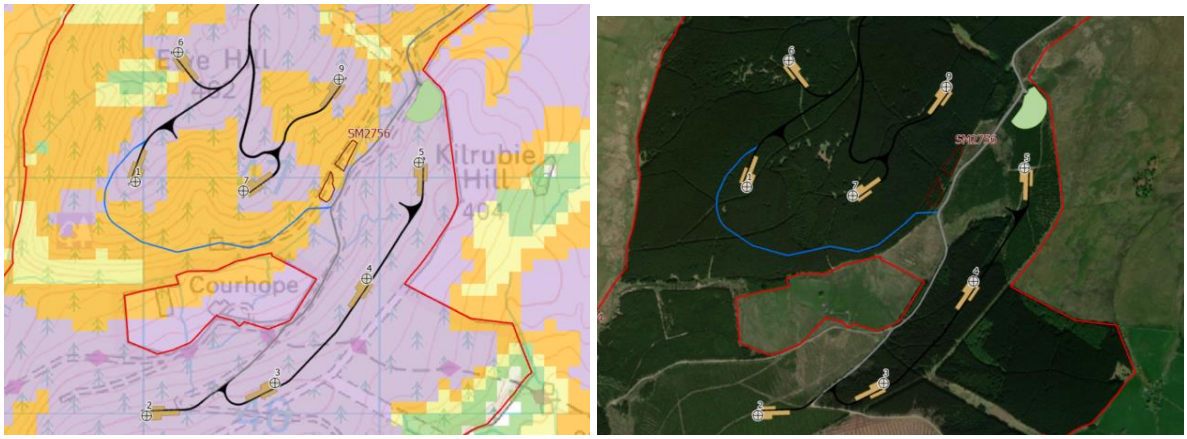


Plate 2: Close up of SM2756 from Figure 6.3 with infrastructure added on left with aerial photograph on right

SM3998 Nether Stewarton, settlement 850 m W of

SM3998 Nether Stewarton, settlement 850 m W of					
Designation	Scheduled Monument	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	0.7 km SE T3 (Figure 6.2)
Figure / Plate	Figures 6.1 and 6.2, Plate 3				
Summary of Asset and Cultural Significance	The monument comprises a prehistoric settlement that has been planted over with commercial forestry. It is located on the lower east facing slope of Crailzie Hill overlooking Harehope Burn and Stewarton Burn. The monument is culturally significant as it has the ability to inform us about prehistoric settlement and land use.				
Definition of Setting and Contribution to Cultural Significance	The most important elements of setting for the settlement would be its relationship with the surrounding landscape and likely contemporary prehistoric assets. The setting of the monument is its elevated position above the burns. Key views from the monument (if not obscured by forestry plantation) would be east and south along the waterways based on the south-easterly sloping topography. Due to the introduction of commercial forestry within and around the designation boundary, there is no discernible visual connection between the heritage asset and the landscape or other prehistoric assets. The monument's setting has been detrimentally altered by forestry planting so that the current setting makes little to no contribution to the asset's cultural significance. In the absence of forestry, the setting would likely extend southwards towards other known prehistoric assets situated in and around the Meldons, but with the current state of planting within the boundary, this is not appreciable on the ground.				
Magnitude of Change to Cultural Significance	The Development would be to the north of the monument, outwith key views and outwith the monument's important setting elements. As the monument has little to no connection with the landscape due to existing forestry and with a setting that is concentrated southwards, the magnitude of change to its cultural significance is negligible.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with a negligible change to cultural significance, there is a negligible effect upon the heritage asset as a result of the Development. This is **not significant** in terms of the EIA Regulations.				

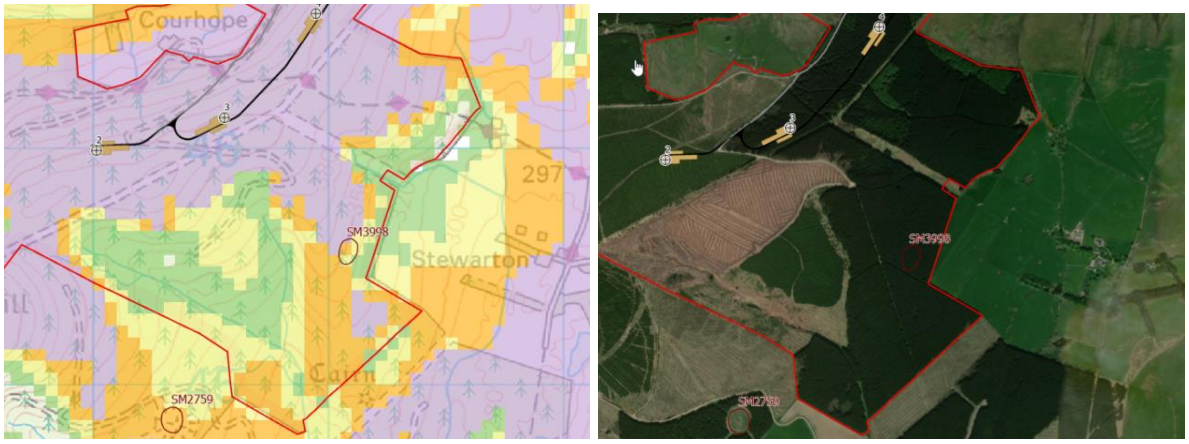


Plate 3: Close up of SM3998 from Figure 6.3 with infrastructure added on left with aerial photograph on right

6.3 SCHEDULED MONUMENTS WITHIN 5 KM STUDY AREA

Within the 5 km Study Area, there are a further 52 Scheduled Monuments as shown on EIA Report Figure 6.2 and detailed in Table A6.3.2. These have been assessed in numerical order by their HES designation number and in groups, where appropriate, as detailed in Table A6.3.2.

Within the 5 km Study Area, significant effects have been identified at six Scheduled Monuments at five locations generally focused around hillforts where long distance views contribute to cultural significance. These effects are summarised in Table A6.3.2 with the full detailed assessment in subsequent tables.

This Page Intentionally Left Blank

A6.3.2 Scheduled Monuments within 5 km Study Area Assessment Summary

Assessment Order and Group	HES Ref.	Title	X	Y	Sensitivity	Magnitude of Change	Significance of Effect
White Meldon Forts	SM114	Cairn and hill fort, White Meldon	321926	642836	High	Moderate	**Moderate and Significant**
White Meldon Forts	SM3075	Upper Kidston, fort & settlement NNW of	322381	643246	High	Moderate	**Moderate and Significant**
White Meldon Settlement and Enclosures	SM2711	White Meldon, platform settlement 640m NW of	321625	643372	High	Slight	Minor and Not Significant
White Meldon Settlement and Enclosures	SM2712	White Meldon, platform settlement 730m NNW of	321821	643569	High	Slight	Minor and Not Significant
White Meldon Settlement and Enclosures	SM3165	White Meldon, enclosures W of	321421	642900	High	Slight	Minor and Not Significant
NA	SM731	Northshield Rings, fort, The Camps	325724	649329	High	Slight	Minor and Not Significant
Lyne Water	SM1492	Lyne, Roman fort, annexes and fortlet	318792	640586	High	Negligible	Negligible and Not Significant
Lyne Water	SM1493	Easter Happrew, Roman fort	319471	640106	High	Negligible	Negligible and Not Significant
Lyne Water	SM1494	Lyne, Roman temporary camp	320070	640961	High	Negligible	Negligible and Not Significant
NA	SM1495	Drochil Castle	316195	643489	High	Negligible	Negligible and Not Significant
NA	SM2393	Terrace Wood, cultivation terraces	316249	647012	High	Negligible	Negligible and Not Significant
NA	SM2416	Milkieston Rings, fort	324771	645971	High	Slight	Minor and Not Significant
Harehope	SM2677	Harehope Rings, fort, Harehope Hill	319632	644574	High	Slight	Minor and Not Significant

Assessment Order and Group	HES Ref.	Title	X	Y	Sensitivity	Magnitude of Change	Significance of Effect
Harehope	SM2759	Harehope, palisaded settlement 730m NNE of	320337	644850	High	Slight	Minor and Not Significant
Harehope	SM3237	Harehope, earthwork SW of	319876	643945	High	Slight	Minor and Not Significant
Harehope	SM3790	Harehope, earthwork 550m NNE of	320173	644696	High	Slight	Minor and Not Significant
Whitfield / Deepskyehead	SM2678	Old Deepsykehead, enclosed cremation cemetery 270m SSE of	317520	653639	High	Negligible	Negligible and Not Significant
Whitfield / Deepskyehead	SM4624	Upper Whitfield, enclosures 375m SE and 350m ESE of	317745	653844	High	Negligible	Negligible and Not Significant
Whitfield / Deepskyehead	SM2789	Old Deepsykehead long cairn	317977	654648	High	Negligible	Negligible and Not Significant
NA	SM2703	Black Meldon, fort	320632	642529	High	Moderate	**Moderate and Significant**
NA	SM2737	Black Meldon, settlement and scooped homestead 550m E of	321195	642553	High	Negligible	Negligible and Not Significant
South Hill Head	SM2713	South Hill Head, homestead	322043	641619	High	Slight	Minor and Not Significant
South Hill Head	SM3212	South Hill Head, settlement WNW of	321471	641955	High	Slight	Minor and Not Significant
Sheriff Muir	SM2718	Sheriff Muir Cottages, standing stones 520m W of	320095	640058	High	Negligible	Negligible and Not Significant
Sheriff Muir	SM3171	Sheriff Muir, cairn	320168	640231	High	Negligible	Negligible and Not Significant
Romanno Mains	SM2728	Romanno Mains, two barrows 550m SE of	317537	647983	High	Slight	Minor and Not Significant
Romanno Mains	SM2730	Romanno Mains, barrow 910m SE of	317860	647828	High	Slight	Minor and Not Significant

Assessment Order and Group	HES Ref.	Title	X	Y	Sensitivity	Magnitude of Change	Significance of Effect
Fingland/Flemington Burn	SM2732	Drum Maw, settlement 780m SE of	318188	646496	High	Slight	Minor and Not Significant
Fingland/Flemington Burn	SM2733	Romanno Hope, barrow & enclosures S of	318539	646701	High	Slight	Minor and Not Significant
NA	SM2734	Green Knowe, two ring enclosures & barrow 550m SSE of	319192	646349	High	Moderate	**Moderate and Significant**
Whiteside Hill Ring Enclosures	SM2735	Whiteside Hill, ring enclosures 820m SE of	317546	645793	High	Slight	Minor and Not Significant
Whiteside Hill Ring Enclosures	SM2821	Flemington, ring enclosures 840m NE of	317326	645704	High	Slight	Minor and Not Significant
NA	SM2955	Whiteside Hill, fort & enclosure	316819	646121	High	Moderate	**Moderate and Significant**
Hamildean Hill	SM2736	Hamildean, homestead 1140m NE of	319422	642387	High	Slight	Minor and Not Significant
Hamildean Hill	SM2957	Hamildean Hill, fort	318732	641994	High	Slight	Minor and Not Significant
NA	SM2738	Wether Law, cairn	319465	648376	High	Moderate	**Moderate and Significant**
Green Knowe	SM2760	Green Knowe, platform settlement	321198	643312	High	Slight	Minor and Not Significant
Green Knowe	SM2912	Harehope, cairn 1510m ESE of	321382	643508	High	Slight	Minor and Not Significant
Green Knowe	SM3158	Green Knowe, cairn NE of	321677	644040	High	Slight	Minor and Not Significant
NA	SM2774	Cavarra Hill, settlement	325810	645522	High	Slight	Minor and Not Significant
Dundreich and Jeffries Corse	SM2777	Dundreich, cairn	327464	649091	High	Slight	Minor and Not Significant

Assessment Order and Group	HES Ref.	Title	X	Y	Sensitivity	Magnitude of Change	Significance of Effect
Dundreich and Jeffries Corse	SM3527	Jeffries Corse, cairn	328127	649539	High	Slight	Minor and Not Significant
Henderland and Bordland	SM2840	Henderland Hill, fort	314958	645977	High	Negligible	Negligible and Not Significant
Henderland and Bordland	SM3010	Bordland Rings, fort, Bordlands Hill	315605	646333	High	Negligible	Negligible and Not Significant
NA	SM2940	Wormiston, cairn 360m NNW of	323221	646002	High	Negligible	Negligible and Not Significant
Happrew and Torbank	SM3027	Tor Hill, fort 600m WNW of Torbank	317531	640931	High	Slight	Minor and Not Significant
Happrew and Torbank	SM2944	Wester Happrew, fort 360m NW of	316821	642125	High	Slight	Minor and Not Significant
Drochil and Callands	SM2956	Drochil Castle, fort & enclosure 1190m NNW of	315698	644672	High	Slight	Minor and Not Significant
Drochil and Callands	SM3074	Callands House, earthwork S of	315931	644839	High	Slight	Minor and Not Significant
NA	SM3071	Newlands Church and graveyard, 50m SW of Newlands House	316112	646559	High	Negligible	Negligible and Not Significant
NA	SM3269	Meldon Bridge, pit alignment 250m W of	320514	640454	High	Negligible	Negligible and Not Significant
NA	SM6065	Bents Quarry, lime kilns and quarry	318449	652010	High	Negligible	Negligible and Not Significant

White Meldon and Upper Kidston Forts

SM114 Cairn and hill fort, White Meldon **SM3075 Upper Kidston, fort & settlement NNW of**					
Designation	Scheduled Monuments	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	3.5 km SE T3
Figure / Plate	Figures 6.2 and 6.5, Plate 4				
Summary of Asset and Cultural Significance	The forts are located on the eastern side of Meldon Burn on White Meldon (Figure 6.2). White Meldon fort and cairn (SM114) lies at the summit with the Upper Kidston fort (SM3075) located on a slightly lower knoll to the north-east. White Meldon fort's (SM114) strategic location on the summit overlooking both Meldon Valley and Eddleston Valley indicates that it was a major strategic and political centre of the Iron Age. It survives as a sequence of enclosures surrounding traces of timber roundhouses. Whilst there are several gaps in the walls of the enclosures, the NNE and SSW have been identified as the entrances[1]. Upper Kidston Fort (SM3075) lies to the north-east at a slightly lower elevation to White Meldon Fort on a small knoll. It has a single rampart bank and ditch and an entrance to the north-west with three house platforms in the interior. These forts are culturally significant representing elevated visual defensive settlements associated with the continuity of prehistoric occupation on White Meldon. The forts inform our understanding of prehistoric settlement and land use, most notably social, political, and economic links within the Tweed Valley.				
Definition of Setting and Contribution to Cultural Significance	The setting of White Meldon fort (SM114) is defined by its prominent location, allowing for the control and protection of the land and routes through north/south running Meldon Valley and Eddleston Valley which run into the Tweed Valley further to the south. At a slightly lower elevation to the north, Upper Kidston fort is not quite as prominent more orientated for view northwards over the Meldon Valley and eastwards over Eddleston Valley. The relationship to one another and adjacent contemporary sites, in and around the north/south running Meldon Valley, would have defined the prehistoric community in the valley and is indicative of patterns of land use that are reflective of the prehistoric political, social and economic landscape of the valley. The strategic relationship of White Meldon Fort (SM114) to Black Meldon fort (SM2703) which lies on the opposite summit to the west would have served to dominate the routes into and out of Meldon Valley. Relationships and intervisibility of White Meldon and Upper Kidston with other hill forts, notably Harehope Hill (SM2677) to the north-west, the Cademuirs to the south (SM2441, SM2715), Milkieston Rings to the east (SM2416), and Whiteside Hill to the west (SM3051) would have further reinformed the dominance of this society over the Eddleston and Tweed Valleys. Key views are between the scheduled monuments in and around the Meldon Burn (such as the settlements on the Meldons and at Harehope Hill) as this represents the immediate associated and supportive occupation of the Meldon forts. Views between contemporary forts helped to control the valleys such as Black Meldon (SM2703) to the west overlooking Meldon Valley, Milkieston Ring Forts (SM2416) to the east overlooking Eddleston Valley, and other forts to the south at Cademuir Hill (SM2441, SM2715) overlooking Tweed Valley. As such, these views also contribute to the appreciation of intervisibility between prehistoric hill forts, reflective of prehistoric settlement and land use.				
Magnitude of Change to Cultural Significance	Given the White Meldon and Upper Kidston's prominent location, all 12 turbines will be visible from the summit with visibility reducing somewhat as one travels to the lower elevations on the slopes of White Meldon.				

[1] Lock, G. and Ralston, I. 2017. Atlas of Hillforts of Britain and Ireland. [Online] Available at: https://hillforts.arch.ox.ac.uk. (Accessed 22/03/2021)

SM114 Cairn and hill fort, White Meldon **SM3075 Upper Kidston, fort & settlement NNW of**	
	The Development would be situated 3.5 km north of the monument in a part of the landscape that no longer retains its historic landscape character of open moorland but is characterised by modern commercial forestry in varying states of felling and regrowth (Figure 6.5). As shown on the viewpoint (Figure 6.5), there are no further hills visible beyond the forestry to the north in the same line of sight as the turbines so that the Development will not impinge on any key views between other hill forts (located generally to the south and east on either side of key lowland valley corridors) though may backcloth views from these other forts towards White Meldon. The Development would be readily visible and prominent in the landscape to the north albeit in a part of the landscape that is retains little prehistoric character due to the introduction modern commercial forestry which obscures views towards the prehistoric assets that survive within the site (most notably Whaup Law Cairn SM2755). The introduction of modern turbines extending above the ridgeline and forestry in views northwards from the forts and across White Meldon from the south (noting that the consented scheme view was similar) is a moderate change to the appreciation or experience of the White Meldon heritage assets due to the views towards Harehope Hill (noting that these are currently obscured by forestry) which would contain turbines in periphery sightline and the backclothing of turbines in views towards the Meldons. This represents a moderate change to the cultural significance of the monuments.
Statement of Significance of Effect	As heritage assets of high sensitivity with a moderate magnitude of change to cultural, the effect is moderate. This is **significant** in terms of the EIA Regulations.

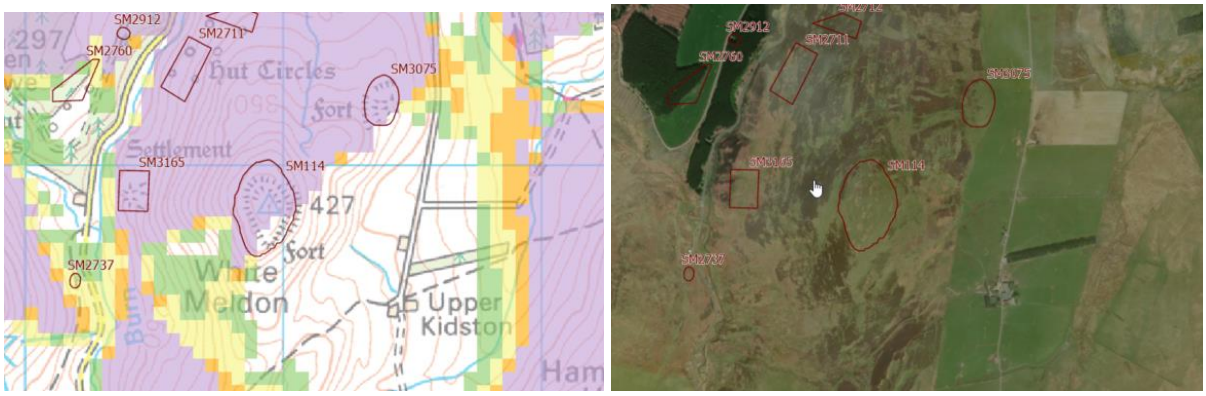


Plate 4: Close up of SM114 and SM3075 from Figure 6.3 on left with aerial photograph on right

White Meldon Platform Settlement and Enclosures

SM2711 White Meldon, platform settlement 640m NW of **SM2712 White Meldon, platform settlement 730m NNW of** **SM3165 White Meldon, enclosures west of**					
Designation	Scheduled Monuments	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	3.5 km SE T3
Figure / Plate	Figures 6.2 and 6.5, Plate 5				
Summary of Asset and Cultural Significance	All the prehistoric monuments are located on the eastern side of Meldon Burn on White Meldon (Figure 6.2). Scheduled settlement remains (SM2711, SM2712 and SM3165) are located on the lower elevations on the western slope of White Meldon below White Meldon fort (SM114) and above Meldon burn. Further downslope to the west of the summit and fort is the supporting settlement evidence in the form of hut platform settlements (SM2711, SM2712) and enclosures (SM3165) with other undesignated settlement evidence on the hill slopes. These sites on the slopes of the hill would have supported the fort as a strategic and defensive location. These monuments are culturally significant as a collection of assets representing continuity of prehistoric occupation on White Meldon with the ability to inform our understanding of prehistoric settlement and land use, most notably social, political, and economic support of the more elevated hill forts.				
Definition of Setting and Contribution to Cultural Significance	The setting of settlement evidence is as auxiliary settlement supporting the White Meldon fort (SM114), allowing for the control and protection of the land and routes through north/south running Meldon Valley which runs into the Tweed Valley further to the south. The relationship to one another and adjacent contemporary sites, in and around the north/south running Meldon Valley, would have defined the prehistoric community in the valley and is indicative of patterns of land use that are reflective of the prehistoric political, social and economic landscape of the valley. Key views are to the Black Meldon (SM2703) and White Meldon (SM114) forts and north/south along the Meldon Burn as this represents the immediate associated and supportive occupation of the Meldon Valley.				
Magnitude of Change to Cultural Significance	The Development would be situated 3.5 km north of the monument in a part of the landscape that no longer retains its historic character of open moorland but is characterised by modern commercial forestry in varying states of felling and regrowth. As the settlement evidence lies at lower elevations on the slopes of the White Meldon, the tops of the turbines would be visible behind the ridgeline to the north within the trees which extend downwards to the banks of the Meldon Burn (similar to that presented in Figure 5.2.5) but would not overly dominate the sightline due to the settlement remains being at lower elevations. The Development would be visible in the landscape to the north albeit in a part of the landscape that retains little prehistoric character due to the introduction of modern commercial forestry. The introduction of the tops of the turbines above commercial forestry in views northwards (noting that the consented scheme view was similar) is a slight change to the appreciation or experience of the assets as the surviving visibility of any prehistoric landscape context within this part of the landscape is limited and the turbines would be clearly associated with the more distant forestry context.				
Statement of Significance of Effect	As heritage assets of high sensitivity with a slight magnitude of change to cultural, the effect is moderate. This is **not significant** in terms of the EIA Regulations.				

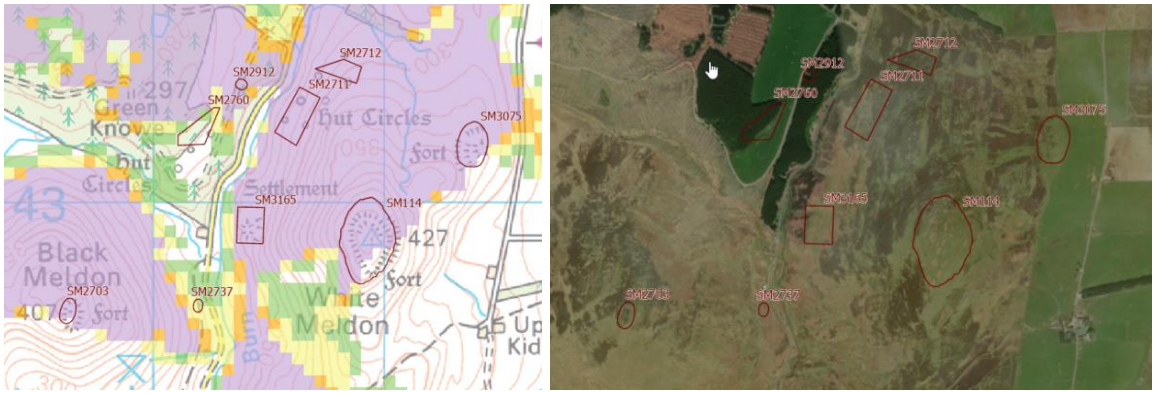


Plate 5: Close up of SM2711, SM2712, and SM3165 from Figure 6.3 on left with aerial photograph on right

SM731 Northshield Rings, fort, The Camps

SM731 Northshield Rings, fort, The Camps					
Designation	Scheduled Monument	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	5.1 km E T10
Figure / Plate	Figure 6.2, Plate 6				
Summary of Asset and Cultural Significance	The monument comprises of a fort and settlement dating to the prehistoric period, located on the high ground overlooking Eddleston Valley to the west and Portmore Loch to the north-east (Figure 6.2). It lies with a wooded area within the grounds of Portmore Gardens (GDL00318). The monument is culturally significant for the ability to inform our understanding of prehistoric settlement and land use, most notably social, political and economic links.				
Definition of Setting and Contribution to Cultural Significance	The setting of the monument is defined by its elevated position on the eastern side of the Eddleston Valley, which along with Milkieston Rig Fort (SM2416) to the south and White Meldon Fort (SM114) to the west would have formed part of the strategic defence of the Eddleston Valley, controlling and protecting the land and routes from the north into the Eddleston Valley to the Tweed Valley in the south. As such, views northwards contribute to the cultural significance. Other key elements of setting that contribute to its cultural significance is its association with the Eddleston Valley and contemporary sites within it. Eddleston valley is a relatively flat agricultural land that has seen settlement and cultivation for the past 1500 years so that much of the prehistoric landscape contemporary with the fort is largely obscured by later occupation. The fort's key relationship and intervisibility with other Iron Age hillforts, most notably Milkieston Fort (SM2416) to the south and White Meldon (SM114) and Upper Kidston (SM3075) forts to the south-west on the opposite side of the Eddleston Valley, also contribute to the cultural significance though intervisibility is largely obscured by the woodland surrounding it to the west and south-west that forms part of the Portmore GDL. From Dundreich Hill (SM2777) to the east towards the Development, the monument is not particularly visible as the overall field of view is extensive over the lower elevations of the Eddleston Valley.				
Magnitude of Change to Cultural Significance	The Development lies on the eastern side of the Eddleston Valley, 5.1 km west of the monument, in an area of woodland that is markedly different than the agricultural land at the base of the valley or the surviving historic upland moorland character (such as at White Meldon). The Development would not affect the relationship of the fort with the north/south running Eddleston Valley or				

SM731 Northshield Rings, fort, The Camps	
	intervisibility between the other key hillforts along the valley so that the key aspects of cultural significance are still readily appreciable. However, the introduction of tall modern turbines into views westwards (noting that the consented scheme's view was similar) represents a slight change to the cultural significance of the monument.
Statement of Significance of Effect	As a heritage asset of high sensitivity with a slight magnitude of change to cultural significance, the effect upon the heritage asset is minor. This is **not significant** in terms of the EIA Regulations.

Plate 6: Close up of SM731 from Figure 6.3 on left with aerial photograph on right

Lyne Water Group

SM1492 Lyne, Roman fort, annexes and fortlet (not in ZTV) **SM1493 Easter Happrew, Roman fort** **SM1494 Lyne, Roman Temporary Camp (not in ZTV)**					
Designation	Scheduled Monuments	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	5.3 km S T3
Figure / Plate	Figure 6.2, Plate 7				
Summary of Asset and Cultural Significance	The Lyne Roman fort (SM1492) and temporary camp (SM1494) are situated on the north side of the Lyne Water and are not in the ZTV (Figure 6.2). SM1492 comprises of a fort built in the late Antonine period, probably occupied for only a few years, and SM1494 is the remains of a Roman camp built to serve the Roman army as overnight or short-term accommodation. Happrew fort (SM1493) is situated on the south side of the Lyne Water and comprises of a former Roman fort, likely established during the Agricolan invasion. The monuments are culturally significant as they have the potential to enhance our knowledge of Roman military occupation in southern Scotland.				
Definition of Setting and Contribution to Cultural Significance	The setting of these monuments is defined by their strategic location above the Lyne Water which runs south-east/north-west and would have served as a means to monitor local tribes and control key thoroughfares through the valley and into the Tweed Valley. The setting of the monument contributes to its cultural significance as its placement within the landscape aids in the understanding of its strategic location for the Roman Army to try to control local tribes and key routes into and from the Tweed Valley. Views between these assets and east /west along the Lyne Water and eastwards into the Tweed Valley contribute to the cultural significance, aiding in the understanding of its strategic location.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but situated 5.3 km north of the assets, forming part of the wider landscape context. As shown on Figure 6.2, both SM1492 and SM1494 are outwith the ZTV and therefore the Development would not be visible. From SM1493 the Development would be visible in periphery views towards the Roman monuments to the north but not in the direct line of sight towards the camp and fort opposite. The Development would also not interfere with the north-west/south-east key views along the Lyne Water and towards the Tweed Valley. This represents a negligible change to the cultural significance of the monument.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with a negligible magnitude of change to cultural significance, the effect upon the heritage asset is negligible. This is **not significant** in terms of the EIA Regulations.				

Plate 7: Close up of SM1492, SM1493 and SM1494 from Figure 6.3 on left with aerial photograph on right

SM1495 Drochil Castle

SM1495 Drochil Castle					
Designation	Scheduled Monument	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	4.5 km SW T10 (not in ZTV)
Figure / Plate	Figure 6.2, Plate 8				
Summary of Asset and Cultural Significance	The monument comprises of the ruins of the medieval Drochil Castle, built around 1578 at the base of Drochil Hill above the Lyne Water (Figure 6.2). It was built as a large-scale fortified residence, with two parallel ranges of rooms set on each side of a broad central gallery to each floor, and with round towers at the diagonally-opposite north-east and south-west corners The monument is culturally significant for its architectural style and for its historical association, having been built by James fourth earl of Morton, who became Regent of Scotland in 1572.				
Definition of Setting and Contribution to Cultural Significance	The setting of the monument is its elevated position above the junction of the Lyne Water and Tarth Water, on the south-east slope of Drochil Hill. It is now entirely surrounded by foliage with a farm to its south. The setting of the monument contributes to the understanding of the defensive nature of the castle and importance of waterways as a means of navigating through the valleys.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but situated 4.5 km north-east in the wider landscape context. As shown on Figure 6.2, the Development would not be visible from the monument or in key views over the Lyne Water and Tarth Water. As such, there is no change to the cultural significance of the monument.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with no change to cultural significance, there is no effect upon the heritage asset. This is **not significant** in terms of the EIA Regulations.				

Plate 8: Close up of SM1495 from Figure 6.3 on left with aerial photograph on right

SM2393 Terrace Wood, cultivation terraces

SM2393 Terrace Wood, cultivation terraces					
Designation	Scheduled Monument	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	3.7 km W T1 (not in ZTV)
Figure / Plate	Figure 6.2, Plate 9				
Summary of Asset and Cultural Significance	The monument comprises of cultivation terraces which date to the prehistoric period adjacent to the B7059 road and bounded by Terrace Wood to the north, east and south (Figure 6.2). Although not part of the monument, to the east in Terrace Wood is recorded a 'little round fortification of earth and stone' however there are no visible traces at present. The monument is culturally significant as it has the ability to provide further information about prehistoric land use most notably farming practices				
Definition of Setting and Contribution to Cultural Significance	The setting of the monument is its position on the steeply sloping, west facing ridge above the Lyne Water. Due to the surrounding woodland, this confines its setting so that there is limited connection to the wider landscape. The setting contributes to its cultural significance as its placement within the landscape contributes to understanding of cultivation terraces of this period.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but situated 3.7 km east monument in part of the much wider landscape context. As shown on Figure 6.2, the Development would not be visible from the monument or in key views over the westward over the Lyne Water. As such, there is no change to the cultural significance of the monument.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with no change to cultural significance, there is no effect upon the heritage asset. This is **not significant** in terms of the EIA Regulations.				

Plate 9: Close up of SM2393 from Figure 6.3 on left with aerial photograph on right

SM2416 Milkieston Rings, fort

SM2416 Milkieston Rings, fort					
Designation	Scheduled Monument	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	3.8 km E T4
Figure / Plate	Figure 6.2 and 6.4, Plate 10				
Summary of Asset and Cultural Significance	Situated on the summit of Milkieston Hill, the monument comprises of a prehistoric fort which has been heavily quarried and robbed of stone. The fort comprises of two inner enclosures and two outer circuits. The monument is culturally significant as it has the ability to provide further information about prehistoric society, defensive settlement and land use.				
Definition of Setting and Contribution to Cultural Significance	The setting of the monument is defined by its elevated position on the eastern side of the Eddleston Valley (Figure 6.2), which along with Northshield Fort (SM731) to the north and White Meldon Fort (SM114) to the west would have formed part of the strategic defence of the Eddleston Valley, controlling and protecting the land and routes through the Eddleston Valley to the Tweed Valley in the south. The key elements of setting that contribute to its cultural significance is its association with the Eddleston Valley and contemporary sites within it. Eddleston valley is relatively flat agricultural land that has seen settlement and cultivation for the past 1500 years so that much of the prehistoric landscape contemporary with the fort is largely obscured by later occupation within the valley floor. The fort's key relationship and intervisibility with other Iron Age hillforts, most notably Northshield (SM2731) to the north and White Meldon (SM114) and Kidston (SM3075) forts to the south-west on the opposite side of the Eddleston Valley, also contribute to the cultural significance.				
Magnitude of Change to Cultural Significance	The Development lies on the eastern side of the Eddleston Valley, 3.8 km west of the monument, in an area of modern commercial forestry that is markedly different than the agricultural land at the base of the valley and the upland moorland that would have characterised the prehistoric period and survives at White Meldon (Figure 6.4). The Development would not affect the relationship of the fort with the north/south running Eddleston Valley. However, the Development would be visible in views westwards across the Eddleston Valley though direct sight lines between the other key hillforts along the valley most notably White Meldon (SM114) and Upper Kidston (SM3075) are uninterrupted and readily appreciable, as shown on Figure 6.4a, with turbines in right periphery view. The introduction of the turbines into this view (noting that the consented scheme view was similar) is a slight change to the appreciation or experience of the heritage asset. This represents a slight change to the cultural significance of the monument.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with a slight magnitude of change to cultural significance, the effect upon the heritage asset is minor. This is **not significant** in terms of the EIA Regulations.				

Plate 10: Close up of SM2393 from Figure 6.3 on left with aerial photograph on right

Harehope Hill Group

SM2677 Harehope Rings, fort, Harehope Hill **SM2759 Harehope, palisaded settlement 730m NNE of** **SM3237 Harehope, earthwork SW of** **SM3790 Harehope, earthwork 550m NNE of**					
Designation	Scheduled Monument	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	1.4 km S T2
Figure / Plate	Figures 6.2, 6.5b and 5.2.4b, Plate 11				
Summary of Asset and Cultural Significance	Harehope fort comprises of a prehistoric fort 58 m in diameter within a clearing in commercial forestry on Harehope Hill below Crailzie Hill (Figure 6.2). The fort has two entrances and contains traces of eleven circular house platforms. At lower elevation to east are Scheduled settlement remains (SM2759, SM3237, SM3790). All the prehistoric monuments are located on the south-east facing slopes of Crailzie Hill along the tributaries of Millhope Burn and Lyne Burn that feed into Meldon Burn and Meldon Valley to the east. Harehope fort's (SM2677) and nearby settlement remains (SM2759, SM3237, SM3790) would have formed part of the prehistoric occupation of the Meldon Valley, providing another strategic hillfort to Black Meldon (SM2706) and White Meldon (SM114) albeit at a slightly lower elevation. This fort and settlements on the slope of Crailzie Hill would have supported the Meldon forts as a strategic and defensive location. These monuments are culturally significant as a collection of assets representing continuity of prehistoric occupation in Meldon Valley with the ability to inform our understanding of prehistoric settlement and land use, most notably social, political and economic links.				
Definition of Setting and Contribution to Cultural Significance	The setting of the monuments is defined by their relationship to one another and adjacent contemporary sites in and around the Meldon Valley, which indicates strategic patterns of land use that are indicative of the prehistoric political, social and economic landscape in the valley, though with the exception of SM3237, all currently lie within clearings within commercial forestry plantation. Harehope Hill Fort is strategically located above Lyne Burn and Millhope Burn which feeds into Meldon Burn in the valley overlooking this slightly flatter landscape between it and White Meldon Fort (SM114) and Black Meldon fort (SM2703) to the south-east. The strategic relationships and intervisibility with other hill forts, notably the Meldon forts would have further reinformed the strategic dominance of this society over the Meldon Valley. Key views are south-easterly between the scheduled monuments in and around the Meldon Burn as this represents the immediate associated and supportive occupation of the Meldon Valley. Views between contemporary forts to the south-east, notably Black Meldon SM2703 and White Meldon (SM114) helped to control the key route through the Meldon Valley southwards into the Tweed Valley. As such, these views also contribute to the appreciation of intervisibility between prehistoric hill forts, reflective of prehistoric settlement and land use albeit their appreciation is diminished by the commercial forestry plantation which currently restricts intervisibility.				
Magnitude of Change to Cultural Significance	The Development is not within this setting but situated 1.4 km north in commercial forestry plantation. The Development would not affect the relationship of the fort with the Meldon Valley or interfere with key views from the fort towards the Melon forts (SM2703 and SM114). The Development would be visible in periphery views towards Harehope fort from the Meldons but not in the direct sightline from White Meldon (as shown in left hand side of Figure 6.5b) and Black Meldon (as shown in right hand side of Figure 5.2.4b). As such, the key sight lines between the monuments and from the fort to the south-east as well as between the key forts overlooking Meldon Valley are uninterrupted and readily appreciable. The introduction of the				

SM2677 Harehope Rings, fort, Harehope Hill **SM2759 Harehope, palisaded settlement 730m NNE of** **SM3237 Harehope, earthwork SW of** **SM3790 Harehope, earthwork 550m NNE of**	
	turbines into views northwards (noting that the consented scheme view was similar) is a slight change to the understanding, appreciation or experience of the heritage asset. This represents a slight change to the appreciation of the cultural significance of the monument.
Statement of Significance of Effect	As a heritage asset of high sensitivity with a slight magnitude of change in the experience of the heritage asset, there is a minor effect upon the heritage asset as a result of the Development. This is **not significant** in terms of the EIA Regulations.

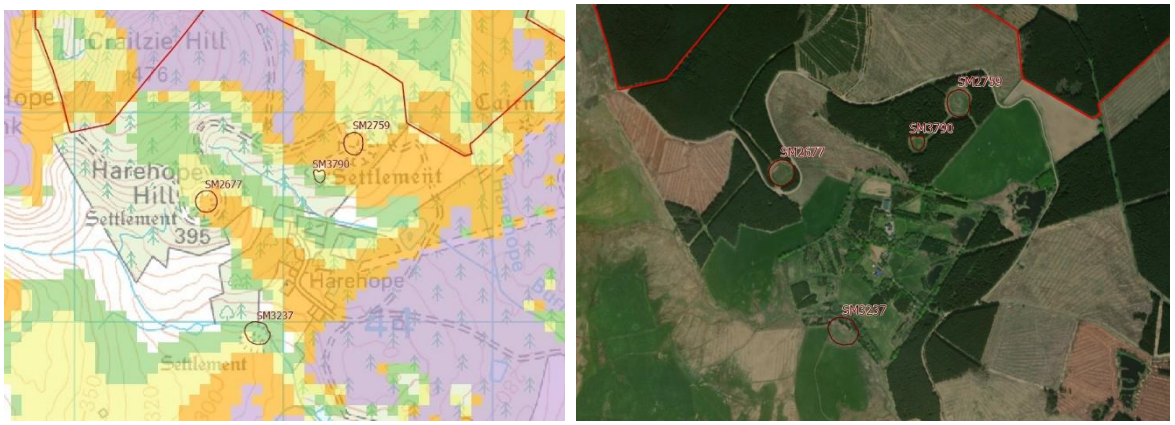


Plate 11: Close up of SM2677, SM2759, SM3237 and SM3790 from Figure 6.3 on left with aerial photograph on right

Whitfield / Deepsykehead Group

SM2678 Old Deepsykehead, enclosed cremation cemetery 270m SSE of; and SM4624 Upper Whitfield, enclosures 375m SE and 350m ESE of SM2789 Old Deepsykehead long cairn					
Designation	Scheduled Monuments	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	5.4 km NW T12
Figure / Plate	Figure 6.2, Plate 12				
Summary of Asset and Cultural Significance	These monuments are situated within Deepsyke Forest, on a ridge above the Cairn Burn to the south and Harlawmuir Burn to the north (Figure 6.2). SM2678 comprises of an enclosed cremation cemetery with three enclosures and dates to the prehistoric period. SM4624 consists of two circular encloses of similar character which are thought to either be cremation cemeteries dating to the same period as SM2678 or a Bronze Age/Iron Age house stance similar to one excavated at Douglasmuir. SM2789 comprises a long cairn burial mound. The monuments are culturally significant as they have the ability to aid our understanding of prehistoric funerary and ritual practices and potentially domestic architecture.				
Definition of Setting and Contribution to Cultural Significance	The setting of these monuments is defined by their elevated position above the Cairn Burn looking south-west downstream and above Harlawmuir Burn looking north-east. They are currently situated within woodland so that there is little to no visual connection with the wider landscape. The setting of these monument contributes to their cultural significance as it may play a ritualistic element, however due to surrounding woodland these connections are not currently appreciable.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but part of the wider landscape 5.4 km to the south-east of the monuments. There is limited to no connection between the monuments and its setting due to being surrounded by woodland. Should the woodland be felled, the Development would not interfere or obscure the relationship between the two monuments nor would it be visible in key views south-west down Cairn Burn or north-east down Harlawmuir Burn. This represents a negligible change to the cultural significance of the monument.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with a negligible magnitude of change to cultural significance, the effect upon the heritage asset is negligible. This is **not significant** in terms of the EIA Regulations.				

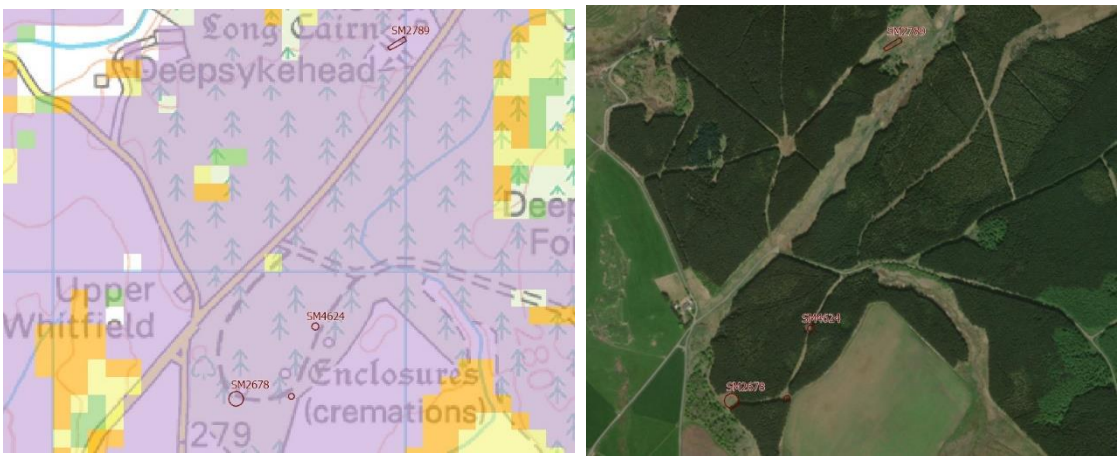


Plate 12: Close up of SM2678, SM4624 and SM2789 from Figure 6.3 on left with aerial photograph on right

SM2703 Black Meldon, fort

SM2703 Black Meldon, fort					
Designation	Scheduled Monument	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	3.6 km S T3
Figure / Plate	Figure 6.2 and 5.2.4c, Plate 13				
Summary of Asset and Cultural Significance	The fort (SM2703) is located on the western side of Meldon Burn at the summit of Black Meldon (Figure 6.2). The summit is approached from the west via the settlement as all other sides steeply fall to the ground offering natural defences. Black Meldon fort's (SM2703) strategic location on the summit overlooking the Meldon Valley indicates that it was part of the major strategic and political centre within Meldon Valley. The fort is culturally significant representing elevated visual defensive settlements associated with the continuity of prehistoric occupation in the Meldon Valley. The fort informs our understanding of prehistoric settlement and land use, most notably social, political, and economic links within the Tweed Valley.				
Definition of Setting and Contribution to Cultural Significance	Black Meldon Fort is strategically located on the summit but is not as prominent as White Meldon and is a smaller fort at a slightly lower elevation. Its location on the west side of Meldon Valley suggests its strategic importance in controlling the valley with key views eastwards across the valley to White Meldon (SM114) and north-west towards Harehope Hill Fort (SM2677). Key views are north/south along the Meldon Valley and Meldon Burn as this represents the immediate associated and supportive occupation of the Meldon Valley. Views between contemporary forts to the south-east, as well as White Meldon (SM114) to the east and Harehope Hill fort to the north-west (SM2677) helped to control the key route through the Meldon Valley southwards into the Tweed Valley. As such, these views also contribute to the appreciation of intervisibility between prehistoric hill forts, reflective of prehistoric settlement and land use.				
Magnitude of Change to Cultural Significance	The Development would not be in the direct sightline northwards up the Meldon Valley (Figure 5.2.4c) or interfere with key views from the fort towards White Meldon fort (SM114 slopes of which are shown on right hand side of Figure 5.2.4c) and Harehope fort (SM2677 shown on far right in Figure 5.2.4b)). However, the Development would be visible in on the western side of the Meldon Valley when looking northwards up the Meldon Valley as shown on Figure 5.2.4c. The Development appears in part of the landscape characterised by modern commercial forestry that is markedly different from the surviving prehistoric upland moorland context of the Meldons. The introduction of the turbines into this view (noting that the consented scheme view was similar) is an appreciable change to the understanding, appreciation or experience of the heritage asset. This represents a moderate change to the cultural significance of the monument.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with a moderate magnitude of change to cultural significance, the effect upon the heritage asset is moderate. This is **significant** in terms of the EIA Regulations.				

Plate 13: Close up of SM2678, SM4624 and SM2789 from Figure 6.3 on left with aerial photograph on right

SM2737 Black Meldon, settlement and scooped homestead 550 m E of

SM2737 Black Meldon, settlement and scooped homestead 550 m E of					
Designation	Scheduled Monument	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	3.6 km S T3
Figure / Plate	Figure 6.2, Plate 14				
Summary of Asset and Cultural Significance	The Black Meldon settlement lies at lower elevations to the east of Black Meldon fort (SM2703) on the eastern slope of Black Meldon above the burn (Figure 6.2). Black Meldon fort's (SM2703) strategic location on the summit overlooking the Meldon Valley indicates that it was part of the major strategic and political centre within Meldon Valley. The settlement (SM2737) on the slopes of the hill would have supported the fort as a strategic and defensive location. This monument is culturally significant as is represents continuity of prehistoric occupation on Black Meldon with the ability to inform our understanding of prehistoric settlement and land use, most notably social, political, and economic support of the more elevated hill forts.				
Definition of Setting and Contribution to Cultural Significance	The setting of settlement evidence is as auxiliary settlement supporting the Black Meldon fort (SM2703), allowing for the control and protection of the land and routes through north/south running Meldon Valley which runs into the Tweed Valley further to the south. The relationship to one another and adjacent contemporary sites, in and around the north/south running Meldon Valley, would have defined the prehistoric community in the valley and is indicative of patterns of land use that are reflective of the prehistoric political, social and economic landscape of the valley. Key views are to the Black Meldon (SM2703) to the west and White Meldon (SM114) to the east and north/south along the Meldon Burn as this represents the immediate associated and supportive occupation of the Meldon Valley.				
Magnitude of Change to Cultural Significance	The Development would be situated 3.6 km north of the monument in a part of the landscape that no longer retains its historic character of open moorland but is characterised by modern commercial forestry in varying states of felling and regrowth. As the settlement evidence lies at lower elevations on the slopes of the Black Meldon, only the tips of four turbines would be visible behind the ridgeline to the north within the trees which extend downwards to the banks of the Meldon Burn. This would not be readily visible when trees are present and would not overly dominate the sightline due to the settlement remains being at lower elevations. The Development would be visible in the landscape to the north albeit in a part of the landscape that retains little prehistoric character due to the introduction of modern commercial forestry. The introduction of the tips of the turbines above commercial forestry in views northwards (noting that the consented scheme view was similar) is a negligible change to the appreciation or experience of the assets as very few turbine tips would be visible within a part of the landscape that does not retain any prehistoric landscape context so that the turbines would be clearly associated with the more distant forestry context.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with a negligible magnitude of change to cultural significance, the effect upon the heritage asset is negligible. This is **not significant** in terms of the EIA Regulations.				

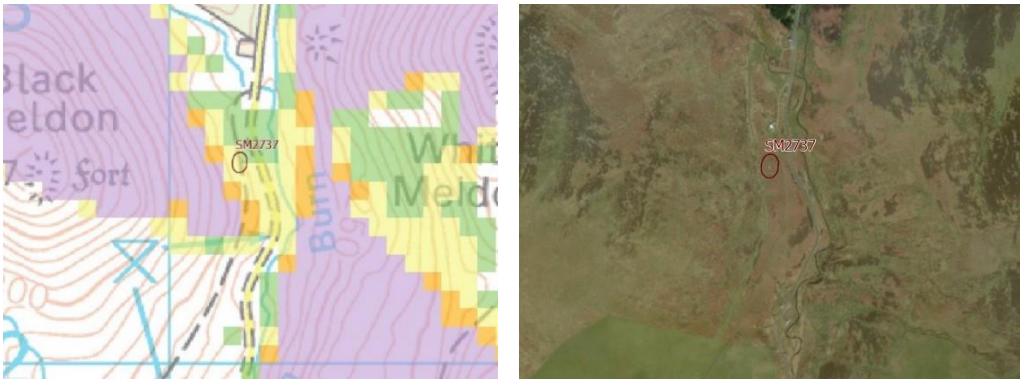


Plate 14: Close up of SM2737 from Figure 6.3 on left with aerial photograph on right

South Hill Head Group

SM2713 South Hill Head, homestead **SM3212 South Hill Head, settlement WNW of**					
Designation	Scheduled Monument	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	4.5 km S T3
Figure / Plate	Figures 6.2 and 5.2.5, Plate 15				
Summary of Asset and Cultural Significance	All the prehistoric monuments are located on the eastern side of Meldon Burn on South Hill Head. The homestead (SM2713) lies on the south side of the summit with the scheduled settlement remains (SM3212) located on the lower elevations on the western slope of the hill above the burn (Figure 6.2). The homestead's (SM2713) strategic location on the southern side of the summit overlooking the junction of the Meldon Burn and the River Tweed indicates that it was part of the major strategic and political centre within Meldon Valley protecting the southern access point into the Meldon Valley. The settlement (SM3212) on the slopes of the hill may have supported the homestead as a strategic and defensive location. These monuments are culturally significant as a collection of assets representing continuity of prehistoric occupation in Meldon Valley with the ability to inform our understanding of prehistoric settlement and land use, most notably social, political and economic links. The monuments are culturally significant as it has the ability to inform us about prehistoric domestic and defensive land use.				
Definition of Setting and Contribution to Cultural Significance	The setting of the monuments is defined by their relationship to one another and adjacent contemporary sites in and around the Meldon Valley, which indicates patterns of land use that reflect the prehistoric political, social and economic landscape in the valley. The homestead is strategically located on the summit of South Hill head overlooking the southern entrance to the Meldon Valley. Its location suggests its strategic importance in controlling the valley with key views southwards across the Tweed Valley and over the entrance into the Meldon Valley. Views northwards towards up the Meldon Valley towards the Meldon Forts (SM2703, SM114) would also contribute to the cultural significance as part of the associated and supportive occupation of the Meldon Valley. As such, these views also contribute to the appreciation of intervisibility between prehistoric hill forts, reflective of prehistoric settlement patterns and land use.				

SM2713 South Hill Head, homestead **SM3212 South Hill Head, settlement WNW of**	
Magnitude of Change to Cultural Significance	The Development would not affect the relationship of the fort with the southern part of the Meldon Valley and Tweed Valley. Due to the prominence of White Meldon and the lower elevation of the homestead fort, the Development would not be visible in views northwards up the Meldon Valley as turbines are hidden behind White Meldon though would be visible from lower elevation settlement similar to that shown in Figure 5.2.5. The visibility of the Development from the lower elevation settlement would be behind the ridgeline to the north within the trees which extend downwards to the banks of the Meldon Burn. This would not be readily visible when trees are present and would not overly dominate the sightline due to the settlement remains being at lower elevations. The Development would be visible in the landscape to the north albeit in a part of the landscape that retains little prehistoric character due to the introduction of modern commercial forestry. The introduction of the tops of the turbines above commercial forestry in views northwards (noting that the consented scheme view was similar) is a slight change to the appreciation or experience of the assets as the tops of turbines would be visible within a part of the landscape that does not retain any prehistoric landscape context so that the turbines would be clearly associated with the more distant forestry context.
Statement of Significance of Effect	As heritage assets of high sensitivity with a slight magnitude of change to cultural significance, the effect upon the heritage asset is minor. This is **not significant** in terms of the EIA Regulations.

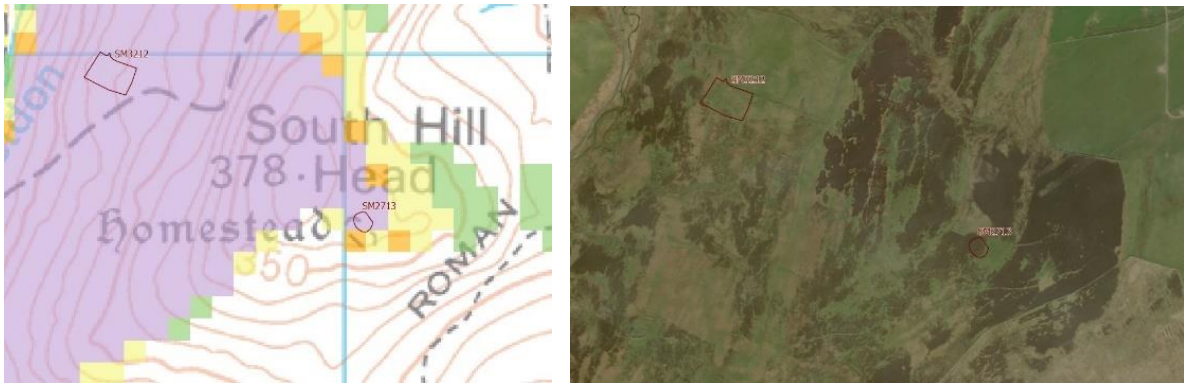


Plate 15: Close up of SM2713 and SM3212 from Figure 6.3 on left with aerial photograph on right

Sheriff Muir Group

SM2718 Sheriff Muir Cottages, standing stones 520m W of SM3171 Sheriff Muir, cairn					
Designation	Scheduled Monument	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	6 km S T3 (not in ZTV)
Figure / Plate	Figure 6.2, Plate 16				
Summary of Asset and Cultural Significance	The monuments are located at the junction of the Lyne Water and River Tweed and comprises of two standing stones aligned north to south, approximately seven feet apart in an agricultural field with the cairn to the north. The monument is culturally significant as it has the ability to inform us about prehistoric rituals and funerary customs.				
Definition of Setting and Contribution to Cultural Significance	The setting of the monument is defined by its position above and between the River Tweed to the south and the Lyne Water to the north (Figure 6.2). The setting of the monument contributes to its cultural significance as the location will pertain to the ritual connection and patterns of land use.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but situated 6 km north in the wider landscape. As shown on Figure 6.2, the Development would not be visible from the monument or in key views over the Lyne Water and River Tweed. As such, there is no change to the cultural significance of the monument.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with no change to cultural significance, there is no effect upon the heritage asset. This is **not significan**t in terms of the EIA Regulations.				

Plate 16: Close up of SM2718 and SM3171 from Figure 6.3 on left with aerial photograph on right

Romano Mains Group

SM2728 Romanno Mains, two barrows 550m SE of **SM2730 Romanno Mains, barrow 910m SE of**					
Designation	Scheduled Monuments	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	2.5 km W T8
Figure / Plate	Figure 6.2, Plate 17				
Summary of Asset and Cultural Significance	Both monuments are cairns (probable bronze age burial mounds) situated to the north of Drum Maw on the western ridge above Fingland Burn. They both date to the prehistoric period and comprise of funerary barrows. Both monuments are culturally significant as they have the ability to aid our understanding of prehistoric funerary practices.				
Definition of Setting and Contribution to Cultural Significance	The setting of these monuments is defined by their elevated position above the Fingland Burn to the east with key views southwards down the burn (Figure 6.2). It is likely that the monuments shared a relationship with contemporary funerary features, such as Wether Law Cairn (SM2738) to the north-east. The setting of these monument contributes to their cultural significance as it may play a ritualistic element in their placement within the landscape.				
Magnitude of Change to Cultural Significance	The Development would be situated 2.5 km west of the monuments, beyond Hag Law and Wether Law with the tips of the turbines visible above the ridgeline though the majority of the turbines would be hidden behind the Hag Law/Wether Law ridgeline with only the those the furthest west showing tips above the ridge. The Development would not interfere with views southwards down the Fingland burn though the tips would appear to the east of Wether Law Cairn (SM2738) above the ridgeline. The introduction of the turbines into this view (noting that the consented scheme view was similar) is a slight change to the understanding, appreciation or experience of the heritage asset as the tips would not be overly dominate and in part of the landscape characterised by forestry. This represents a slight to the cultural significance of the monument.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with a slight magnitude of change to cultural significance, the effect upon the heritage asset is minor. This is **not significant** in terms of the EIA Regulations.				

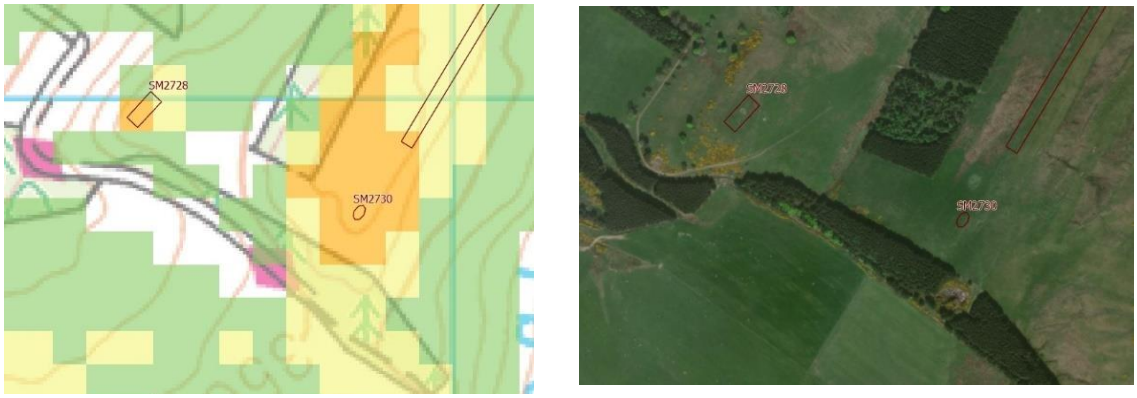


Plate 17: Close up of SM2728 and SM2730 from Figure 6.3 on left with aerial photograph on right

Flemington/Fingland Burn Group

SM2732 Drum Maw, settlement 780 m SE of SM2733 Romanno Hope, barrow & enclosures S of (not in ZTV)					
Designation	Scheduled Monument	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	1.8 km NW T2
Figure / Plate	Figure 6.2, Plate 18				
Summary of Asset and Cultural Significance	The monuments lie on opposite sides of Fingland Burn. The Drum Maw Settlement (SM2732) is located on the south-eastern slope of Drum Maw and Romanno Hope barrow and enclosures lies on the opposite side of the burn on the western slopes of Green Knowe, both overlook the junction of the Fingland Burn and Flemington Burn (Figure 6.2). SM2732 is an Iron Age enclosed settlement whilst SM2732 comprises of a barrow and enclosures which dates to the prehistoric period. The monuments are culturally significant as they have the ability to inform us about prehistoric society, most notably land use, settlement funerary and ritual customs.				
Definition of Setting and Contribution to Cultural Significance	The setting of the monument is defined by their position overlooking the junction of Finland Burn and Flemington Burn with key views southwards over the waterways. It is likely that these monuments form part of the lower elevations of settlements associated with the numerous hillforts in the area, the closest being Whiteside Hill (SM2955) to the west by which Flemington Burn flows into the Lyne Water. Whilst these monuments lie on tributaries to the Lyne Water and likely form part of the prehistoric Lyne Valley landscape, the Meldon Valley does lie in close proximity to the east with the Meldon forts visible. As such, these views south along Fingland Burn, south-west along Flemington Burn, and south-east towards the Meldons also contribute to the appreciation of intervisibility between prehistoric hill forts, reflective of prehistoric settlement patterns and land use.				
Magnitude of Change to Cultural Significance	The Development is not in the setting but is located 1.8 km to the west. The Development would not be visible from SM2733 as it is not in the ZTV as shown on Figure 6.2. The Development would be visible from SM2732 when looking westwards but this does not interfere with key views southwards along Fingland Burn, south-westwards along Flemington Burn, and south-eastwards towards the Meldons. The introduction of the turbines into this westward view but not within a key view integral to its cultural significance (noting that the consented scheme view was similar) is a slight change to the understanding, appreciation or experience of the heritage asset. This represents a slight change to the cultural significance of the monument.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with a slight magnitude of change to cultural significance, the effect upon the heritage asset is minor. This is **not significant** in terms of the EIA Regulations.				

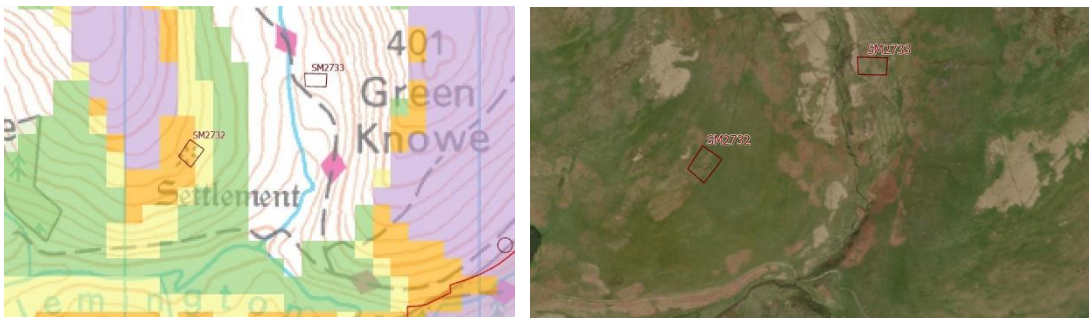


Plate 18: Close up of SM2732 and SM2733 from Figure 6.3 on left with aerial photograph on right

SM2734 Green Knowe, two ring enclosures and barrow 500, SSE of

SM2734 Green Knowe, two ring enclosures and barrow 500, SSE of					
Designation	Scheduled Monument	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	895 m NW T2
Figure / Plate	Figure 6.2 and 5.2.1, Plate 19				
Summary of Asset and Cultural Significance	Located on the western periphery of the CSA on the eastern slope of Green Knowe, above Flemington Burn (Figure 6.2), the monument comprises of two ring enclosures covered in turf and a barrow. The barrow is approximately 3 m in diameter and 0.25 m in height with a potential second barrow to the south which was previously excavated in the 1950's with inconclusive results in determining if there was a second barrow. As the monument dates to the prehistoric period, it is culturally significant as it has the potential to provide further information about funerary and ritual customs dating to this period.				
Definition of Setting and Contribution to Cultural Significance	The setting of the monument is defined by its position on the south-east slope of Green Knowe overlooking the Flemington Burn to the south and towards the Crailzie Hill opposite which is now covered in modern forestry plantation. It is likely that the monument forms part of the lower elevations of settlements associated with the numerous hillforts in the area, the closest accessible fort along the waterway being Whiteside Hill (SM2955) to the west by which Flemington Burn flows into the Lyne Water, likely forming part of the prehistoric Lyne Valley landscape, the Meldon Valley does lie in close proximity on the opposite side of Crailzie Hill.				
Magnitude of Change to Cultural Significance	The Development is not within key views downstream along the Flemington Burn or between the enclosures and barrow. The Development is visible from the monument within views upstream along Flemington Burn towards Ewe Hill (similar to that shown in Figure 5.2.1) with turbines visible above the hills and treeline to the north and east; however, these sightlines encompass modern forestry plantations and are not as integral to understanding the cultural significance of the monument as views downstream along Flemington Burn. The introduction of the turbines into views north and east (noting that the consented scheme view was similar) would see turbines tips above the forestry and in close proximity; an appreciable change to the understanding, appreciation or experience of the heritage asset. This represents a moderate change to the cultural significance of the monument.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with a moderate magnitude of change to cultural significance, the effect upon the heritage asset is moderate. This is **significant** in terms of the EIA Regulations.				

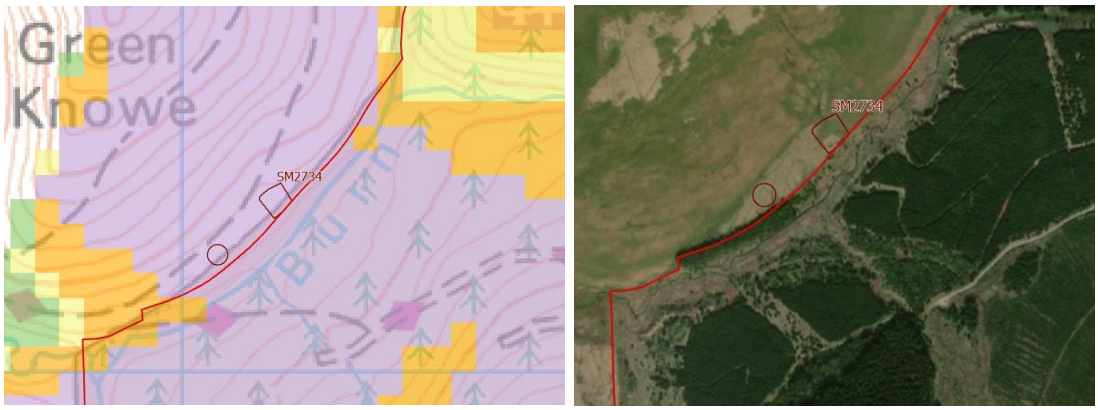


Plate 19: Close up of SM2734 from Figure 6.3 on left with aerial photograph on right

Whiteside Hill Ring Enclosures

SM2735 Whiteside Hill, ring enclosures 820m SE of SM2821 Flemington, ring enclosures 840m NE of					
Designation	Scheduled Monument	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	2.9 km W T2
Figure / Plate	Figure 6.2, Plate 20				
Summary of Asset and Cultural Significance	The ring enclosures are located on the lower elevations on the south-eastern slopes of Whiteside Hill on either side of Flemington Burn (Figure 6.2). The fort (SM2955) lies on the summit to the north with the ring enclosures to the south along Flemington Burn. The ring enclosures on the slopes of the hill represent settlement and would have supported the fort as a strategic and defensive location. These monuments are culturally significant as a collection of assets representing continuity of prehistoric occupation in Lyne Water Valley with the ability to inform our understanding of prehistoric settlement and land use, most notably social, political and economic links.				
Definition of Setting and Contribution to Cultural Significance	The setting of the ring enclosures is as auxiliary settlement supporting the Whiteside Hill fort (SM2955), allowing for the control and protection of the land and routes through north/south running Lyne Valley to the west. The relationship to one another and adjacent contemporary sites, in and around Flemington Burn and Whiteside Hill, would have defined the prehistoric community in this part of the Lyne Water valley and is indicative of patterns of land use that are reflective of the prehistoric political, social and economic landscape of the valley. Key views from the ring enclosures are along Flemington Burn, most notably views westwards as this would have been the direction of travel from the Lyne Water Valley into the Flemington Burn valley.				
Magnitude of Change to Cultural Significance	The Development would be situated 3 km east of the monuments in a part of the landscape that lies beyond the Flemington Burn Valley and no longer retains its historic character of open moorland but is characterised by modern commercial forestry in varying states of felling and regrowth. As the settlement evidence lies at lower elevations on the slopes along Flemington Burn, only the tips of turbines would be visible from the Whiteside enclosures (SM2735) when looking eastwards up Flemington Burn. The turbine tips would be behind the ridgeline of Green Knowe within forestry topped ridgeline behind the open moorland valley sides of Flemington Burn. The turbines would not be readily visible when trees are present and would not overly dominate the sightline due to the settlement remains being at lower elevations. The Development would be visible in the landscape to the east albeit in a part of the landscape that retains little prehistoric character due to the introduction of modern commercial forestry. The introduction of the tips of the turbines above commercial forestry in views eastwards (noting that the consented scheme view was similar) is a slight change to the appreciation or experience of the assets as turbines tips would be visible within a part of the landscape that does not retain any prehistoric landscape context so that the turbines would be clearly associated with the more distant forestry context.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with a slight magnitude of change to cultural significance, the effect upon the heritage asset is moderate. This is **not significant** in terms of the EIA Regulations.				

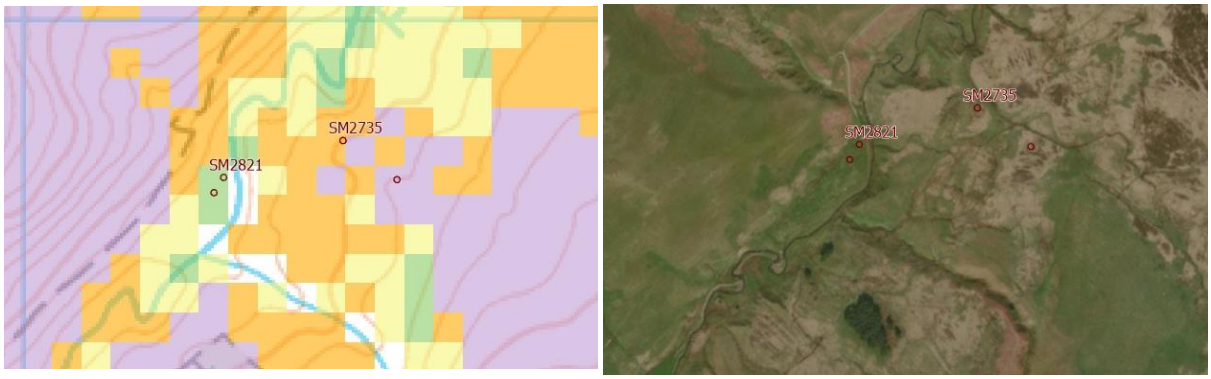


Plate 20: Close up of SM2821 and SM2735 from Figure 6.3 on left with aerial photograph on right

SM2955 Whiteside Hill, fort and enclosure

SM2955 Whiteside Hill, fort and enclosure					
Designation	Scheduled Monument	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	2.9 km W T2
Figure / Plate	Figures 6.2 and 6.7, Plate 21				
Summary of Asset and Cultural Significance	The fort (SM2955) is located at the summit of Whiteside Hill (Figure 6.2). The fort's (SM2755) strategic location on the summit overlooking the Lyne Water to the west and Flemington Burn to the south-east indicates that it was part of the major strategic and political centre within the Lyne Water. The settlement (SM2737) on the slopes of the hill would have supported the fort as a strategic and defensive location. The fort is culturally significant representing elevated visual defensive settlements associated with the continuity of prehistoric occupation in the Lyne Water Valley. The fort informs our understanding of prehistoric settlement and land use, most notably social, political, and economic links within and around the Tweed Valley.				
Definition of Setting and Contribution to Cultural Significance	The setting of the monument is defined by its relationship to adjacent contemporary sites in and around the Lyne Water, which indicates patterns of land use that reflect the prehistoric political, social and economic landscape in the valley. The fort is strategically located on the summit with key views westwards over the Lyne Water. Its location on the east side of Lyne Water Valleys suggests its strategic importance in controlling the valley with key views towards hillforts on the west side of the Lyne Water (SM2840 Henderland Hill fort to the west and SM2956 Drochil Castle fort to the south-west). Key views are north/south along the Lyne Water. Views between contemporary forts to the west (SM2840 and SM2956) helped to control the route through the Lyne Water Valley. As such, these views also contribute to the appreciation of intervisibility between prehistoric hill forts, reflective of prehistoric settlement and land use.				
Magnitude of Change to Cultural Significance	The Development would not affect the relationship of the fort with the Lyne Water Valley or interfere with key views from the fort towards other forts to the west (SM2840 and SM2956). The Meldons are not intervisible with Whiteside Hill and neither are any hillforts to the east of Cloich Forest and the Development. However, the Development would be visible in views eastwards looking up Flemington Burn				

	(Figure 6.7). The Development appears in part of the landscape characterised by modern commercial forestry that is markedly different from the surviving prehistoric upland moorland context of Whiteside Hill and opposite side of the Lyne Water Valley. This visibility is not a key sightline with key views westwards and north/south along the Lyne Water maintained and uninterrupted. The introduction of the turbines into views eastwards (noting that the consented scheme view was similar) is an appreciable change to the understanding, appreciation or experience of the heritage asset. This represents a moderate change to the cultural significance of the monument.
Statement of Significance of Effect	As a heritage asset of high sensitivity with a moderate magnitude of change to cultural significance, the effect upon the heritage asset is moderate. This is **significant** in terms of the EIA Regulations.

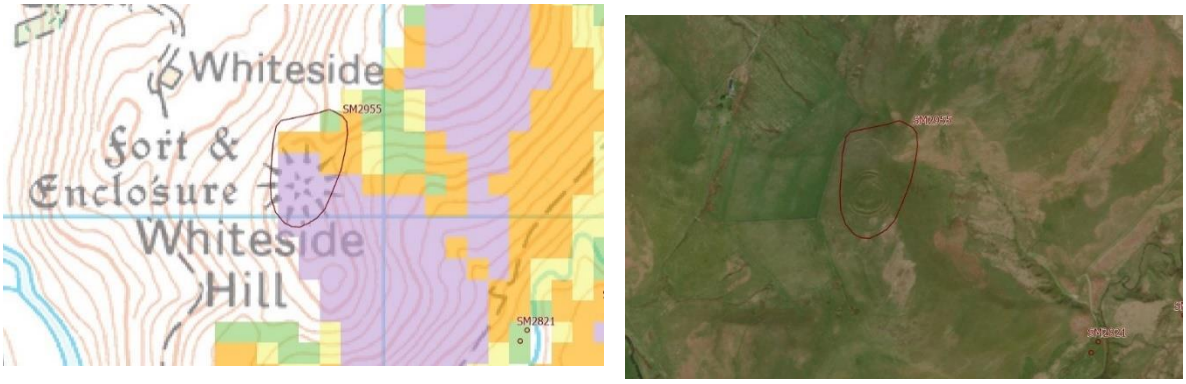


Plate 21: Close up of SM2955 from Figure 6.3 on left with aerial photograph on right

Hamildean Group

SM2736 Hamildean, homestead 1140m NE of SM2957 Hamildean Hill, fort					
Designation	Scheduled Monuments	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	4.1 km SW T2
Figure / Plate	Figure 6.2, Plate 22				
Summary of Asset and Cultural Significance	Hamildean Hill fort (SM2957) is situated on the summit (386 m) of Hamildean with the Lyne Water to its south (Figure 6.2). Hamildean homestead (SM2736) is located 600 m to the north-east of the fort which now appears as a low grass-covered stony bank. Both monuments date to the prehistoric period. Both monuments are culturally significant as they have the ability to aid our understanding of prehistoric land use and occupation within the Lyne Water Valley.				
Definition of Setting and Contribution to Cultural Significance	The setting of the monuments is defined by their relationship to one another and adjacent contemporary sites in and around the Lyne Water Valley, which indicates patterns of land use that reflect the prehistoric political, social and economic landscape in the valley. The setting of the fort is defined by its elevated position on Hamildean Hill which overlooks the Lyne Water and the Roman forts and camps to the south. It lies 2.5 km south-west of Black Meldon fort and 4.5 km south-east of Whiteside Hill. The setting of the homestead is the lower elevation between the two forts, Hamildean to the west and Black Meldon to the east. Its location on Hamildean Hill suggests its strategic importance in controlling the Lyne Water valley and monitoring the Roman forts (SM1492 and SM1494) to the south as a key aspect of its cultural significance. Key views are southwards over the Lynne Water and westwards towards Hog Hill and another settlement (SM2944). Views between contemporary forts also contribute to its cultural significance, most notably the Meldons to the north-east and Torbank Hill fort (SM3027) to the south-west. The intervisibility and strategic placement of these hill forts helped to control the key routes through the Tweed Valley. As such, these views also contribute to the appreciation of intervisibility between prehistoric hill forts, reflective of prehistoric settlement patterns and land use.				
Magnitude of Change to Cultural Significance	The Development would not affect the relationship of the fort with the Lyne Water Valley or interfere with key views southwards over the Roman forts (SM1492, SM1494) to other prehistoric forts and settlements (SM2944, SM3027). However, the Development would be visible in periphery views and not in the direct sightlines north-eastwards towards the Meldons so that the views are still readily appreciable. The Development appears in part of the landscape characterised by modern commercial forestry that is markedly different from the upland moorland context of the Meldons so does not notably detract from the landscape in views northwards from Hamildean Hill. The introduction of the turbines into this view (noting that the consented scheme view was similar) is a slight change to the understanding, appreciation or experience of the heritage asset. This represents a slight change to the cultural significance of the monument.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with a slight magnitude of change to cultural significance, the effect upon the heritage asset is minor. This is **not significant** in terms of the EIA Regulations.				

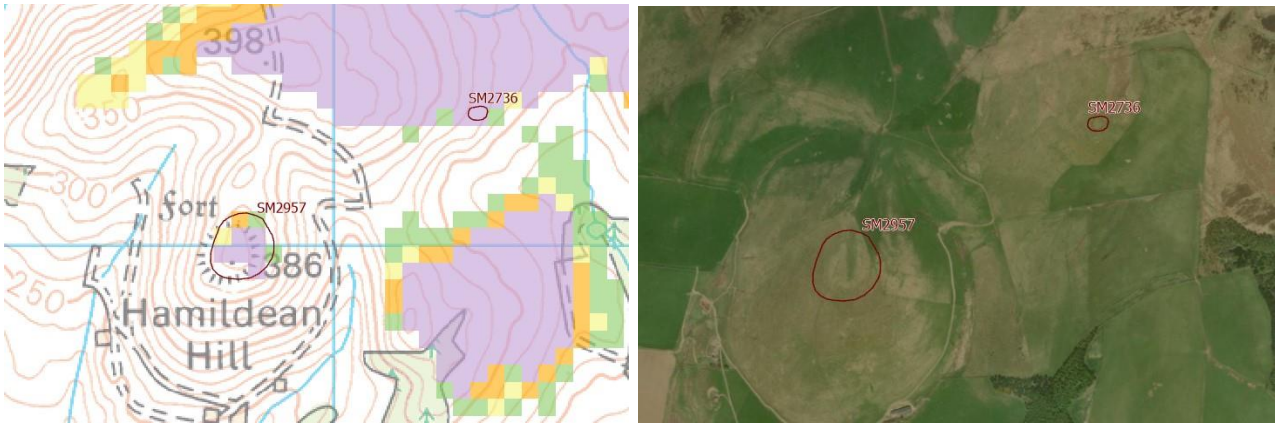


Plate 22: Close up of SM2736 and SM2957 from Figure 6.3 on left with aerial photograph on right

SM2738 Wether Law Cairn

SM2738 Wether Law Cairn					
Designation	Scheduled Monument	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	720 m E T11
Figure / Plate	Figure 6.2, Figure 6.13, Plate 23				
Summary of Asset and Cultural Significance	The monument comprises of a large grass covered Bronze Age burial mound measuring approximately 8 m in diameter and circa 0.6 m high location on the summit (479 m) of Wether Law to the west of Cloich Forest (Figure 6.2). Its elevation is slightly higher than Whaup Law and Peat Hill within the Development circa 1 km to the east. The monument is culturally significant as it has the potential to enhance our understanding regarding funerary and ritual practices during the prehistoric period. Whilst stones may have been borrowed for the nearby modern cairn, it is still largely intact with probable associated funerary archaeological deposits.				
Definition of Setting and Contribution to Cultural Significance	The most important elements of setting for the cairn are its relationship with the surrounding landscape and likely contemporary prehistoric assets. The setting of the monument is its elevated position at the summit of Wether Law with similar elevation of summits to the east (at Whaup Law SM2755 and Peat Hill on which stands another cairn impacted by forestry), south (Hag Law and Ewe Hill) and westwards (Romanno Mains SM2728 and SM2730). Key setting views would be eastwards and southwards towards other cairns with more uninterrupted long distance view westwards towards the Lyne Water. These views and connections to the east are currently limited due to the commercial forestry plantation upon the Cloich Hills which hinders the cairn's connection with this part of the landscape, most notably cairns on Peat Law and Whaup Law within the Development site. Due to the introduction of modern forestry plantation to the north and east of the cairn, the landscape has been altered so that the monument's current setting has limited to some extent the appreciation of the prehistoric landscape and connectivity to other prehistoric assets to the north and east though open views southwards and south-westwards remain unaffected.				
Magnitude of Change to Cultural Significance	The Development is located circa 720 m to the east in a part of the landscape characterised by modern forestry that is markedly different from the upland moorland context that would have characterised the area during the prehistoric period. However, due to proximity these would be dominant features is views eastwards as shown on the wireline in Figure 6.13. Due to the forestry, sightlines between cairns within the Development site (SM2755 Whaup Law and undesignated				

SM2738 Wether Law Cairn	
	cairn on Peat Law) are not currently appreciable. The revised forestry plan would open up sightlines between Whaup Law and Wether Hill re-establishing the connectivity of the cairns within the landscape albeit within the context of a modern wind farm and modern forestry plantation. On balance with the benefit of opening up the view and dominance of the turbines in this view, this represents an appreciable change to the cultural significance of the monument that is moderate.
Statement of Significance of Effect	As a heritage asset of high sensitivity with a moderate change in the experience of the heritage asset, there is a moderate effect upon the heritage asset as a result of the Development. This is **significant** in terms of the EIA Regulations.

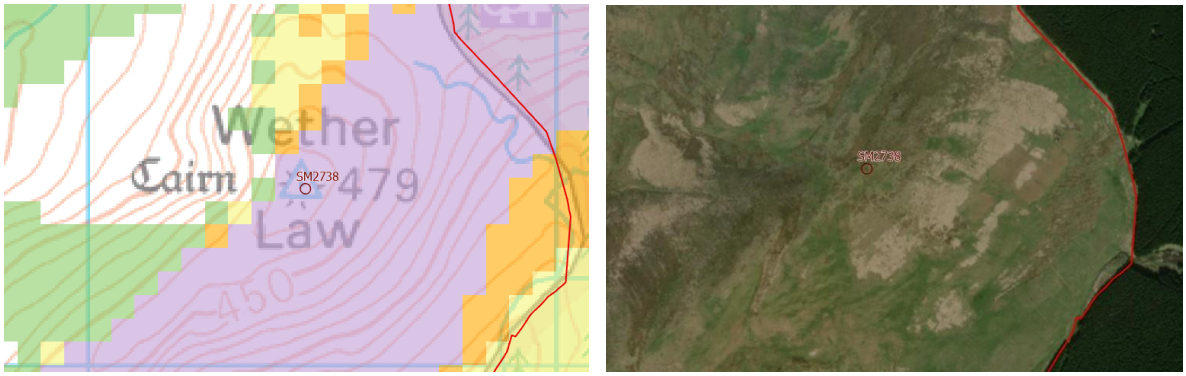


Plate 23: Close up of SM2738 from Figure 6.3 on left with aerial photograph on right

Green Knowe Group

SM2760 Green Knowe, platform settlement **SM2912 Harehope Cairn, 1510m ESE of** **SM3158 Green Knowe, cairn NE of**					
Designation	Scheduled Monuments	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	21.5 km S T3
Figure / Plate	Figure 6.2, Plate 24				
Summary of Asset and Cultural Significance	The monuments comprise a group of settlement and funerary sites dating largely to the Bronze Age. The Green Knowe settlements includes nine hut platforms with associated clearance cairns and a field system. There is commercial forestry to the north and east. The Green Knowe cairn lies to the north of these, adjacent to a track but is otherwise surrounded by forestry (Figure 6.2). Both monuments are culturally significant as they have the ability to aid our understanding of prehistoric land use and occupation in the Meldon Valley.				
Definition of Setting and Contribution to Cultural Significance	The setting of the monuments is defined by their relationship to the Meldon Valley and the prehistoric occupation that was prevalent in the valley as they likely supported the strategic patterns of land use that are indicative of the prehistoric political, social and economic landscape. The current setting of the settlement and cairns is hindered by the surrounding commercial forestry on the west side of the Meldon burn which extends down from the Cloich Hills into the Meldon Valley. Their location in the lower elevations of the valley indicates a more supportive function to the elevated hill forts to the south on Black Meldon (SM2703) and White Meldon (SM114) as they lie directly on the route through the Meldon Valley without the long-distance sightlines available from the forts. Views along the Meldon Valley contribute to their cultural significance as does views towards contemporary forts, most notably the Meldons to the south.				
Magnitude of Change to Cultural Significance	The Development would not affect the relationship of the fort with the Meldon Valley or interfere with key views southwards towards the Meldon forts and occupation on their slopes. However, the Development would be visible in views northwards, albeit many of these views will be obscured by the surrounding forestry with the Development appearing in part of the landscape characterised by modern commercial forestry that is markedly different from the prehistoric upland moorland context in and around the Meldons. The introduction of the turbines into this view (noting that the consented scheme view was similar) is a slight change to the understanding, appreciation or experience of the heritage asset. This represents a slight change to the cultural significance of the monument.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with a slight magnitude of change to cultural significance, the effect upon the heritage asset is minor. This is **not significant** in terms of the EIA Regulations.				

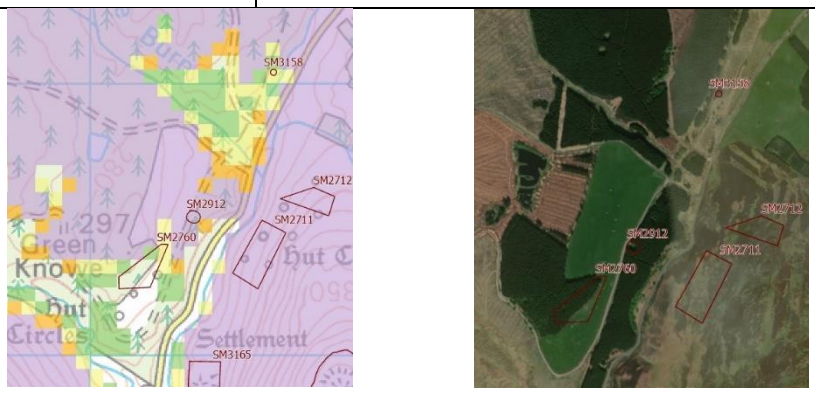


Plate 24: Close up of SM2760, SM2912 and SM3158 from Figure 6.3 on left with aerial photograph on right

SM2774 Cavarra Hill, settlement

SM2744 Cavarra Hill, settlement					
Designation	Scheduled Monument	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	4.9 km E T4
Figure / Plate	Figures 6.2 and 6.4, Plate 25				
Summary of Asset and Cultural Significance	Situated on the summit (423m) of Cavarra Hill (Figure 6.2), the monument comprises of a prehistoric hill settlement. The monument is culturally significant as it has the ability to provide further information about prehistoric society and defensive architecture.				
Definition of Setting and Contribution to Cultural Significance	The setting of the monument is defined by its elevated position on the eastern side of the Eddleston Valley. Whilst not as large as nearby forts at Milkieston Rings Fort (SM2416) to the north-west and White Meldon Fort (SM114) to the south-west, it would have formed part of the wider settlement of the Eddleston Valley supporting these forts in their control and protection of the land and routes through the Eddleston Valley to the Tweed Valley in the south. The key elements of setting that contribute to its cultural significance is its association with the Eddleston Valley and contemporary sites within it. Eddleston valley is relatively flat agricultural land that has seen settlement and cultivation for the past 1500 years so that much of the prehistoric valley landscape contemporary with the fort is largely obscured by later occupation. The settlement's relationship and intervisibility with other Iron Age hillforts, most notably Milkieston Rings (SM2416) to the north-west and White Meldon (SM114) and Kidston (SM3075) forts to the south-west on the opposite side of the Eddleston Valley, also contribute to the cultural significance.				
Magnitude of Change to Cultural Significance	The Development lies on the eastern side of the Eddleston Valley, 4.9 km west of the monument, in an area of modern commercial forestry that is markedly different than the agricultural land at the base of the valley (Figure 6.4) and upland moorland context of the hillforts. The Development would not affect the relationship of the fort with the north/south running Eddleston Valley. However, the Development would be visible in views westwards across the Eddleston Valley though key sight lines between the hillforts it likely supported, most notably Milkieston (SM2416) and White Meldon (SM114), are still readily appreciable, as shown on Figure 6.4 from Milkieston Rings fort. The introduction of the turbines into this view (noting that the consented scheme view was similar) is a slight change to the understanding, appreciation or experience of the heritage asset. This represents a slight change to the cultural significance of the monument.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with a slight magnitude of change to cultural significance, the effect upon the heritage asset is minor. This is **not significant** in terms of the EIA Regulations.				

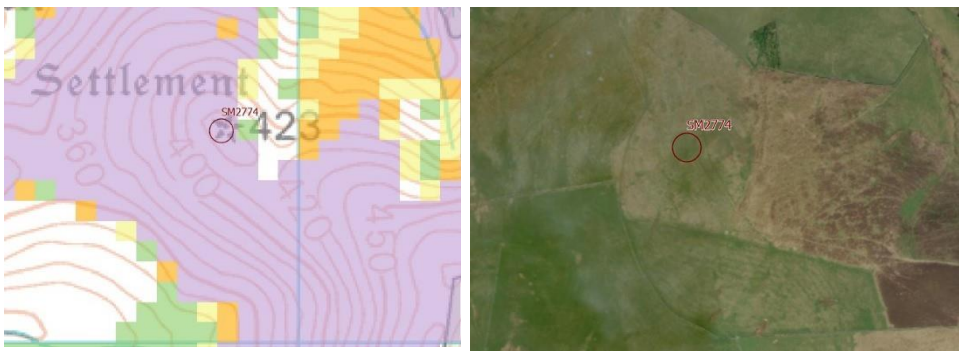


Plate 25: Close up of SM2744 from Figure 6.3 on left with aerial photograph on right

Dundreich and Jeffries Corse Cairns

SM2777 Dundreich, cairn **SM3527 Jeffries Corse, cairn**					
Designation	Scheduled Monument	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	7.2 km E T10
Figure / Plate	Figure 6.2, Plate 26				
Summary of Asset and Cultural Significance	The monuments comprise of large grass covered mounds (likely prehistoric burial mounds) located on the summits of Dundreich (623 m) and Jeffries Corse (613 m) (Figure 6.2). The monuments are culturally significant as they have the potential to enhance our understanding regarding funerary and ritual practices during the prehistoric period.				
Definition of Setting and Contribution to Cultural Significance	The most important elements of setting for the cairns are their relationship with the surrounding landscape and likely contemporary prehistoric assets, most notably Northshield Rings fort (SM731) to the west. The setting of the monuments is their elevated position between the Eddleston Valley to the west and River South Esk valley to the east as they are located at the highest elevations between the two. Key setting views would be eastwards and westwards though much of the surviving prehistoric assets are located to the west along Eddleston Valley.				
Magnitude of Change to Cultural Significance	The Development is located 7.2 km to the west in a part of the distant landscape characterised by modern forestry that is markedly different from the upland moorland context that survives between the cairns and Northshield Rings fort (SM731). The Development would not affect the relationship of the cairns with the Northshield Ring fort and would not be in the direct line of sight from the cairns towards the fort. However, the Development would be visible in periphery views south-westwards towards the Eddleston Valley. The introduction of the turbines into this view (noting that the consented scheme view was similar) is a slight change to the understanding, appreciation or experience of the heritage asset. This represents a slight change to the cultural significance of the monument.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with a slight change in the experience of the heritage asset, there is a minor effect upon the heritage asset as a result of the Development. This is **not significant** in terms of the EIA Regulations.				

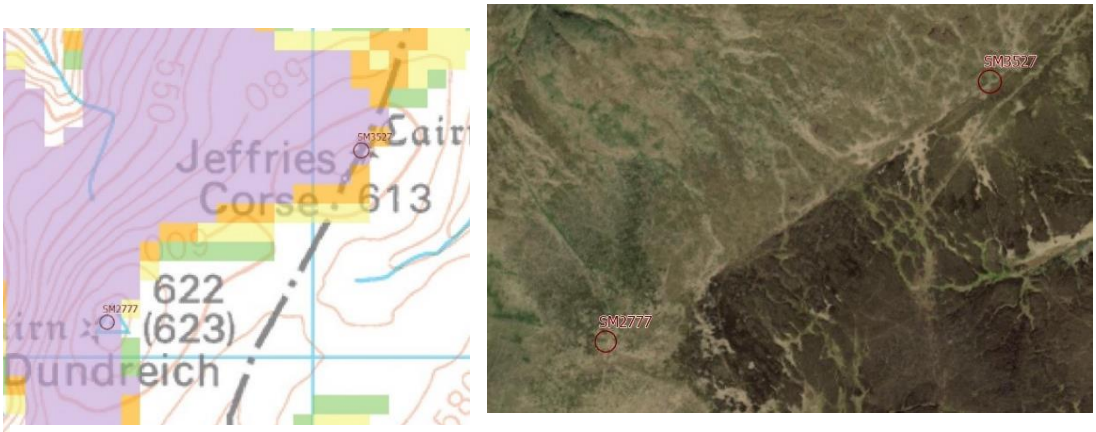


Plate 26: Close up of SM2777 and SM3527 from Figure 6.3 on left with aerial photograph on right

Henderland and Bordland forts

SM2840 Henderland Hill, fort **SM3010 Bordland Rings, fort, Bordlands Hill**					
Designation	Scheduled Monument	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	4.7 km W T2
Figure / Plate	Figure 6.2, Plate 27				
Summary of Asset and Cultural Significance	All the prehistoric monuments are located on the west side of the Lyne Water Valley opposite Whiteside Hill with the Tarth Water to the west (Figure 6.2). The forts' strategic location on the summit (SM2840) and a lower knoll (SM3010) overlooking the Lyne Water towards Whiteside Hill fort (SM2955) indicates that it was part of the major strategic and political centre within the Lyne Water. These monuments are culturally significant as a collection of assets representing continuity of prehistoric occupation in Lyne Water Valley with the ability to inform our understanding of prehistoric settlement and land use, most notably social, political and economic links.				
Definition of Setting and Contribution to Cultural Significance	The setting of the monuments is defined by their relationship to one another and adjacent contemporary sites in and around the Lyne Water and Tarth Water, which indicates patterns of land use that reflect the prehistoric political, social and economic landscape in the valley. The forts are strategically located at elevated positions to control the valleys with key views north/south along the Lyne Water, east to Whiteside Hill fort (SM2955) and westwards over the Tarth Water. As such, their relationship with the Lyne Valley and Tarth Valley and those associated views contribute to the cultural significance.				
Magnitude of Change to Cultural Significance	The Development would not affect the relationship of the fort with the Lyne Water Valley or Tarth Water which are the key elements of its setting and cultural significance. With the topography on the west side of the Lyne Water being at higher elevation than the forts (e.g. Whiteside Hill, White Knowe and Drum Maw), the Development is largely hidden behind these ridgelines with only the tips of turbines visible where the ridgeline dips. As the Development lies in an area of commercial forestry, when trees are present, the turbines would be hidden within the treelines. The introduction of the turbines into views eastwards would be behind the ridgeline and would not interfere with key sightlines towards Whiteside Hill fort so that there is a negligible change to the understanding, appreciation or experience of the heritage asset. This represents a negligible change to the cultural significance of the monument.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with a negligible magnitude of change to cultural significance, the effect upon the heritage asset is moderate. This is **not significant** in terms of the EIA Regulations.				

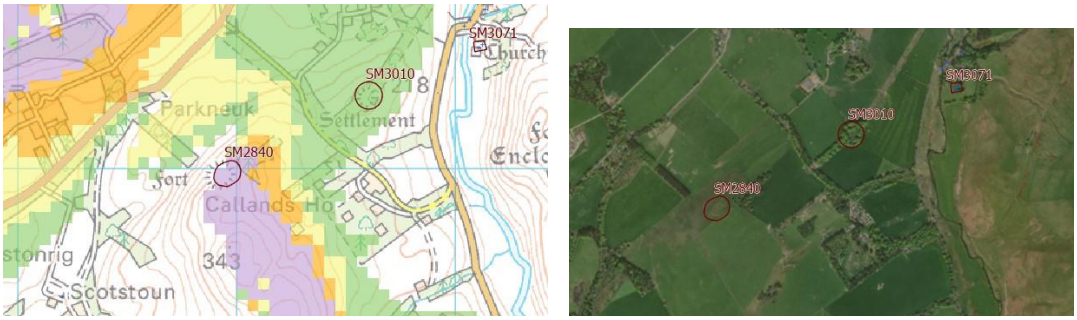


Plate 27: Close up of SM2777 and SM3527 from Figure 6.3 on left with aerial photograph on right

SM2940 Wormiston, cairn 360m NNW of

SM2940 Wormiston, cairn 360 m NNW of					
Designation	Scheduled Monument	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	2.3 km W T4
Figure / Plate	Figure 6.2, Plate 28				
Summary of Asset and Cultural Significance	The monument is a cairn that has been planted over with woodland. The monument is culturally significant as it has the potential to enhance our understanding regarding funerary and ritual practices during the prehistoric period.				
Definition of Setting and Contribution to Cultural Significance	The most important elements of setting for the cairn are its relationship with the surrounding landscape and likely contemporary prehistoric assets, most notably Eddleston Valley and Milkieston Rings fort (SM2416) to the east (Figure 6.2). The setting of the monument has been altered by being planted over with no views currently available, though should trees be removed, key views would be eastwards towards the fort (SM2416).				
Magnitude of Change to Cultural Significance	The Development is located to the east at the higher elevations on the Cloich Hill in a part of the landscape characterised by modern forestry that is markedly different from the prehistoric context of more open moorland. The Development would not affect the relationship of the cairn with Milkieston fort and would not be in the direct line of sight from the cairn towards the fort, as such the key aspects of setting and cultural significance to the east remain unaffected. As the cairn is planted over and has limited to no connection to the upper elevations to the west and the Cloich hills, there is a negligible change to its cultural significance.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with a negligible change in the experience of the heritage asset, there is a negligible effect upon the heritage asset as a result of the Development. This is **not significant** in terms of the EIA Regulations.				

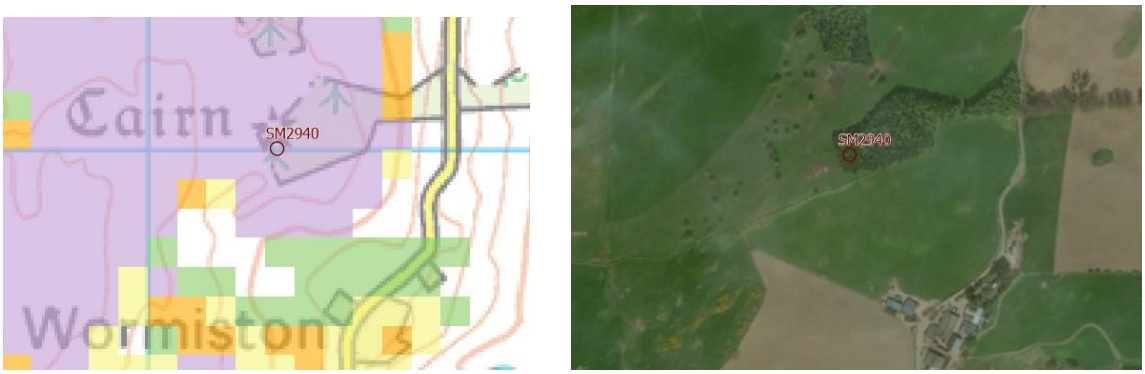


Plate 28: Close up of SM2940 from Figure 6.3 on left with aerial photograph on right

Wester Happrew and Torbank Forts

SM2944 Wester Happrew, fort 360m NW of (not in ZTV) **SM3027 Tor Hill, fort 600m WNW of Torbank**					
Designation	Scheduled Monument	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	4.7 km W T2
Figure / Plate	Figure 6.2, Plate 29				
Summary of Asset and Cultural Significance	The prehistoric forts are located on the west side of the Lyne Water Valley opposite Hamildean hill fort (SM2957) (Figure 6.2). The forts' strategic location on the southern ridgeline overlooking the Lyne Water towards Hamildean fort (SM2955) indicates that it was part of the major strategic and political centre within the Lyne Water. These monuments are culturally significant as a collection of assets representing continuity of prehistoric occupation in Lyne Water Valley with the ability to inform our understanding of prehistoric settlement and land use, most notably social, political and economic links.				
Definition of Setting and Contribution to Cultural Significance	The setting of the monuments is defined by their relationship to one another and adjacent contemporary sites in and around the Lyne Water, which indicates patterns of land use that are indicative of the prehistoric political, social and economic landscape in the valley. The forts are strategically located at elevated positions to control the valleys with key views north/south along the Lyne Water and across the valley to Hamildean Hill (SM2957). As such, their relationship with the Lyne Valley and Hamildean fort and those associated views contribute greatest to the cultural significance.				
Magnitude of Change to Cultural Significance	The Development would not affect the relationship of the fort with the Lyne Water Valley or interfere with key views or direct sight lines from the forts to Hamildean Hill (SM2957) which are the key elements of its setting and cultural significance. However, the Development would be visible in periphery views northwards from Tor hill fort (SM3027) towards Hamildean hill (SM2957) albeit in in part of the landscape characterised by modern commercial forestry that is markedly different from the upland moorland context of forts and the valley of the Lyne Water. The introduction of the turbines into views northwards though not in the direct sightline between the forts (noting that the consented scheme view was similar) is a slight change to the understanding, appreciation or experience of the heritage asset. This represents a slight change to the cultural significance of the monument.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with a slight magnitude of change to cultural significance, the effect upon the heritage asset is minor. This is **not significant** in terms of the EIA Regulations.				

Plate 29: Close up of SM2944 and SM3027 from Figure 6.3 on left with aerial photograph on right

Drochil and Callands

SM2956 Drochil Castle, fort & enclosure 1190m NNW of SM3074 Callands House, earthwork S of					
Designation	Scheduled Monument	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	4.5 km SW T2
Figure / Plate	Figure 6.2, Plate 30				
Summary of Asset and Cultural Significance	All the prehistoric monuments are located on a north-east spur of Drochil Hill overlooking the Lyne Water Valley and its junction of Flemington Burn (Figure 6.2). The forts' strategic location on a lower knoll overlooking the Lyne Water towards Whiteside Hill fort (SM2955) indicates that it was part of the major strategic and political centre within the Lyne Water. These monuments are culturally significant as a collection of assets representing continuity of prehistoric occupation in Lyne Water Valley with the ability to inform our understanding of prehistoric settlement and land use, most notably social, political and economic links.				
Definition of Setting and Contribution to Cultural Significance	The setting of the monuments is defined by their relationship to one another and adjacent contemporary sites in and around the Lyne Water, which indicates strategic patterns of land use that are indicative of the prehistoric political, social and economic landscape in the valley. The forts are strategically located at elevated positions to control the valleys with key views north/south along the Lyne Water and west up Flemington Burn and to Whiteside Hill fort (SM2955). As such, their relationship with the Lyne Valley and those associated views contribute to the cultural significance.				
Magnitude of Change to Cultural Significance	The Development would not affect the relationship of the fort with the Lyne Water Valley or Flemington burn or interfere with key views from the fort towards Whiteside Hill fort to the west (SM2955) though turbines would be visible in the periphery view but not in the direct sightline, which are the key elements of its setting and cultural significance. This periphery view of the Development is up the Flemington Burn albeit in in part of the landscape characterised by modern commercial forestry that is markedly different from the upland moorland context of Whiteside Hill and the valley of the Lyne Water. The introduction of the turbines into views eastwards (noting that the consented scheme view was similar) is a slight change to the understanding, appreciation or experience of the heritage asset. This represents a slight change to the cultural significance of the monument.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with a slight magnitude of change to cultural significance, the effect upon the heritage asset is minor. This is **not significant** in terms of the EIA Regulations.				

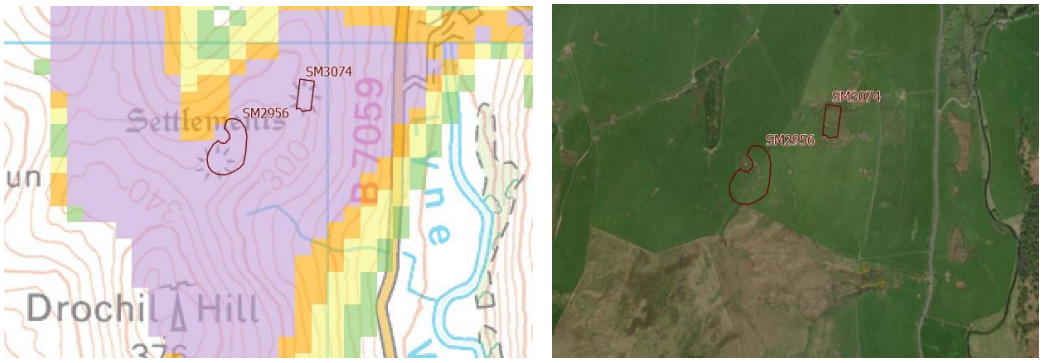


Plate 30: Close up of SM2956 and SM3074 from Figure 6.3 on left with aerial photograph on right

SM3071 Newlands Church and graveyard, 50m SW of Newlands House

SM3071 Newland Church and graveyard, 50m SW of Newlands House					
Designation	Scheduled Monument	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	3.8 km W T1 (not in ZTV)
Figure / Plate	Figure 6.2, Plate 31				
Summary of Asset and Cultural Significance	The monument comprises a church and graveyard first recorded in 1317. The church is roofless with the gables and walls standing almost to wall-head. It is aligned east/west. The associated burial ground surrounds the church and is enclosed by stone walls. The monument is located on valley floor of the Lyne water (Figure 6.2). The monument is culturally significant as it has the ability to provide further information about medieval ecclesiastical sites.				
Definition of Setting and Contribution to Cultural Significance	The setting of the monument is defined by its position in the Lyne Water. Due to the surrounding woodland, this confines its setting creating a sense of enclosure and separation from surrounding settlement.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but situated 3.8 km east monument in part of the much wider landscape context. As shown on Figure 6.2, from nearby within the Lyne Water Valley. As such, there is no change to the cultural significance of the monument.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with no change to cultural significance, there is no effect upon the heritage asset. This is **not significant** in terms of the EIA Regulations.				

Plate 31: Close up of SM3071 from Figure 6.3 on left with aerial photograph on right

SM3269 Meldon Bridge, pit alignment 250m W of

SM3269 Meldon Bridge, pit alignment 250m W of					
Designation	Scheduled Monument	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	5.5 km S T2 (not in ZTV)
Figure / Plate	Figure 6.2, Plate 32				
Summary of Asset and Cultural Significance	The monument is located at the junction of the Meldon Burn, Lyne Water and River Tweed (Figure 6.2) and comprises prehistoric domestic and defensive pit alignments. The monument is culturally significant as it has the ability to inform us about late Neolithic domestic land use and occupation.				
Definition of Setting and Contribution to Cultural Significance	The setting of the monument is defined by its position on a slight terrace above the junctions of the Meldon Burn, Lyne water and River Tweed. The setting of the monument contributes to its cultural significance as the location will pertain to its strategic location.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but situated 5.5 km north in the wider landscape. As shown on Figure 6.2, the Development would not be visible from the monument or in key views over any of the waterways. As such, there is no change to the cultural significance of the monument.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with no change to cultural significance, there is no effect upon the heritage asset. This is **not significant** in terms of the EIA Regulations.				

Plate 32: Close up of SM3269 from Figure 6.3 on left with aerial photograph on right

SM6065 Bents Quarry, lime kilns and quarry

SM6065 Bents Quarry, lime kilns and quarry					
Designation	Scheduled Monument	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	3.5 km NW T12 (Figure 6.2)
Figure / Plate	Figure 6.2, Plate 33				
Summary of Asset and Cultural Significance	The monument comprises the remains of a quarry and a series of lime kilns, one of number of remains associated with the late 18th- and early 19th-century lime industry in southern Scotland. The monument is culturally significant because it displays the well-defined field characteristics of late 18th and early 19th century lime workings, specifically the full range of kiln technology.				
Definition of Setting and Contribution to Cultural Significance	The setting of the monuments is defined by their functional location and link with key transport networks (e.g. the now dismantled railway line to the north and A701 road to the south) and nearby buildings, rather than any reliance on the wider landscape to appreciate its cultural significance.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but part of the wider landscape to the south-east. The Development would be visible in views from the monument across the A701 albeit in in part of the landscape characterised by modern commercial forestry that has limited to no connection with the lime kilns. This represents a negligible change to the cultural significance of the monument.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with a negligible magnitude of change to cultural significance, the effect upon the heritage asset is negligible. This is **not significant** in terms of the EIA Regulations.				

Plate 33: Close up of SM6065 from Figure 6.3 on left with aerial photograph on right

6.4 SELECTED SCHEDULED MONUMENTS BEYOND 5 KM STUDY AREA

Beyond the 5 km Study Area, there are 28 further Scheduled Monuments that have been selected for further consideration as detailed shown in EIA Report Figure 6.3 and detailed in Table A6.3.3. These have been assessed in numerical order by their HES designation number and in groups, where appropriate, as detailed in Table A6.3.3.

Beyond the 5 km Study Area, significant effects have been identified at four Scheduled Monuments at two locations generally focused around hillforts where long distance views contribute to cultural significance. These effects are summarised Table A6.3.3 with the full detailed assessment in subsequent tables.

This Page Intentionally Left Blank

Table A6.3.3 Selected Scheduled Monuments Beyond 5 km Study Area Assessment Summary

Assessment Order and Group	HES Ref.	Title	X	Y	Sensitivity	Magnitude of Change	Significance of Effect
NA	SM1157	The Gowk Stane	320400	657642	High	Negligible	Negligible and Not Significant
NA	SM1163	Camp Hill Fort	319275	659623	High	Negligible	Negligible and Not Significant
Cademuir	SM2441	Cademuir Hillfort	323009	637472	High	Moderate	**Moderate and Significant**
Cademuir	SM2715	Cademuir Hillfort	322448	637084	High	Moderate	**Moderate and Significant**
Cademuir	SM3044	Kirkton Manor, enclosures 550m SE of	322491	637709	High	Slight	Minor and Not Significant
Cademuir	SM3045	Bellanrig settlement, fort & enclosures	323545	637958	High	Moderate	**Moderate and Significant**
Cademuir	SM3166	Bellanrig, settlement SE of	323395	323395	High	Slight	Minor and Not Significant
Forts East of Peebles	SM2681	Horsburgh Castle Farm, settlement 930m NNW of Castle Hill	329158	640068	High	Negligible	Negligible and Not Significant
Forts East of Peebles	SM3028	Janet's Brae, fort 750m E of Peebles	326791	640438	High	Negligible	Negligible and Not Significant
Forts East of Peebles	SM3029	Janet's Brae, fort 550m E of Peebles	326581	640400	High	Negligible	Negligible and Not Significant
Forts East of Peebles	SM3061	SM3061 Tor Hill, fort	327353	638774	High	Negligible	Negligible and Not Significant
Castlehill	SM2787	Castlehill Tower	321425	635455	High	Slight	Minor and Not Significant
Castlehill	SM2959	Castlehill, fort 250m WSW of	321113	635373	High	Slight	Minor and Not Significant
Castlehill	SM3170	Canada Hill, scooped homestead WSW of	321791	634936	High	Slight	Minor and Not Significant

Assessment Order and Group	HES Ref.	Title	X	Y	Sensitivity	Magnitude of Change	Significance of Effect
Tarth Water	SM2905	Blyth cairn	312841	646749	High	Slight	Minor and Not Significant
Tarth Water	SM2990	Blyth Hillfort	312432	645756	High	Slight	Minor and Not Significant
Tarth Water	SM3069	Newmill, enclosures SW of	311542	646152	High	Slight	Minor and Not Significant
Tarth Water	SM3236	Shaw Hill, cairn	311476	645627	High	Slight	Minor and Not Significant
Tarth Water	SM3256	West Mains, enclosure 200 m NE of	313007	644727	High	Slight	Minor and Not Significant
Dawyck (south tweed valley)	SM2950	Easter Dawyck, fort & settlement	319741	637288	High	Slight	Minor and Not Significant
Dawyck (south tweed valley)	SM3059	Kerr's Knowe Fort	318244	638464	High	Slight	Minor and Not Significant
Dawyck (south tweed valley)	SM3068	Syke Hill fort	320155	638064	High	Slight	Minor and Not Significant
NA	SM3039	Venlaw Castle Hotel settlement	325940	641654	High	Negligible	Negligible and Not Significant
NA	SM3051	Woodhouse, Hill Fort	320880	637319	High	Moderate	**Moderate and Significant**
NA	SM3056	Wood Hill, fort & enclosure	320552	633437	High	Negligible	Negligible and Not Significant
Roman Road Group	SM3247	Cock Rig to Linton Muir Roman Road	314838	654162	High	Negligible	Negligible and Not Significant
Roman Road Group	SM3263	Hardgatehead Roman road and turnpike road	312556	649873	High	Negligible	Negligible and Not Significant
NA	SM5742	South Slipperfield, barrows	312672	649501	High	Negligible	Negligible and Not Significant

SM1157 The Gowk Stane,730m ENE of Auchencorth

(SM1157) The Gowk Stane,730m ENE of Auchencorth					
Designation	Scheduled Monument	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	8.7 km N T12
Figure / Plate	Figure 6.3, Plate 34				
Summary of Asset and Cultural Significance	The monument comprises of a sandstone monolith on a small ridge east of Auchencorth Farm Steading with the North Esk River to the north and Hare Burn to the south (Figure 6.3). Dating to the prehistoric period, the stone also features a fragmentary inscription which is thought to be of a later date. The monument is culturally significant as it has the ability to inform us about prehistoric ritual and funerary practices relating to standing stones.				
Definition of Setting and Contribution to Cultural Significance	The setting of the monument is defined by its location within an agricultural field on the south side of the North Esk River. Key views would be northwards over the North Esk River towards Camp Hill Fort (SM1163) which would contribute to understanding its placement within the prehistoric landscape.				
Magnitude of Change to Cultural Significance	The Development would be situated 8.7 km south of the monument, and is not within the setting but part of the wider landscape to the south. The Development would not affect the relationship of the stone to the North Esk River or its relationship with the Camp Hill Fort. This represents a negligible change to the cultural significance of the monument.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with a negligible magnitude of change to cultural significance, the effect upon the heritage asset is negligible. This is **not significant** in terms of the EIA Regulations.				

Plate 34: Close up of SM1157 from Figure 6.3 on left with aerial photograph on right

SM1163 Camp Hill Fort

SM1163 Camp Hill Fort					
Designation	Scheduled Monument	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	10.7 km N T12
Figure / Plate	Figures 6.3 and 6.9, Plate 35				
Summary of Asset and Cultural Significance	The monument comprises the remains of a late prehistoric fort surviving as a series of earth works. The monument lies on a low hill on the south-east edge of the Pentland Hill.				
Definition of Setting and Contribution to Cultural Significance	The setting of the fort is defined by its strategic location on the hill overlooking the River North Esk Valley to the south (Figure 6.3) which allowed for the control and protection of the land and routes through east/west running valley. The relationship to other adjacent contemporary sites in and around this part of the River North Esk Valley reveals patterns of land use that are indicative of the prehistoric political, social and economic landscape in the valley. Key views are south and east across the valley and contribute to the appreciation of the strategic location of the hillfort.				
Magnitude of Change to Cultural Significance	The Development would not affect the relationship of the forts with River North Esk Valley but would be visible in views southwards (Figure 6.9) in a part of the landscape characterised by modern commercial forestry that is markedly different from wider and more open valley. The introduction of the turbines into these views is a negligible change to the understanding, appreciation or experience of the heritage asset as the fort has limited connection to the Cloich Hills other than as backcloth landscape context. This represents a negligible change to the cultural significance of the monument.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with a negligible magnitude of change in the experience of the heritage asset, there is a negligible effect upon the heritage asset as a result of the Development. This is **not significant** in terms of the EIA Regulations.				

Plate 35: Close up of SM1163 from Figure 6.3 on left with aerial photograph on right

Cademuir Group

SM2441 Cademuir Hill, fort 1200m W of; **SM2715 Cademuir Hill, fort 1800m WSW of;** **SM3044 Kirkton Manor, enclosures 550m SE of;** **SM3045 Bellanrig, settlement, fort & enclosures 870m SE of; and** **SM3166 Bellanrig, settlement SE of**					
Designation	Scheduled Monuments	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	9 km SE T2
Figure / Plate	Figures 6.3 and 5.2.19, Plate 36				
Summary of Asset and Cultural Significance	All of the monuments are situated on Cademuir Hill, (Figure 6.3) with the forts (SM2441) and (SM2715) situated on summits of the ridgeline with scheduled settlements (SM3045, SM3166, SM3044) on the north facing slopes of Cademuir Hill. The settlements would have supported the forts' strategic and defensive location above the River Tweed and Manor Water. These monuments are culturally significant as a collection of assets representing continuity of prehistoric occupation within the Tweed Valley, with the ability to inform our understanding of prehistoric settlement and land use, most notably social, political and economic links within the Tweed Valley.				
Definition of Setting and Contribution to Cultural Significance	The setting of the forts is defined by their prominent location, allowing for the control and protection of the land and routes through north/south running Manor Water to the west and east/west Hundleshope Valley to the south into the flat agricultural land of the east/west Tweed Valley to the north. Their relationship to one another and adjacent contemporary sites in and around the valleys, would have defined the prehistoric community in the valley. The cultural significance of monuments is defined by their relationship to one another and adjacent contemporary sites to the west across the Manor Water towards Woodhouse fort (SM3051), northwards across the Tweed Valley towards the Meldons (SM114, SM2703), and southwards across the Hundleshope valley towards Chester Hill fort (SM2991). This relationship indicates patterns of land use that reflect prehistoric political, social and economic landscape in the valley. The relationship of the forts over the waterways and valleys of Manor Water, Hundleshope Burn, and River Tweed would have served to dominate these routes into and out of Tweed Valley. Strategic relationships and intervisibility with other hill forts, notably the Meldons to the north, Woodhouse fort to the west, and Chesterhill fort to the south would have further reinforces the strategic dominance of this society over the Tweed Valley. As such, the key views are over the valleys and between the scheduled forts as this intervisibility between prehistoric hill forts, is an integral element of cultural significance allowing for the appreciation of these strategic and defensive prehistoric settlement and patterns of land use.				
Magnitude of Change to Cultural Significance	The Development would not affect the relationship of the forts with the waterway valleys or interfere with key views from the fort towards forts to the west (SM3051) or south (SM2991) which are the key elements of its setting and cultural significance. However, the Development would be visible in views northwards towards the Meldons due to the forts' elevated and prominent position on the south side of the Tweed Valley (Figure 5.2.19). The turbines would be visible behind views towards White Meldon (SM114) albeit in part of the backclothed landscape characterised by modern commercial forestry that is markedly different from the upland moorland context that would have characterised the prehistoric landscape. The introduction of the turbines into views southwards at a distance of 9 km (noting that the consented scheme view was similar) is an appreciable change to the understanding, appreciation or experience of the forts and a slight change to the settlements as their cultural significance does not rely on long distance views. This represents a				

SM2441 Cademuir Hill, fort 1200m W of; **SM2715 Cademuir Hill, fort 1800m WSW of;** **SM3044 Kirkton Manor, enclosures 550m SE of;** **SM3045 Bellanrig, settlement, fort & enclosures 870m SE of; and** **SM3166 Bellanrig, settlement SE of**	
	moderate change to the cultural significance of the forts and a slight change to the settlements.
Statement of Significance of Effect	For the forts (SM2441, SM2715, SM3045) as heritage asset of high sensitivity with a moderate magnitude of change in the experience of the forts there is a moderate effect upon the heritage asset as a result of the Development. This is **significant** in terms of the EIA Regulations. For the settlements (SM3044, SM3166), as heritage asset of high sensitivity with a slight magnitude of change in the experience, there is a minor effect upon the heritage asset as a result of the Development. This **is not significant** in terms of the EIA Regulations.

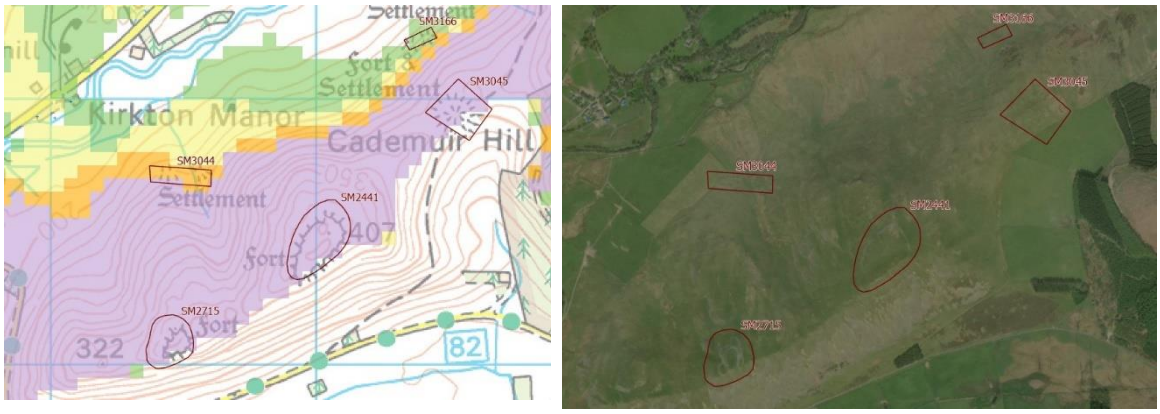


Plate 36: Close up of SM2441, SM2715, SM3044, SM3045 and SM3166 from Figure 6.3 on left with aerial

Forts East of Peebles

SM2681 Horsburgh Castle Farm, settlement 930m NNW of Castle Hill **SM3028 Janet's Brae, fort 750m E of Peebles** **SM3029 Janet's Brae, fort 550m E of Peebles** **SM3061 Tor Hill, fort**					
Designation	Scheduled Monuments	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	9 km SE T3
Figure / Plate	Figure 6.3, Plate 37				
Summary of Asset and Cultural Significance	All the prehistoric monuments are located on the eastern side of Peebles on the north (SM3061) and south (SM2681, SM3028, SM3029) sides of the Tweed Valley (Figure 6.3). These monuments are culturally significant as a collection of assets representing continuity of prehistoric occupation in the Tweed Valley with the ability to inform our understanding of prehistoric settlement and land use, most notably social, political and economic links within the Tweed Valley.				
Definition of Setting and Contribution to Cultural Significance	The setting of the forts is defined by their strategic location on the ridgelines overlooking the Tweed Valley, allowing for the control and protection of the land and routes through east/west running valley. The relationship to one another and adjacent contemporary sites in and around this part of the Tweed Valley reveals patterns of land use that are indicative of the prehistoric political, social and economic landscape in the valley. The town of Peebles to the west at the junction of the River Tweed and Eddleston Water limits the connection of this part of the landscape with the Tweed Valley to the west of Peebles. As such, the setting and cultural significance of the forts relies on their strategic relationship and intervisibility with each other. Key views are between the scheduled monuments north/south across the part of the River Tweed helped to control the routes through the valley and contribute to the appreciation of intervisibility between prehistoric hill forts, reflective of prehistoric settlement and land use.				
Magnitude of Change to Cultural Significance	The Development would not affect the relationship of the forts with the Tweed Valleys or interfere with key views between the forts which are the key elements of its setting and cultural significance. However, the Development would be visible in periphery views northwards in a part of the landscape characterised by modern commercial forestry that is markedly different from the upland moorland context that would have characterised the prehistoric landscape. The introduction of the turbines into periphery views northwards at a distance of 9 km with the town of Peebles in the foreground (noting that the consented scheme view was similar) is a negligible change to the understanding, appreciation or experience of the heritage asset. This represents a negligible change to the cultural significance of the monument.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with a negligible magnitude of change in the experience of the heritage asset, there is a negligible effect upon the heritage asset as a result of the Development. This is **not significant** in terms of the EIA Regulations.				

Plate 37: Close up of SM2681, SM3028, SM3029 and SM3061 from Figure 6.3 on left with aerial photograph on

Castlehill Group

SM2787 Castlehill tower **SM2959 Castlehill, fort 250m WSW of** **SM3170 Canada Hill, scooped homestead WSW of**					
Designation	Scheduled Monuments	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	10.6 km S T2
Figure / Plate	Figure 6.3, Plate 38				
Summary of Asset and Cultural Significance	All the prehistoric monuments are located on either side of Manor Water (Figure 6.3) with the tower and fort to west and the homestead to the east. The location on the side of the valley at lower elevations to the nearby forts of Woodhouse (SM3051) and Cademuir forts to the north indicates that these would have supported the forts as strategic and defensive locations. These monuments are culturally significant as a collection of assets representing continuity of prehistoric occupation along the Manor Water valley, with the ability to inform our understanding of prehistoric settlement and land use, most notably social, political and economic links within the Tweed Valley.				
Definition of Setting and Contribution to Cultural Significance	The setting of the monuments is defined by their relationship to one another and adjacent contemporary sites in and around the Manor Water, which indicates strategic patterns of land use that are indicative of the prehistoric political, social and economic landscape in the valley. The monuments are strategically located to support the larger forts to the north with the control of the valleys leading into Tweed Valley. Key views are north/south along the Manor Water, and northwards to the Woodhouse fort (SM3051) and Cademuir forts. As such, their relationship with the Manor Valley and those associated views contribute to the cultural significance.				
Magnitude of Change to Cultural Significance	The Development would not affect the relationship of the fort with the Manor Water Valley or views across the waterway towards each other. However, the Development would be visible in views northwards up the Manor Valley towards the Tweed Valley albeit slightly restricted by their lower elevation within the valley. These views would be marginal and towards part of the landscape characterised by modern commercial forestry that is markedly different from the upland moorland context of the forts to the north (Woodhouse and Cademuir). The introduction of the turbines into views northwards (noting that the consented scheme view was similar) is a slight change to the understanding, appreciation or experience of the heritage asset. This represents a slight change to the cultural significance of the monument.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with a slight magnitude of change to cultural significance, the effect upon the heritage asset is minor. This is **not significant** in terms of the EIA Regulations.				

Plate 38: Close up of SM2787, SM2959 and SM3170 from Figure 6.3 on left with aerial photograph on right

Tarth Water Group

SM2990 Blyth Hill, fort **SM2905 Blyth, cairn 1050m NNW of** **SM3236 Shaw Hill Cairn** **SM3069 Newmill, enclosures SW of** **SM3256 West Mains, enclosure 200 m NE of**					
Designation	Scheduled Monuments	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	7.5 km W of T2
Figure / Plate	Figure 6.3, Plate 39				
Summary of Asset and Cultural Significance	All the prehistoric monuments are indicative of the wider pattern of prehistoric settlement along the valleys and waterways in this case the upper reaches of the Tarth Water. They are located on either side of the Tarth Water (Figure 6.3) with the Blyth fort and cairn to east and the settlement and Shaw Hill cairn to the west. These monuments are culturally significant as a collection of assets representing continuity of prehistoric occupation along the Tarth Water valley, with the ability to inform our understanding of prehistoric settlement and land use, most notably social, political and economic links within the wider prehistoric landscape in and around the Tweed Valley.				
Definition of Setting and Contribution to Cultural Significance	The setting of the monuments is defined by their relationship to one another and adjacent contemporary sites in and around the Tarth Water, which indicates strategic patterns of land use that are indicative of the prehistoric political, social and economic landscape in the valley. The monuments are strategically located to support the more elevated fort (SM2990) with the control of the Tarth Water valley. Key views are north-west /south-east along the Tarth Water. As such, their relationship with the each other and the Tarth Valley and those associated views contribute to the cultural significance.				
Magnitude of Change to Cultural Significance	The Development would not affect the relationship of any of the monuments with Tarth Valley or views across the waterway towards each other. However, the Development would be visible in views eastwards as part of the distant backclothed landscape to the east in views towards SM2840 Henderland Hill Fort. These views would be towards part of the landscape characterised by modern commercial forestry that is markedly different from the upland moorland context that characterised the surviving prehistoric landscape. The introduction of the turbines into views eastwards (noting that the consented scheme view was similar) is a slight change to the understanding, appreciation or experience of the heritage asset. This represents a slight change to the cultural significance of the monument.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with a slight magnitude of change to cultural significance, the effect upon the heritage asset is minor. This is **not significant** in terms of the EIA Regulations.				

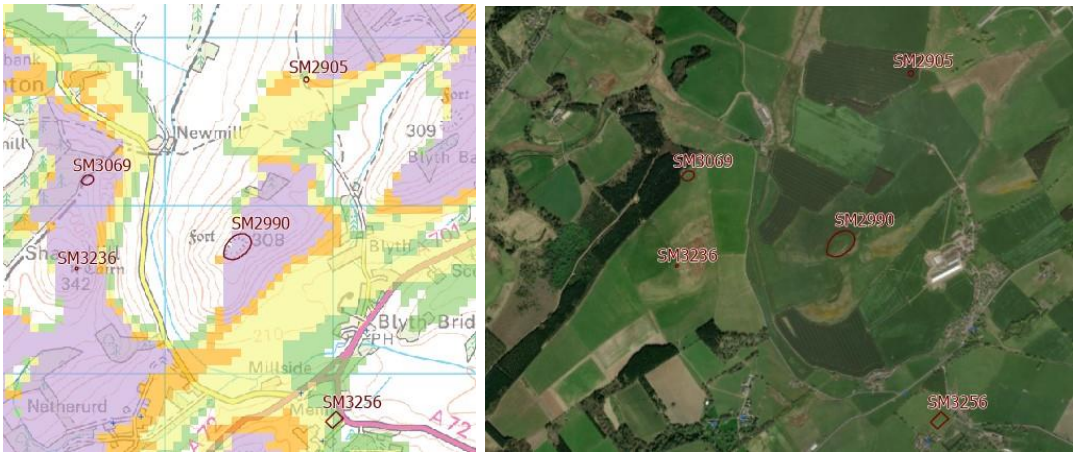


Plate 39: Close up of SM990, SM2905, SM3069 and SM3256 from Figure 6.3 on left with aerial photograph on right

Dawyck – South Tweed Valley forts

SM2950 Easter Dawyck, fort & settlement **SM3059 Kerr's Knowe Fort** **SM3068 Syke Hill fort**					
Designation	Scheduled Monuments	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	8 km S of T2
Figure / Plate	Figures 6.3 and 6.6, Plate 40				
Summary of Asset and Cultural Significance	All of these forts are indicative of the wider pattern of prehistoric settlement along the valleys and waterways in this case the lower portion of the Tweed Valley that runs north/south from the Lyne Water. They are located on either side of the River Tweed with SM2950 and SM3068 to the east and SM3059 to the west (Figure 6.3). These monuments are culturally significant as a collection of assets representing continuity of prehistoric occupation along the Tweed Valley, with the ability to inform our understanding of prehistoric settlement and land use, most notably social, political and economic links within the wider prehistoric landscape in and around the Tweed Valley.				
Definition of Setting and Contribution to Cultural Significance	The setting of the monuments is defined by their relationship to one another and adjacent contemporary sites in and around this part of the Tweed Valley, which indicates strategic patterns of land use that are indicative of the prehistoric political, social and economic landscape in the valley. The forts are strategically located at elevated positions to control the valleys with key views north-east and south-west along the River Tweed with Meldons dominating the terminus of the view to the north. As such, their relationship with this part of the Tweed Valley and those associated views contribute to the cultural significance.				
Magnitude of Change to Cultural Significance	The Development would not affect the relationship of the fort with the Tweed Valley or interfere with key views from the fort towards the Meldons (Figure 6.6) which are the key elements of its setting and cultural significance. However, the Development would be visible in the periphery to the left of Black Meldon in views northwards as shown on Figure 6.6. As this part of the landscape is characterised by modern commercial forestry that is markedly different from the upland moorland context of the forts and the Meldons, the introduction of the turbines into views eastwards (noting that the consented scheme view was similar) is a slight change to the understanding, appreciation or experience of the heritage asset as the key relationships and visibility with the Meldon forts remains uninterrupted. This represents a slight change to the cultural significance of the monument.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with a slight magnitude of change to cultural significance, the effect upon the heritage asset is minor. This is **not significant** in terms of the EIA Regulations.				

Plate 40: Close up of SM2950, SM3059 and SM3068 from Figure 6.3 on left with aerial photograph on right

SM3039 Venlaw Castle Hotel settlement

SM3039 Venlaw Castle Hotel settlement					
Designation	Scheduled Monument	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	7 km SE T3
Figure / Plate	Figure 6.3, Plate 41				
Summary of Asset and Cultural Significance	Situated in a clearing within forestry, this monument is a prehistoric settlement situated below the crest of the ridge (Figure 6.3). The monument is culturally significant as it has the ability to provide further information about prehistoric land use and occupation.				
Definition of Setting and Contribution to Cultural Significance	The setting of the monument is defined by its elevated position on the eastern side of the Eddleston Valley. It is not located on the summit but just below Glenbield and is likely associated with the prehistoric settlements around Ven Law to the south (undesignated). The key elements of setting that contribute to its cultural significance is its association with the Eddleston Water and Tweed River junction to the south as part of the Ven law settlements. This part of the landscape has been drastically altered with the town of Peebles now characterising this junction and the asset being surrounded by forestry.				
Magnitude of Change to Cultural Significance	The Development lies on the eastern side of the Eddleston Valley, 7 km north-west of the monument. The Development would not affect the relationship of the fort with the north/south running Eddleston Valley to the east or the remnants of the prehistoric landscape to the south, albeit drastically altered by the town of Pebbles. However, should forestry be felled, the Development would be visible in periphery views north-westwards across the Eddleston Valley. The introduction of the turbines into this view (noting that the consented scheme view was similar) represents a negligible change to the understanding, appreciation or experience of the heritage asset generally due to the already altered landscape context with the town of Peebles. This represents a negligible change to the cultural significance of the monument.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with a negligible magnitude of change to cultural significance, the effect upon the heritage asset is negligible. This is **not significant** in terms of the EIA Regulations.				

Plate 41: Close up of SM3039 from Figure 6.3 on left with aerial photograph on right

SM3051 Woodhouse, Hill Fort

SM3051 Woodhouse, Hill Fort					
Designation	Scheduled Monuments	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	8.9 km S of T3
Figure / Plate	Figures 6.3 and 6.12, Plate 42				
Summary of Asset and Cultural Significance	Woodhouse Hill fort is a fort situated on the west side of the Manor water opposite the Cademuir hillforts to its east (Figure 6.3). The monument is culturally significant as it represents continuity of prehistoric occupation along the Manor Water and Tweed Valleys, with the ability to inform our understanding of prehistoric settlement and land use, most notably social, political and economic links within the wider prehistoric landscape in and around the Tweed Valley.				
Definition of Setting and Contribution to Cultural Significance	The setting of the monument is defined by its relationship to adjacent contemporary sites in and around this part of the Tweed Valley, most notably the Cademuir forts to the east, which reflects patterns of land use that are indicative of the prehistoric political, social and economic landscape in the valley. The fort is strategically located at elevated positions to control the valleys with key views north-east and south along the Manor Water and east towards the Cademuir hillforts, noting that the Meldons dominate the terminus of the view to the north. As such, their relationship with this part of the Tweed Valley and those associated views contribute to the cultural significance.				
Magnitude of Change to Cultural Significance	The Development would not affect the relationship of the fort with the Manor Water Valley or interfere with key views east towards the Cademuir hillforts or north-east/south along the Manor Water. However, the Development would be visible in views northwards in the same line of sight behind Black Meldon. As this part of the landscape is characterised by modern commercial forestry that is markedly different from the upland moorland context of the forts and the Meldons, the introduction of the turbines into this sight line northwards (noting that the consented scheme view was similar) is an appreciable change to the understanding, appreciation or experience of the heritage asset. This represents a moderate change to the cultural significance of the monument.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with a moderate magnitude of change in the experience of the heritage asset, there is a moderate effect upon the heritage asset as a result of the Development. This is **significant** in terms of the EIA Regulations.				

Plate 42: Close up of SM3051 from Figure 6.3 on left with aerial photograph on right

SM3056 Wood Hill, fort and enclosure / Macbeth's Castle Fort

SM3056 Wood Hill, fort and enclosure / Macbeth's Castle Fort					
Designation	Scheduled Monuments	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	8.9 km S of T3
Figure / Plate	Figures 6.3 and 6.8, Plate 43				
Summary of Asset and Cultural Significance	The fort situated on the west side of the Manor Water (Figure 6.3). The monument is culturally significant as a collection of assets representing continuity of prehistoric occupation along the Manor Water and Tweed Valleys, with the ability to inform our understanding of prehistoric settlement and land use, most notably social, political and economic links within the wider prehistoric landscape in and around the Tweed Valley.				
Definition of Setting and Contribution to Cultural Significance	The setting of the monument is defined by its relationship to adjacent contemporary sites in and around this part of the Manor Water Valley, most notably its strategic location with key views north and south along the Manor Water. As such, their relationship with this part of the Manor Water Valley and those associated views contribute to the cultural significance.				
Magnitude of Change to Cultural Significance	The Development would not affect the relationship of the fort with the Manor Water Valley or interfere with key views north/south along the Manor Water. The Development would be visible in views northwards though beyond intervening hills with turbines tips visible above forestry (Figure 6.8). As this part of the landscape is characterised by modern commercial forestry that is markedly different from the upland moorland context of the prehistoric landscape, the introduction of the turbines into this sight line northwards (noting that the consented scheme view was similar) is a negligible change to the understanding, appreciation or experience of the heritage asset. This represents a negligible change to the cultural significance of the monument.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with a negligible magnitude of change in the experience of the heritage asset, there is a negligible effect upon the heritage asset as a result of the Development. This is **not significant** in terms of the EIA Regulations.				

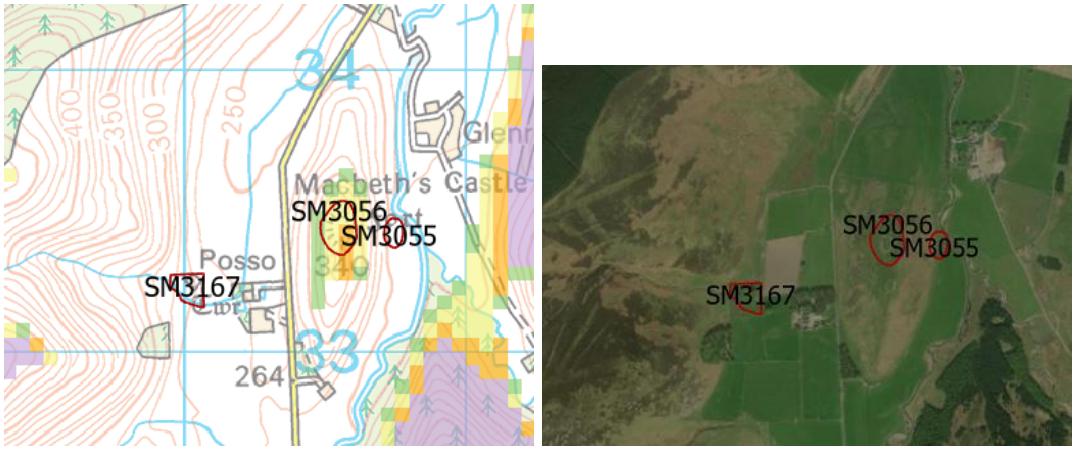


Plate 43: Close up of SM3056 from Figure 6.3 on left with aerial photograph on right

Roman Road Group

SM3247 Cock Rig to Linton Muir Roman Road **SM3263 Hardgatehead Roman road and turnpike road**					
Designation	Scheduled Monuments	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	7.6 km W T12
Figure / Plate	Figure 6.3, Plate 44				
Summary of Asset and Cultural Significance	These monuments are two remnants of a Roman Road that runs north and parallel to the A702 (Figure 6.3). The monuments are culturally significant as they have the ability to aid our understanding of Roman occupation and key travel corridors in this part of Scotland.				
Definition of Setting and Contribution to Cultural Significance	The setting of these monuments is defined by their slightly elevated position along a ridge line on the north side of the A702 The setting of these monument is limited as its key function is a means of travel though it elevated position along the ridgeline likely served to monitor lower elevations and keep the road out of the flood plain.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but part of the wider landscape 7.6 km to the east of the monuments. There is limited to no connection between the road and this part of the landscape so that there is no change to setting or its cultural significance.				
Statement of Significance of Effect	As heritage assets of high sensitivity with no change to cultural significance, there is no effect upon the heritage assets. This is **not significant** in terms of the EIA Regulations.				

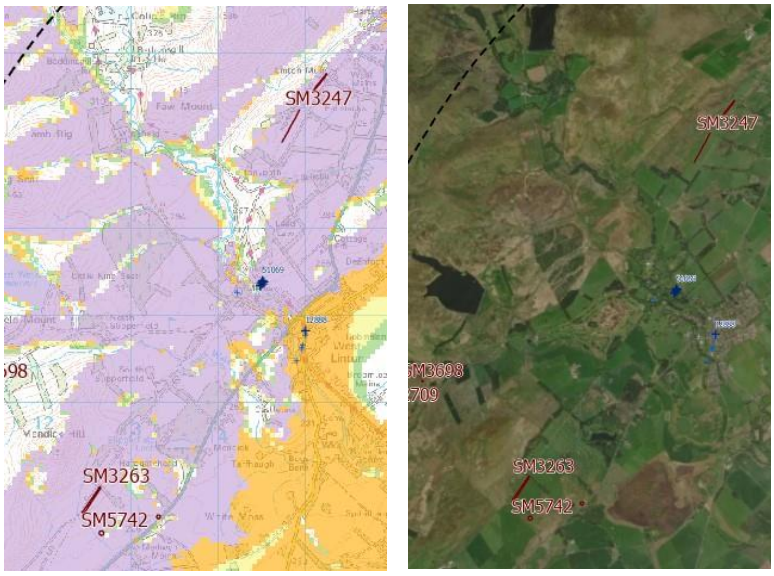


Plate 44: Close up of SM3247 and SM3263 from Figure 6.3 on left with aerial photograph on right

SM5742 South Slipperfield, barrows

SM5742 South Slipperfield, barrows					
Designation	Scheduled Monuments	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	7.5 km W T2
Figure / Plate	Figure 6.3, Plate 45				
Summary of Asset and Cultural Significance	The monument comprises two grassy barrows, prehistoric burial mounds, which are situated on the top of low knolls in a field of pasture. Both monuments are culturally significant as they have the ability to aid our understanding of prehistoric ritual and funerary practices.				
Definition of Setting and Contribution to Cultural Significance	The setting of these monuments is defined their elevated position above the A702 and the Lyne Water to the east (Figure 6.3). The setting of these monument contributes to their cultural significance as it may play a ritualistic element in their placement within the landscape.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but part of the backclothed landscape beyond the Lyne Water to the east. The Development would not interfere with views south-eastwards across the more open lower elevations leading to the Lyne Water. This represents a negligible change to the cultural significance of the monument.				
Statement of Significance of Effect	As a heritage asset of high sensitivity with a negligible magnitude of change to cultural significance, the effect upon the heritage asset is negligible. This is **not significant** in terms of the EIA Regulations.				

Plate 45: Close up of SM5742 from Figure 6.3 on left with aerial photograph on right

6.5 INVENTORY GARDEN AND DESIGNED LANDSCAPE AND ASSOCIATED LISTED BUILDINGS

There is one Garden and Designed Landscape (GDL) within the 5 km Study Area: Portmore GDL. Within Portmore GDL, there are two listed buildings:

- Category A listed Portmore House (LB2037); and
- Entrance Gateway and Lodge (LB2038).

A group assessment of these is presented below with a localised significant effect identified at one location within the GDL looking across the Category A Listed Portmore House.

Portmore Group: Portmore (GDL00318)

Portmore (GDL00318) **Category A Listed Portmore House (LB2037)** **Category C Listed Entrance Gateway and Lodge, Portmore (LB2038)**					
Designation	Gardens and Designed Landscapes, Category A Listed Building and Category C Listed Building	**Sensitivity (Value)**	High	**Distance and Direction to Nearest Turbine**	3.8 km E T10 (Figure 6.2)
Figure / Plate	Figures 6.2 and 5.2.9, Plate 46				
Summary of Asset and Cultural Significance	Located on a ridge above the A703 and the Eddleston Water, Portmore Garden and Designed Landscape (GDL) contains Portmore Entrance Gateway and Lodge on the western boundary and Portmore House in the central southern portion of the GDL. The GDL forms the estate grounds of Portmore House, and is accessed via a drive on the A703 where the entrance gateway and lodge are situated. Built from stone, the lodge features crowsteps and a bay window. Portmore House is a red sandstone stately home designed by Bryce in the Scottish Jacobean style with building beginning in the 1850s. It has been built on the site of the former village of Northshield which dates to the eighteenth century. Within the grounds there is a walled garden to the north of the house and a formal garden to the east. The Garden and Designed Landscape is characterised by extensive woodland cover which was planted in the early nineteenth century and neat lawns fringed by mature woodland as well as Victorian sunken terraced gardens. The GDL is culturally significant as it forms the setting of the buildings contained within it and is of high artistic and historical value. Both Portmore House and the Entrance Gateway and Lodge are architecturally and historically significant.				
Definition of Setting and Contribution to Cultural Significance	The GDL is located on the moderately steep slower slopes of the Eddleston Water Valley. To the east the land rises steeply towards the Moorfoot Hills. The blocks of woodland within the GLD limits much of its connection to the more distant landscape and provides an insular setting for Portmore House and lodge. From within the walled garden, views are limited by rising topography and woodland with key views from the house southwards over the open lawn towards the Meldons.				
Magnitude of Change to Cultural Significance	The Development would be situated 3.8 km west, on the western edge of the Eddleston Water Valley. The Development would not be in key views from the house looking southwards across the open lawn or from within the designed gardens. The turbines would be visible from within the agricultural open fields to the north of the GDL where the ground is open or where tree cover is sparse. For the majority of these views, visibility would only be glimpsed and is not an integral part of the cultural significance of the GDL or listed buildings. It is likely that greater visibility of turbines would be available from the upper stories of the house though these would be periphery in views southwards and glimpsed through trees in views eastwards.				

Portmore (GDL00318) **Category A Listed Portmore House (LB2037)** **Category C Listed Entrance Gateway and Lodge, Portmore (LB2038)**	
	There is a view from a bench of the Category A house above the terraced formal garden to the east of the house where the turbines would be visible above the house in the same sightline (See LVIA VP 5.2.9). Whilst it is clear that this is separate part of the landscape not affiliated with the GDL, the presence of the turbines does detract from the appreciation of the house at this one specific location. This represents a moderate change to the appreciation of the cultural significance of the Category A listed building with the lodge and GDL as a whole receiving a slight change.
Statement of Significance of Effect	As a Category A listed building, Portmore House is of high sensitivity with a moderate magnitude of change in the experience of the heritage asset but only from one viewpoint looking across the asset, there is a moderate effect upon the heritage asset as a result of the Development. This is **significant** in terms of the EIA Regulations. For the remaining heritage assets of high sensitivity, there is a slight magnitude of change and a minor effect as a result of the Development. This is **not significant** in terms of the EIA Regulations.

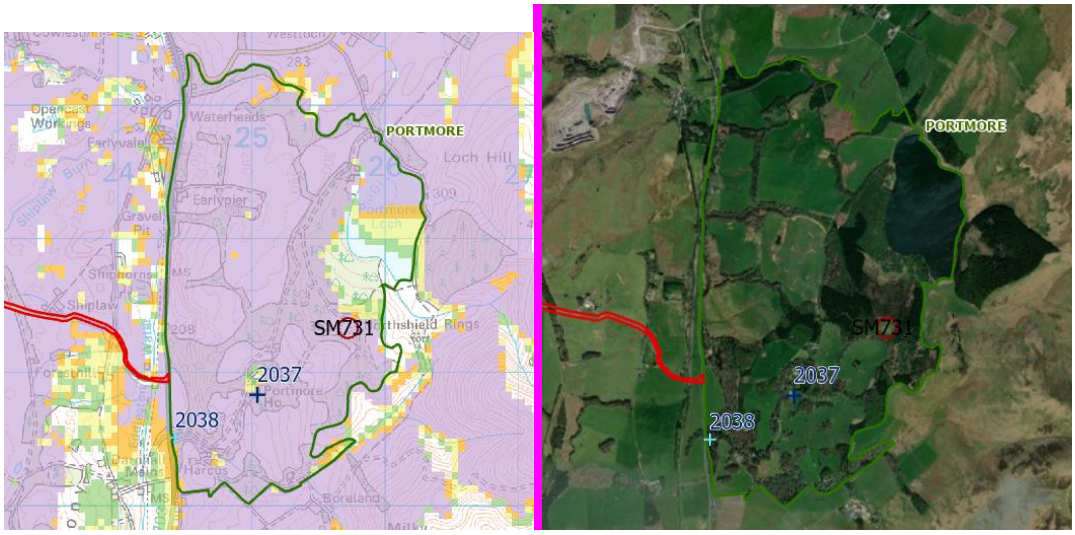


Plate 46: Close up of Portmore GDL from Figure 6.3 on left with aerial photograph on right

6.6 LISTED BUILDINGS AND CONSERVATION AREAS WITHIN 5 KM STUDY AREA

There are no Listed Buildings or Conservation Areas within the CSA. Within the 5 km Study Area there are 64 Listed Buildings (excluding the two listed buildings assessed as part of the Portmore GDL) and one Conservation Area as shown in EIA Report Figure 6.2 and detailed in Table A6.3.4. These have been assessed in numerical order by their HES designation number and in groups, where appropriate, as detailed in Table A6.3.4 with the full detailed assessment in subsequent tables.

This Page Intentionally Left Blank

Table A6.3.4 Listed Buildings and Conservation Areas in 5 km Study Area Summary Assessment

Assessment Order and Group	HES Ref.	Title	Category	ZTV	X	Y	Sensitivity	Magnitude of Change	Significance of Effect
Eddleston Conservation Area (CA)	157	The Horse Shoe Inn, Eddleston	C	Y	324304	647202	Medium	Slight	Minor and Not Significant
Eddleston CA	2020	Eddleston Parish Church and Graveyard	B	Y	324396	647201	Medium	Slight	Minor and Not Significant
Eddleston CA	2021	Moredun, And Adjoining 2 Cottages (Glen Nevis and Old School House)	B	Y	324330	647212	Medium	Slight	Minor and Not Significant
Eddleston CA	2022	Eddleston Village Nos. 1-23 And 2-22. Station Road	B	Y	324170	647080	Medium	Slight	Minor and Not Significant
Eddleston CA	2023	Eddleston Bridge Eddleston	C	Y	324201	646978	Medium	Slight	Minor and Not Significant
NA	2035	Cringletie House, Including Lodges, Walled Garden, Sundial and Dovecot	B	N	323481	644540	Medium	Negligible	Negligible and Not Significant
NA	2039	Old Harehope	B	Y	320017	644176	Medium	Slight	Minor and Not Significant
Barony Castle	2040	Black Barony Hotel	B	Y	323639	647269	Medium	Negligible	Negligible and Not Significant
Barony Castle	2041	Ice House, Black Barony.	B	Y	323670	647351	Medium	Negligible	Negligible and Not Significant
Barony Castle	2042	Summerhouse, Black Barony	B	N	323490	647289	Medium	Negligible	Negligible and Not Significant
Barony Castle	2043	Bellevue Temple In Former Policies of Black Barony.	C	Y	323256	647051	Medium	Negligible	Negligible and Not Significant
Barony Castle	51957	Barony Castle Hotel, The Great Polish Map of Scotland	B	Y	323653	647177	Medium	Negligible	Negligible and Not Significant

Assessment Order and Group	HES Ref.	Title	Category	ZTV	X	Y	Sensitivity	Magnitude of Change	Significance of Effect
Spitalhaugh	8334	Paulswell Farmhouse and Steading	C	Y	315947	649308	Medium	Slight	Minor and Not Significant
Spitalhaugh	8361	Spitalhaugh House Including Stable and Bridge	A	Y	316270	649662	High	Slight	Minor and Not Significant
Spitalhaugh	51628	Spitalhaugh, Doocot House	C	Y	316205	649693	Medium	Slight	Minor and Not Significant
Scotstoun	8337	Castlecraig, Entrance Gates and Twin Lodges.	B	N	313917	644507	Medium	Negligible	Negligible and Not Significant
Scotstoun	15169	Scotstoun House	B	N	314201	645415	Medium	Negligible	Negligible and Not Significant
Scotstoun	15170	Stable Square, Scotstoun	C	N	314269	645324	Medium	Negligible	Negligible and Not Significant
Newlands	13862	Newlands Parish Church	B	N	316137	646724	Medium	Negligible	Negligible and Not Significant
Newlands	15136	Newlands Manse	B	N	316135	646603	Medium	Negligible	Negligible and Not Significant
Newlands	15137	Newlands Old Kirk	B	N	316124	646564	Medium	Negligible	Negligible and Not Significant
Newlands	15138	Mackay Of Scotstoun Tomb in Kirkyard	B	N	316107	646550	Medium	Negligible	Negligible and Not Significant
Newlands	15139	Bridgend Cottage and Camitswalls	B	N	316067	646676	Medium	Negligible	Negligible and Not Significant
Newlands	15140	Newlands Bridge	B	N	316042	646650	Medium	Negligible	Negligible and Not Significant
Hallyne	13896	Hallyne House	B	N	319236	640541	Medium	Negligible	Negligible and Not Significant
Hallyne	15357	Lyne Parish Church	B	N	319178	640524	Medium	Negligible	Negligible and Not Significant

Assessment Order and Group	HES Ref.	Title	Category	ZTV	X	Y	Sensitivity	Magnitude of Change	Significance of Effect
Hallyne	15358	The Beggar Path Bridge	B	N	320126	640455	Medium	Negligible	Negligible and Not Significant
Hallyne	19742	Five Mile Bridge	B	N	318589	640764	Medium	Negligible	Negligible and Not Significant
Whim	13898	Smithy Cottages, Near Whim	C	Y	321269	653097	Medium	Slight	Minor and Not Significant
Whim	15150	Cistern, In Policies of Whim House	C	N	321426	653412	Medium	Slight	Minor and Not Significant
Whim	15151	Cowden Lodge at Drive Entrance to Whim House	B	Y	321469	653326	Medium	Slight	Minor and Not Significant
Whim	15180	Whim House (Now the White House Hotel)	B	Y	321353	653688	Medium	Slight	Minor and Not Significant
Whim	15181	Ice House, In Policies of Whim House	B	Y	321389	653513	Medium	Slight	Minor and Not Significant
Whim	15182	Dovecot, Whim House	C	Y	321513	653447	Medium	Slight	Minor and Not Significant
Whim	19724	Ed Court of Offices, Whim House	A	Y	321402	653578	High	Slight	Minor and Not Significant
Romanno	15141	Old Romanno Bridge Over the Lynne Water	B	Y	315954	647986	Medium	Slight	Minor and Not Significant
Romanno	15166	Romanno Bridge Hotel and Adjoining House and Two Cottages	B	N	316089	648003	Medium	Slight	Minor and Not Significant
Romanno	19717	Romanno Toll	B	N	316073	648013	Medium	Slight	Minor and Not Significant
Romanno	19722	Romanno Post Office and Adjoining Range	B	N	316089	648072	Medium	Slight	Minor and Not Significant
NA	15152	Flemington Tower	B	Y	316680	645161	Medium	Slight	Minor and Not Significant

Assessment Order and Group	HES Ref.	Title	Category	ZTV	X	Y	Sensitivity	Magnitude of Change	Significance of Effect
Drochil Castle	15171	Drochil Castle Farm House	C	N	316303	643463	Medium	Negligible	Negligible and Not Significant
Drochil Castle	15172	Tarth Bridge Over Tarth Water	C	N	316406	642921	Medium	Negligible	Negligible and Not Significant
Macbiehill	15173	Macbiehill Gateway And Lodge	B	Y	318898	651543	Medium	Negligible	Negligible and Not Significant
Macbiehill	15174	Beresford Burial Vault	C	Y	319034	651670	Medium	Negligible	Negligible and Not Significant
Lamancha	15175	Lower Grange	C	N	319628	652019	Medium	Negligible	Negligible and Not Significant
Lamancha	15176	Lamancha	B	N	319949	652255	Medium	Negligible	Negligible and Not Significant
Lamancha	15177	Sundial, Lamancha	A	N	319954	652238	High	Negligible	Negligible and Not Significant
Lamancha	15178	Entrance Gateway, Lamancha	B	N	320198	652060	Medium	Negligible	Negligible and Not Significant
Lamancha	15179	Madrisa Farmhouse and Steading, Lamancha	C	N	320599	652317	Medium	Negligible	Negligible and Not Significant
Lyne Station	15208	Edston Toll (Also Known as Lyne Toll)	C	N	321139	640106	Medium	Negligible	Negligible and Not Significant
Lyne Station	19665	Lyne Viaduct	B	N	320946	640006	Medium	Negligible	Negligible and Not Significant
Lyne Station	19741	Lynesmill Bridge	B	N	320926	640096	Medium	Negligible	Negligible and Not Significant
Rosetta	15209	Rosetta House	B	N	324394	641403	Medium	Negligible	Negligible and Not Significant
Rosetta	15210	Rosetta, Walled Garden and Garden Building	C	N	324366	641341	Medium	Negligible	Negligible and Not Significant

Assessment Order and Group	HES Ref.	Title	Category	ZTV	X	Y	Sensitivity	Magnitude of Change	Significance of Effect
Rosetta	19728	Rosetta Stables	B	N	324363	641453	Medium	Negligible	Negligible and Not Significant
Rosetta	48932	Standalane Cottage	C	N	324452	641633	Medium	Negligible	Negligible and Not Significant
Chapelhill	15211	Chapelhill Farmhouse and Courtyard Farm Buildings	B	Y	324528	642165	Medium	Negligible	Negligible and Not Significant
Chapelhill	15212	Chapel Hill Bridge	B	Y	324656	642187	Medium	Negligible	Negligible and Not Significant
Winkston	15213	Winkston Farm House	B	Y	324489	643051	Medium	Negligible	Negligible and Not Significant
Winkston	15214	Winkston Tower House	B	Y	324496	643070	Medium	Negligible	Negligible and Not Significant
NA	15215	Redscarhead, George Meikle Kemp Memorial (At Moy Hall)	B	Y	323990	644033	Medium	Negligible	Negligible and Not Significant
Wester Happrew and Brownsland	15375	Brownsland	C	Y	316904	641342	Medium	Negligible	Negligible and Not Significant
Wester Happrew and Brownsland	19744	Wester Happrew	C	N	317129	641818	Medium	Negligible	Negligible and Not Significant
NA	19723	Halmyre House	B	N	317458	649640	Medium	Negligible	Negligible and Not Significant

This Page Intentionally Left Blank

Eddleston Conservation Area and Associated Listed Buildings

Eddleston Conservation Area and Associated Listed Buildings within it **LB157 Category C Listed the Horse Shoe Inn** **LB2020 Category B Listed Eddleston Parish Church and Graveyard** **LB2021 Category B Listed Moredun, And Adjoining 2 Cottages (Glen Nevis and Old School House)** **LB2022 Category B Listed Eddleston Village Nos. 1-23 And 2-22. Station Road** **LB2023 Category C Listed Eddleston Bridge Eddleston**					
Designation	Listed Buildings and Conservation Area	**Sensitivity (Value)**	Medium	**Distance and Direction to Nearest Turbine**	2.9 km E T5 (Figure 6.2)
Figure / Plate	Figure 6.2, Plate 47				
Summary of Asset and Cultural Significance	The village of Eddleston was founded in about 1785 as a single street of whinstone cottages. Currently the Conservation Area is centred on the east bank of the River Eddleston on either side of the A703 covering most of the village, with the historic core within the centre of the village. The main street, Station Street, reflects its location along the now dismantled railway that ran through the village. The wider area of Eddleston potentially has Anglo-Gaelic/ Gaelic-Saxon origins, with the Gaelic name *Baile Ghille Mhoire* reflecting 'town of St Mary's lad' while the etymology of Eddleston comes from *'Edulstun'*, an early-medieval landowner[2]. LB2021 Moredun 'Old castle' potentially dates from the 16th century, and as such is the oldest structure within the Conservation Area (Canmore ID 51404) and is now a private residency, located within the north of the historic core of Eddleston. The Listed Buildings are largely nineteenth century in date representing when the settlement underwent a major period of expansion as part of the industrial era. The buildings are predominately stone built and are of one to two storeys in height throughout the conservation area. They are culturally significant for their architectural and historic value which contribute to the history of the village of Eddleston.				
Definition of Setting and Contribution to Cultural Significance	The setting of these Listed Buildings is the Eddleston conservation area with the setting of the village defined by its location in the Eddleston Valley at the confluence of Loncote Burn and Eddleston Water. On the opposite side of the Eddleston River lies Black Barony estate. Whilst the village is generally inwards focused, the immediately adjacent agricultural landscape provides context for its appreciation as a small rural valley settlement. Visibility of the higher elevations of the valley varies within the village but does contribute to its sense of enclosure within the valley.				
Magnitude of Change to Cultural Significance	The Development would be located on the western elevations of the Eddleston Valley. The Development appears in part of the landscape characterised by modern commercial forestry that is markedly different from the village and surrounding agricultural context along the river and valley floor. This visibility is not within any key views but would be visible, especially from the eastern side of Eddleston as the village rises from the valley floor. The introduction of the turbines to the west of the village (noting that the consented scheme view was similar) is a slight change to the understanding, appreciation or experience of the heritage assets. This represents a slight change to the cultural significance of the conservation area and village setting of the listed buildings.				
Statement of Significance of Effect	As a conservation area and listed buildings of medium sensitivity with a slight magnitude of change to cultural significance, the effect upon the heritage asset is minor. This is **not significant** in terms of the EIA Regulations.				

[2] Eddleston. [Online] Available at: http://onlineborders.org.uk/community/eddlestonvillage/history (Accessed 09/02/2021)

Plate 47: Close up of LB157, LB2020, LB2021, LB2022 and LB2023 from Figure 6.3 on left with aerial photograph on right

LB2035 Cringletie House, Including Lodges, Walled Garden, Sundial and Dovecot

LB2035 Category B Listed Cringletie House, Including Lodges, Walled Garden, Sundial and Dovecot					
Designation	Category B Listed Building	**Sensitivity (Value)**	Medium	**Distance and Direction to Nearest Turbine**	2.9 km E T5 (Figure 6.2)
Figure / Plate	Figure 6.2, Plate 48				
Summary of Asset and Cultural Significance	Cringletie Country House[3] was designed by Scottish architect David Bryce for the Wolfe Murray family and completed in 1861. The house has distinctive, small towers at the corners of the top floor. In 1904, one of the Wolf Murray daughters married Sir George Henry Sutherland and the house became their home with the house modernised in 1921. In 1971, the house was sold and became a hotel with subsequent later renovations and improvements to the grounds and gardens. The house is culturally significant for their architectural and historic value which contribute to the understanding and evolution of country houses and estates.				
Definition of Setting and Contribution to Cultural Significance	The setting of Cringletie House and associated listed buildings is the estate grounds. The walled garden lies to the north of the house with pockets of woodland to the north, south and east. Key views from the house are westwards across open lawn with views available of the house from the west looking east.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but part of the landscape context to the west. The listed buildings are not within the ZTV as shown on Figure 6.2 so the Development would not be visible from the main grounds of the estate or in key views westwards from the house or eastwards when looking towards the house from the west. As such, there is no change to the cultural significance of the listed buildings.				
Statement of Significance of Effect	As listed buildings of medium sensitivity with no change to cultural significance, there is no effect upon the heritage asset. This is **not significant** in terms of the EIA Regulations.				

Plate 48: Close up of LB2035 from Figure 6.3 on left with aerial photograph on right

[3] Cringletie (2021). Cringletie. [Online] Available at: https://www.cringletie.com/about-us/history (Accessed 30/3/2021)

LB2039 Old Harehope

LB2039 Category B Listed Old Harehope					
Designation	Category B Listed Building	**Sensitivity (Value)**	Medium	**Distance and Direction to Nearest Turbine**	1.8 km S T2 (Figure 6.2)
Figure / Plate	Figure 6.2, Plate 49				
Summary of Asset and Cultural Significance	'Old Harehope' house dates from the 17th century when it was used as a private residence, and later converted into a farmhouse in the 19th century[4]. The building is culturally significant for its architectural and historic value which contribute to the understanding of rural settlement and farmsteads within this part of the Scottish Borders.				
Definition of Setting and Contribution to Cultural Significance	The setting of Old Harehope is defined by the immediately adjacent agricultural fields associated with the house extending generally north and south from the house. The fields are bounded by woodland which creates a sense of enclosure and separation of the wider and more distant landscape which is largely characterised by commercial forestry to the north, south and east with upland moorland to the west.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but appears in part of the northern landscape characterised by modern commercial forestry that is markedly different from the surrounding agricultural context around the house. This visibility is not within any key views but turbines may be visible in views northwards within the forestry. Due to the limited connection of the house to this part of the landscape, the introduction of the turbines to the north within forestry is a slight change to the understanding, appreciation or experience of the heritage asset, largely due to proximity. This represents a slight change to the cultural significance of the listed building.				
Statement of Significance of Effect	As a listed building of medium sensitivity with a slight magnitude of change to cultural significance, the effect upon the heritage asset is minor. This is **not significant** in terms of the EIA Regulations.				

Plate 49: Close up of LB2039 from Figure 6.3 on left with aerial photograph on right

[4] Old Harehope. [Online] Available at: http://portal.historicenvironment.scot/designation/LB2039 (Accessed 09/02/2021)

Barony Castle Group

LB2040 Category B Listed Black Barony Hotel (Now known as Barony Castle Hotel) **LB2041Category B Listed Black Barony Icehouse** **LB2042 Category B Listed Summerhouse** **LB2024 Category C Listed Bellevue Temple in Former Policies of Black Barony** **LB51957 Category B Listed The Great Polish Map of Scotland**					
Designation	Category B and C Listed Buildings	**Sensitivity (Value)**	Medium	**Distance and Direction to Nearest Turbine**	2.4 km E T5 (Figure 6.2)
Figure / Plate	Figure 6.2, Plate 50				
Summary of Asset and Cultural Significance	Barony Castle[5] and associated listed buildings lie on the western side of the River Eddleston and valley. Barony Castle was originally known as Darnell with the earliest known building onsite being a 15th century peel tower later replaces by a baronial style building in 1536 with later renovations and additions, most notably in the early 18th century when the French façade was added. The Ice house lies to the north of the hotel and the summerhouse to the west within woodland surrounding the main house. The polish map lies in woodland to the south on the opposite side of Fairydean Burn. The temple lies in more distant woodland to the south-west. All of the assets are within the Barony Estate which is a non-designated heritage landscape. The listed buildings are culturally significant for their architectural and historic value which contribute to the history and understanding of the evolution of fortified buildings into country estates in the part of the Scottish Borders.				
Definition of Setting and Contribution to Cultural Significance	The setting of these Listed Buildings is defined by the estate grounds (i.e. undesignated heritage landscape) with the majority of the listed buildings in close proximity to the main house (now hotel). This setting is inward focus due to the surrounding woodland to the north, west and south so that there is limited connection to the wider landscape in these directions. The house is orientated to the east and with the hotel's elevated position on the west side of the Eddleston Valley, key views are across the valley to the east.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but is in part of the landscape to the west characterised by modern commercial forestry. Wooded policies that surround the listed buildings will largely screen visibility of the Development though the turbines may be visible from the upper floors of the hotel. The introduction of the turbines to the west of the hotel (noting that the consented scheme view was similar) is a negligible change to the understanding, appreciation or experience of the heritage asset. This represents a negligible change to the cultural significance of the listed buildings.				
Statement of Significance of Effect	As listed buildings of medium sensitivity with a negligible magnitude of change to cultural significance, the effect upon the heritage asset is negligible. This is **not significant** in terms of the EIA Regulations.				

Plate 50: Close up of LB2040, LB2041, LB2042, LB2024 and LB51957 from Figure 6.3 on left with aerial photograph

[5] Barony Castle Website. [Online] Available at: https://www.baronycastle.com/about-barony-castle/the-history-of-barony-castle/ (Accessed 30/3/2021)

Spitalhaugh Group

LB8334 Category C Listed Paulswell Farmhouse and Steading **LB3861 Category A Listed Spitalhaugh House Including Stable and Bridge** **LB51628 Category C Listed Spitalhaugh, Doocot House**					
Designation	Category A and C Listed Buildings	**Sensitivity (Value)**	High (Category A) and Medium (Category C)	**Distance and Direction to Nearest Turbine**	4 km W T12 (Figure 6.2)
Figure / Plate	Figures 6.2 and 5.2.8, Plate 51				
Summary of Asset and Cultural Significance	The old house of Spitalhaugh, said to have been erected in 1678, was almost entirely rebuilt in the third quarter of the 19th century, and the building is to all appearances a Victorian mansion (LB8361) with turrets, wings, and castellations[6]. The Doocot (LB51628) is an auxiliary building associated with the estate whilst the farmhouse lies to the south-west in the agricultural lands beyond the formal estate grounds. The listed buildings are culturally significant for their architectural and historic value which contribute to the history and understanding of the evolution of country estates in the part of the Scottish Borders.				
Definition of Setting and Contribution to Cultural Significance	The setting of these Listed Buildings is defined by their location on the west side of the Lyne Water. Spitalhaugh house faces the Lyne Water to the north-east and is located on a bend in the river. With the exception of views north-eastwards and southwards to the Lyne Water, wooded polices surrounding the listed buildings creating a sense of enclosure and privacy around the house so that there is limited connection to the agricultural landscape beyond. The farmhouse lies beyond the formal grounds of Spitalhaugh house in the agricultural landscape to the south-west. To the north are modern agricultural buildings and to the south is the garden surrounded by woodland. The surrounding agricultural fields extending eastwards to the Lyne Waters, and south and west towards Romanno Bridge contribute to the setting.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but is in part of the upland landscape to the east characterised by modern commercial forestry. Wooded policies that surround the listed buildings will largely screen visibility of the Development though the turbines would likely be visible from the upper floors of the house and from the farmstead similar to that in LVIA VP 8 Figure 5.2.8. The introduction of the turbines to the east with turbine tips above the ridgeline is a slight change to the understanding, appreciation or experience of the heritage asset. This represents a slight change to the cultural significance of the listed buildings, primarily the Category A listed Spitalhaugh House.				
Statement of Significance of Effect	As listed buildings of medium and high sensitivity with a slight magnitude of change to cultural significance, the effect upon the listed buildings is minor. This is **not significant** in terms of the EIA Regulations.				

Plate 51: Close up of LB8334, LB3861 and LB51628 from Figure 6.3 on left with aerial photograph on right

[6] Spitalhaugh House Including Stable and Bridge. [Online] Available at: http://portal.historicenvironment.scot/designation/LB8361. (Accessed 09/02/2021)

Scotstoun Group

LB8337 Category B Listed Castlecraig, Entrance Gates and Twin Lodges **LB15169 Category B Listed Scotstoun House** **LB15170 Category C Listed Stable Square, Scotstoun.**					
Designation	Category B and C Listed Buildings	**Sensitivity (Value)**	Medium (Category B) (Category C)	**Distance and Direction to Nearest Turbine**	5.7 km WSW T2 (not in ZTV) (Figure 6.2)
Figure / Plate	Figure 6.2, Plate 52				
Summary of Asset and Cultural Significance	Scotstoun House was built around 1770 by Alexander Telfer and later sold to Aeneas MacKay of the East India Company in 1787. It is a Georgian Manor, complete with the auxiliary Stable Square (LB15170) set within wooded policies. The gates and lodge (LB8337) lie on the opposite side of the A72 and is associated with the Castlecraig estate. The listed buildings are culturally significant for their architectural and historic value which contribute to the history and understanding of the evolution of manorial estates in the part of the Scottish Borders.				
Definition of Setting and Contribution to Cultural Significance	The setting of these Listed Buildings is defined by their location on the Tarth Water with the house and stables on the east side of the Tarth Water on the lower elevations below Drochil Hill and the gate house on the west side of the Tarth Water by the A72. Scotstoun house is aligned north/south surrounded by wooded policies with the stables to the south-east, similarly lined by wooded polices with associated agricultural and extending to the south-east towards the gate house and to the north towards the A72.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but is in part of the upland landscape to the east characterised by modern commercial forestry. None of the buildings lie within the ZTV as shown on Figure 6.2 and due to the wooded policies surrounding them, there would not be any views towards or across the listed buildings that would contain the Development. As such, there is no change to the cultural significance of the listed buildings.				
Statement of Significance of Effect	As listed buildings of medium sensitivity with no change to cultural significance, there is no effect upon the heritage assets. This is **not significant** in terms of the EIA Regulations.				

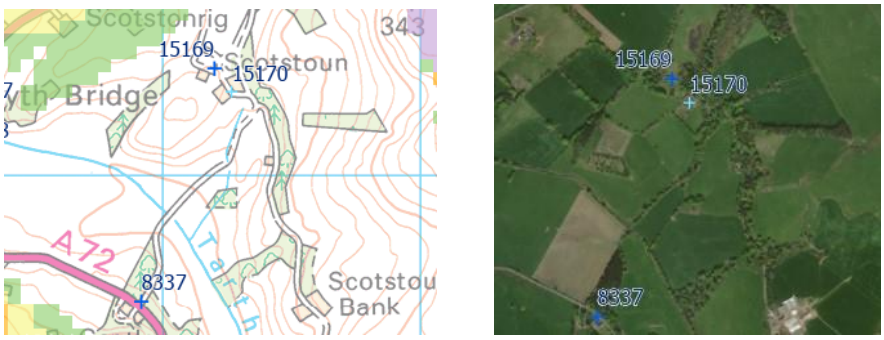


Plate 52: Close up of LB8337, LB15169 and LB15170 from Figure 6.3 on left with aerial photograph on right

Newlands Group

LB13862 Category B Listed Newlands Parish Church **LB15136 Category B Listed Newlands Manse** **LB15137 Category B Listed Newlands Old Kirk** **LB15138 Category B Listed Mackay of Scotstoun Tomb in Kirkyard** **LB15139 Category B Listed Bridgend Cottage and Camitswalls** **LB15140 Category B Listed Newlands Bridge**					
Designation	Category B Listed Buildings	**Sensitivity (Value)**	Moderate (Category B)	**Distance and Direction to Nearest Turbine**	2.76 km WSW T1 (not in ZTV) (Figure 6.2)
Figure / Plate	Figure 6.2, Plate 53				
Summary of Asset and Cultural Significance	The six Category B Listed Buildings are located within the settlement of Newland's and are cultural significant as they represent the evolution of an early medieval ecclesiastical settlement through to post-medieval periods along the eastern bank of the Lyne Water.				
Definition of Setting and Contribution to Cultural Significance	The setting of these Listed Buildings is defined by their location on the east side of the Lyne Water on the lower slopes of the hills. There is wooded policies around the listed buildings and the settlement of Newlands which creates an insular setting focused upon the Lyne water. Where views are available, these are generally westwards across the river or north/south along the river.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but is in part of the upland landscape to the east. None of the buildings lie within the ZTV as shown on Figure 6.2 and due to the wooded policies and elevations surrounding them, there would not be any views towards or across the listed buildings that would contain the Development. As such, there is no change to the cultural significance of the listed buildings.				
Statement of Significance of Effect	As listed buildings of medium sensitivity with no change to cultural significance, there is no effect upon the heritage assets. This is **not significant** in terms of the EIA Regulations.				

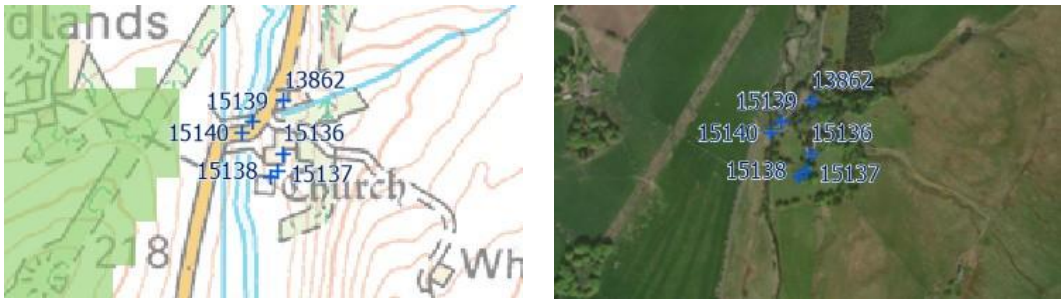


Plate 53: Close up of LB13862, LB15136, LB15137, LB15138, LB15139 and LB15140 from Figure 6.3 on left with aerial photograph on right

Hallyne Group

LB13896 Category B Listed Hallyne House **LB15357 Category B Listed Lyne Parish Church** **LB15358 Category B Listed the Beggar Path Bridge** **LB19742 Category B Listed Five Mile Bridge**					
Designation	Category B Listed Buildings	**Sensitivity (Value)**	Medium (Category B)	**Distance and Direction to Nearest Turbine**	5.5 km S T2 (Not in ZTV) (Figure 6.2)
Figure / Plate	Figure 6.2, Plate 54				
Summary of Asset and Cultural Significance	Hallyne House is a two storey Georgian manse dating to 1830[7]. The Parish Church lies to its west and dates to circa 1645 with later renovations in the 19th c. The bridges lie to the east (LB153538) and west (LB19742) over the Lyne Water. The listed buildings are culturally significant for their architectural and historic value.				
Definition of Setting and Contribution to Cultural Significance	The setting of these Listed Buildings is defined by their location along the Lyne Water. Hallyne House and the parish church lie within wooded policies on the north side on slopes above the river with key views southwards. The bridges serve as crossing points over the Lyne Water with key views towards them from along the A72.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but is in part of the upland landscape to the north characterised by modern commercial forestry. None of the buildings lie within the ZTV as shown on Figure 6.2 and due to the wooded policies and elevations surrounding them, there would not be any views towards or across the listed buildings that would contain the Development. As such, there is no change to the cultural significance of the listed buildings.				
Statement of Significance of Effect	As listed buildings of medium sensitivity with no change to cultural significance, there is no effect upon the heritage assets. This is **not significant** in terms of the EIA Regulations.				

Plate 54: Close up of LB13896, LB15357, LB15358 and LB19742 from Figure 6.3 on left with aerial photograph on right

[7] Savills. Hallyne House. [Online] Available at: https://search.savills.com/property-detail/gbedrseds190171 (Accessed 12/04/2021)

Whim Group

LB13898 Category C Listed Smithy Cottages, Near Whim **LB15150 Category C Listed Cistern, In Policies of Whim House** **LB15151 Category B Listed Cowden Lodge at Drive Entrance to Whim House** **LB15180 Category B Listed Whim House (Now the White House Hotel)** **LB15181 Category B Listed Ice House, In Policies of Whim House** **LB15182 Category C Listed Dovecot, Whim House;** **LB19724 Category A Listed Ed Court of Offices, Whim House**					
Designation	Category A Category B and C Listed Buildings	**Sensitivity (Value)**	High (Category A) Medium (Category B and C)	**Distance and Direction to Nearest Turbine**	4.7 km NNW T12 (Figure 6.2)
Figure / Plate	Figure 6.2, Plate 55				
Summary of Asset and Cultural Significance	There are seven Listed Buildings within the Whim House estate. Category B Listed Whim House dates from the 18th century as does the range of Category A buildings known a Whim Square. The other auxiliary buildings are related to the historic estate with the gatehouse lodge on the north side of A701 and the smithy cottage to the south. From the lodge heading north along the drive are the cistern and dovecot with the icehouse further along before coming to Ed court offices and Whim House. The listed buildings are culturally significant for their architectural and historic value as a collection of buildings relating to an 18th century country estate.				
Definition of Setting and Contribution to Cultural Significance	The setting of these Listed Buildings is defined by their location along the A701 set within wooded polices that surround much of the estate which limits views. Their cultural significance is linked by their relationship to each other within the estate grounds. Whim house and Ed court offices have views eastwards towards Whim Pond with woodland screening views in other directions. The auxiliary buildings (cistern, ice house and dovecot) lie within woodland with no long-distance views. The lodge has views southwards across the A702 over agricultural opposite whilst the smithy is surrounded by trees though open agricultural land lies to its south.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but is in part of the upland landscape to the south characterised by modern commercial forestry. Wooded policies that surround the listed buildings will largely screen visibility of the Development from the main buildings though turbine tips may be visible from the lodge when looking across the A702. The introduction of the turbines to the south (noting that the consented scheme view was similar) is a slight change to the understanding, appreciation or experience of the heritage asset. This represents a slight change to the cultural significance of the listed buildings.				
Statement of Significance of Effect	As listed buildings of High to medium sensitivity with a slight magnitude of change to cultural significance, the effect upon the buildings is minor to negligible. This is **not significant** in terms of the EIA Regulations.				

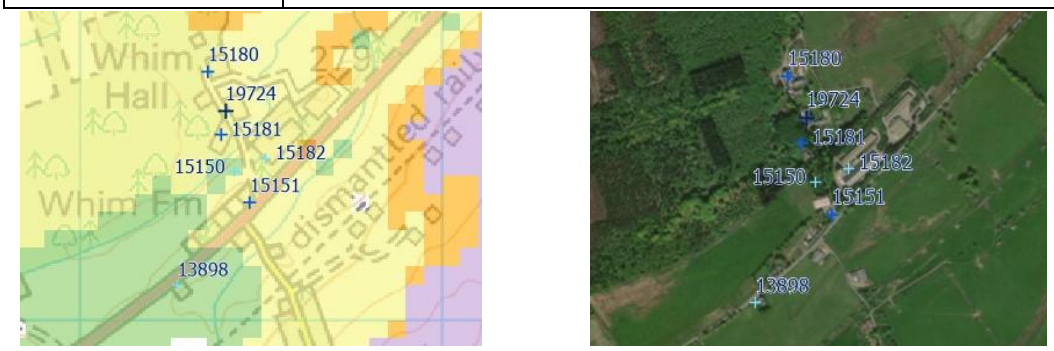


Plate 55: Close up of LB13898, LB15150, LB15151, LB15180, LB15181, LB15182 and LB19724 from Figure 6.3 on left with aerial photograph on right

Romannobridge Group

LB15141 Category B Listed Old Romanno Bridge Over the Lynne Water **LB15166 Category B Listed Romanno Bridge Hotel and Adjoining House and Two Cottages** **LB19717 Category B Listed Romanno Toll** **LB19722 Category B Listed Romanno Post Office and Adjoining Range**					
Designation	Category B Listed Buildings	**Sensitivity (Value)**	Moderate (Category B)	**Distance and Direction to Nearest Turbine**	4.1 km W T1 (Figure 6.2)
Figure / Plate	Figure 6.2, Plate 56				
Summary of Asset and Cultural Significance	The village is located on the terraced slopes on the west side of the Lyne Water. It served as a stopping place along the turnpike roads to Pebbles or Moffat[8]. The listed buildings date from the 1800s and are culturally significant for their architectural and historic value as a collection of buildings relating to an 18th century village and stopping place for travel during this time period.				
Definition of Setting and Contribution to Cultural Significance	The setting of these Listed Buildings is defined by their location within the settlement of Romannobridge on the west side of the Lyne Water. Whilst the historic turnpike has been replaced by the A701, the Old Romanno Bridge remains so that its historic approach from the west with the toll upon entrance to the village can still be appreciated. The hotel lies opposite the toll with the post office to the north and aligned with the frontage to the west towards the river. Key views are westwards towards the Lyne Water and eastwards when approaching the village from the bridge and toll.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but is in part of the upland landscape to the east characterised by modern commercial forestry. Wooded policies that surround the village to the east creating an insular feel within the village as it slopes westwards towards the Lyne Water. With the excepting of the Old Romanno Bridge, the listed buildings are not within the ZTV or in key views westwards towards the Lyne Water. The approach from east via the bridge and landscape context behind the village characterised by modern commercial forestry that is markedly different from the surrounding agricultural context around the river valley. Due to the limited connection of the village to this part of the landscape, the introduction of the turbines to the east within forestry is a slight change to the understanding, appreciation or experience of the heritage asset, largely due to proximity. This represents a slight change to the cultural significance of the listed building.				
Statement of Significance of Effect	As listed buildings are of medium sensitivity with a slight magnitude of change to cultural significance, the effect upon the buildings is minor. This is **not significant** in terms of the EIA Regulations.				

Plate 56: Close up of LB15141, LB15166, LB19717 and LB19722 from Figure 6.3 on left with aerial photograph on right

[8] Peeblesshire News (2018) Nostalgia: The history of Romanno Bridge. [Online] Available at: https://www.peeblesshirenews.com/news/16115104.nostalgia-history-romanno-bridge/ (Accessed 12/04/2021)

LB15152 Flemington Tower

15152 Category B Listed Flemington Tower					
Designation	Category B Listed Building	**Sensitivity (Value)**	Medium (Category B)	**Distance and Direction to Nearest Turbine**	3.4 km WSW T2 (Figure 6.2)
Figure / Plate	Figure 6.2, Plate 57				
Summary of Asset and Cultural Significance	Flemington Tower is a tower house turned farmstead located on the north side of Flemington Burn near the junction of the Lyne Water which lies to the west. The small tower house likely dates to the 16th century and is very much altered and now used as a stable. The listed building is culturally significant for its architectural and historic value contributing to the understanding of tower houses in this part of Scotland.				
Definition of Setting and Contribution to Cultural Significance	The setting of tower is defined by its location on Flemington Burn flowing westwards into the Lyne Water. It lies within a farmstead largely surrounded by wooded policies with some limited visibility eastwards up the Flemington Burn.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but is in part of the upland landscape to the north-east characterised by modern commercial forestry that is markedly different from the agricultural context along the Lyne Water and upland moorland around it. Due to the limited connection of the tower to this part of the landscape, the introduction of the turbines to the east within forestry is a slight change to the understanding, appreciation or experience of the heritage asset, largely due to proximity. This represents a slight change to the cultural significance of the listed building.				
Statement of Significance of Effect	As listed buildings are of medium sensitivity with a slight magnitude of change to cultural significance, the effect upon the buildings is minor. This is **not significant** in terms of the EIA Regulations.				

Plate 57: Close up of LB15152 from Figure 6.3 on left with aerial photograph on right

Drochil Castle Group

15171 Category C Listed Drochil Castle Farm House **15172 Category C Listed Tarth Bridge Over Tarth Water**					
Designation	Category C Listed Buildings	**Sensitivity (Value)**	Medium (Category C)	**Distance and Direction to Nearest Turbine**	4.5 SW T2 (not in ZTV) (Figure 6.2)
Figure / Plate	Figure 6.2, Plate 58				
Summary of Asset and Cultural Significance	Drochil Castel Farmhouse is a two-story farmhouse with a simple limewashed façade dating to circa 1824. The Tarth Bridge is a single segmental arch spanning the River Tarth to the south of the farmstead. The listed buildings are culturally significant for their architectural and historic value as part of the post-medieval farming and transportation in this part of the borders.				
Definition of Setting and Contribution to Cultural Significance	The setting of these Listed Buildings is defined by their location above the junction of the Lyne Water to the east and Tarth Water to the south. Key views are focused generally north/south along the Lyne Water and westwards along the Tarth Water				
Magnitude of Change to Cultural Significance	The Development is not within the setting but is in part of the upland landscape to the north-east. None of the buildings lie within the ZTV as shown on Figure 6.2, and due to location on the lower slopes above the waterways, there would not be any views towards or across the listed buildings that would contain the Development. As such, there is negligible change to the cultural significance of the listed buildings.				
Statement of Significance of Effect	As listed buildings of high and medium sensitivity with a negligible change to cultural significance, there is a negligible effect upon the heritage assets. This is **not significant** in terms of the EIA Regulations.				

Plate 58: Close up of LB15171 and LB15172 from Figure 6.3 on left with aerial photograph on right

Macbiehill Group

LB15173 Category B Listed Macbiehill Gateway and Lodge **LB15174 Category C Listed Beresford Burial Vault**					
Designation	Category B and C Listed Building	**Sensitivity (Value)**	Medium (Category B) Low (Category C)	**Distance and Direction to Nearest Turbine**	3 km NNW T12 (Figure 6.2)
Figure / Plate	Figure 6.2, Plate 59				
Summary of Asset and Cultural Significance	These buildings are located on the north side of A701 along the Dead Burn in what historically would have been part of the Macbiehill House estate though the main house was demolished in 1950. Macbiehill Gateway and Lodge dates from the 1820s and lies on the west side of the access track with a small loch (Pond Knowe) to the south. This would have served as the entrance to Macbiehill house which was located further to the west. The burial vault lies to the east of the access track in a small area of woodland. The listed buildings are culturally significant for their architectural and historic value as part of the post-medieval farming and transportation in this part of the borders.				
Definition of Setting and Contribution to Cultural Significance	The setting of these Listed Buildings is defined by their location on the north side of the A701 and their relationship to each other as the main house is no longer extant. The burial vault is completely surrounded by woodland polices which creates an insular localised setting with no connection to the wider landscape. The gateway and lodge have views north-eastwards towards the woodland surrounding the vault and south-westwards across the small loch with woodland directly to its south.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but is in part of the upland landscape to the south-east characterised by modern commercial forestry. The Development is not within any key views and wooded policies that surround the listed buildings will largely screen visibility of the Development. The introduction of the turbines to the south-east (noting that the consented scheme view was similar) results in a negligible change to the understanding, appreciation or experience of the heritage asset. This represents a negligible change to the cultural significance of the listed buildings.				
Statement of Significance of Effect	As listed buildings are of medium sensitivity with a negligible magnitude of change to cultural significance, the effect upon the buildings is negligible. This is **not significant** in terms of the EIA Regulations.				

Plate 59: Close up of LB15173 and LB15174 from Figure 6.3 on left with aerial photograph on right

Lamancha Group

LB15175 Category C Listed Lower Grange **LB15176 Category B Listed Lamancha** **LB15177 Category A Listed Sundial, Lamancha** **LB15178 Category B Listed Entrance Gateway, Lamancha** **LB15179 Category C Listed Madrisa Farmhouse and Steading, Lamancha**					
Designation	Category A, B and C Listed Building	**Sensitivity (Value)**	High (Category A) Medium (Category B) (Category C)	**Distance and Direction to Nearest Turbine**	3.3 km N T12 (not in ZTV) (Figure 6.2)
Figure / Plate	Figure 6.2, Plate 60				
Summary of Asset and Cultural Significance	The Category A late 17th century sundial stands in front of the main door of the house, (LB15176) this very beautiful dial exhibits the greatest variation from the type of any known example. A lectern-shaped dial, it is set upon a basket of fruit and mounted on a later pedestal[9]. Lamancha house potentially dates from 1663 with later renovations and remodelling in 1927[10]. The main approach is from the A701 to the south where the gateway is located. The lower grange (LB15175) lies to the west and Madrissa Farm (LB15179) to the east on the opposite side of the A701. The listed buildings are culturally significant for their architectural and historic value as part of a country house estate with nearby post-medieval farming.				
Definition of Setting and Contribution to Cultural Significance	The setting of these Listed Buildings is defined by their location in the lower elevations along the A701. The Lamancha listed buildings are surrounded by wooded polices to the north, south and west with housing and agricultural land to the east. The setting of the farm houses is defined by their surrounding agricultural field.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but is in part of the upland landscape to the south characterised by modern commercial forestry. None of the buildings lie within the ZTV as shown on Figure 6.2. Due to their location at lower elevations, there would not be any views towards or across the listed buildings that would contain the Development. As such, there is no change to the cultural significance of the listed buildings.				
Statement of Significance of Effect	As listed buildings are of high to medium sensitivity with no change to their cultural significance, there is no effect upon the listed buildings. This is **not significant** in terms of the EIA Regulations.				

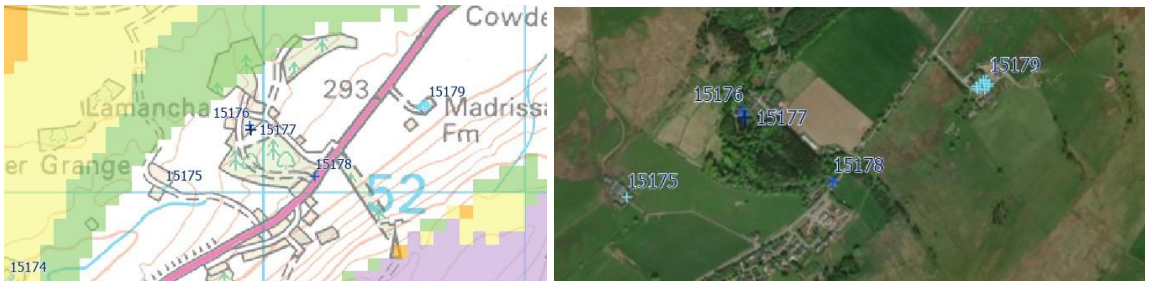


Plate 60: Close up of LB15175, LB15176, LB15177, LB15178 and LB15179 from Figure 6.3 on left with aerial photograph on right

[9] Sundial, Lamancha. [Online] Available at: https://portal.historicenvironment.scot/designation/LB15177. (Accessed 31/03/2021)
[10] Lamancha. [Online] Available at: https://portal.historicenvironment.scot/designation/LB15176. (Accessed 31/03/2021)

Lyne Station Group

LB15208 Category C Listed Edston Toll (Also Known as Lyne Toll) **LB19665 Category B Listed Lyne Viaduct** **LB19741 Category B Listed Lynesmill Bridge**					
Designation	Category B and C Listed Building	**Sensitivity (Value)**	Medium (Category B) (Category C)	**Distance and Direction to Nearest Turbine**	6 km S T2 (not in ZTV) (Figure 6.2)
Figure / Plate	Figure 6.2, Plate 61				
Summary of Asset and Cultural Significance	The buildings are all functional structures relating to traversing the post-medieval landscape on the outskirts of Peebles and are cultural significant as part of the surviving post-medieval infrastructure.				
Definition of Setting and Contribution to Cultural Significance	The setting of these Listed Buildings is localised as infrastructure along the Lyne Water with limited connection to the more distant landscape.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but is in part of the upland landscape to the north characterised by modern commercial forestry. None of the buildings lie within the ZTV as shown on Figure 6.2. Due to their location at lower elevations, there would not be any views towards or across the listed buildings that would contain the Development. As such, there is no change to the cultural significance of the listed buildings.				
Statement of Significance of Effect	As listed buildings are of high to medium sensitivity with no change to their cultural significance, there is no effect upon the listed buildings. This is **not significant** in terms of the EIA Regulations.				

Plate 61: Close up of LB15208, LB19665 and LB19741 from Figure 6.3 on left with aerial photograph on right

Rosetta Group

LB15209 Category B Listed Rosetta House **LB15210 Category C Listed Rosetta, Walled Garden and Garden Building** **LB19728 Category B Listed Rosetta Stables** **LB48932 Category C Listed Standalane Cottage**					
Designation	Category B and C Listed Building	**Sensitivity (Value)**	Medium (Category B) (Category C)	**Distance and Direction to Nearest Turbine**	6 km SSE T3 (Figure 6.2)
Figure / Plate	Figure 6.2, Plate 62				
Summary of Asset and Cultural Significance	Rosetta House is a small mansion dating to 1807 set within wooded grounds to the west of the Eddleston Water. The stables lie to the north of the house and the walled garden to its south. These estate dates to the c 17th century. The house and buildings have since been renovated and converted into a hotel with caravan parks to the north, south and east. The Standalone cottage is located to the north of these. The listed buildings are culturally significant for their architectural and historic value as part of a country house estate with nearby settlement.				
Definition of Setting and Contribution to Cultural Significance	The setting of these Listed Buildings is defined by their slightly elevated location on the west side of the Eddleston Water. The buildings are surrounded by wooded polices which creates a sense of enclosure and privacy around the buildings so that there is limited connection to the landscape and caravan parks surrounding it.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but is in part of the upland landscape to the north-west characterised by modern commercial forestry. None of the buildings lie within the ZTV as shown on Figure 6.2. Due to their location on west facing slopes above the Eddleston Water, there would not be any views towards or across the listed buildings that would contain the Development. As such, there is no change to the cultural significance of the listed buildings.				
Statement of Significance of Effect	As listed buildings are of high to medium sensitivity with no change to their cultural significance, there is no effect upon the listed buildings. This is **not significant** in terms of the EIA Regulations.				

Plate 62: Close up of LB15209, LB15210, LB19728 and LB48932 from Figure 6.3 on left with aerial photograph on right

Chapelhill Group

LB15211 Category B Listed Chapelhill Farmhouse and Courtyard Farm Buildings **LB15212 Category B Listed Chapel Hill Bridge**					
Designation	Category B Listed Building	**Sensitivity (Value)**	Medium (Category B)	**Distance and Direction to Nearest Turbine**	5.6 km SSE T3 (Figure 6.2)
Figure / Plate	Figure 6.2, Plate 63				
Summary of Asset and Cultural Significance	The farmhouse occupies a flat-topped knoll to the west of the Eddleston Water, which is believed to be the site of an ancient chapel. The chapel was removed and a tower house built in the 16th century and extended during the 18th century with major renovations in the 20th century. It is culturally significant as a good example of a Peeblesshire farm representing rural occupation over the past 500 years. The bridge is sited to the east of Chapel Hill farmhouse and is sited on a road that formerly crossed the Peebles Railway and Eddleston Water. The bridge is cultural significant as a good example of a vernacular bridge.				
Definition of Setting and Contribution to Cultural Significance	The setting of these Listed Buildings is defined by their location on Eddleston Water with the bridge as a functional crossing point and the farmstead on a small knoll to the east. The bridge has limited connection to the wider landscape with key views from the farmstead east and south over the Eddleston Water as wooded policies to the north of the farmstead obscure views in that direction.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but is in part of the upland landscape to the north-northwest characterised by modern commercial forestry. The Development is not within any key views and wooded policies that surround the farmstead will largely screen visibility of the Development to the north. The introduction of the turbines to the north-west (noting that the consented scheme view was similar) results in a negligible change to the understanding, appreciation or experience of the heritage asset. This represents a negligible change to the cultural significance of the listed buildings.				
Statement of Significance of Effect	As listed buildings are of medium sensitivity with a negligible magnitude of change to cultural significance, the effect upon the buildings is negligible. This is **not significant** in terms of the EIA Regulations.				

Plate 63: Close up of LB15211 and LB15212 from Figure 6.3 on left with aerial photograph on right

Winkston Group

LB15213 Category B Listed Winkston Farmhouse **LB15214 Category B Winkston Tower House**					
Designation	Category B Listed Building	**Sensitivity (Value)**	Medium (Category B)	**Distance and Direction to Nearest Turbine**	5.6 km SSE T3 (Figure 6.2)
Figure / Plate	Figure 6.2, Plate 64				
Summary of Asset and Cultural Significance	The name of the tower and farm is taken from the Anglo-Norman settlers Wink, or Vink with the tower dating to circa 1545 and extensively restored during the 18th century. The tower was incorporated into the farm steading in the middle of the 19th century with farmhouse in front of the tower house. Originally, the house comprised of the main block with the single storey wings flanking. Circa 1910, nearly a century later, a gabled extension and small lean-tos were added to the rear of the property completing the plan we see now. To the front and side of the property is a well preserved painted cast-iron fence and pedestrian gates; also of interest are the Peebles lamp standards, possibly from Peebles Station. The buildings are culturally significant as they represent continued occupation within this part of the Scottish boarders from tower house to modern day farmstead.				
Definition of Setting and Contribution to Cultural Significance	The setting of these Listed Buildings is defined by their location on the elevations to the east of Eddleston Water with agricultural land rising east along the valley sides and sloping westwards to the river. Wooded polices surround the buildings to the north.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but is in part of the upland landscape to the north-northwest characterised by modern commercial forestry. The Development is not within any key views and wooded policies that surround the buildings will largely screen visibility of the Development to the north. The introduction of the turbines to the north-west (noting that the consented scheme view was similar) results in a negligible change to the understanding, appreciation or experience of the heritage asset. This represents a negligible change to the cultural significance of the listed buildings.				
Statement of Significance of Effect	As listed buildings are of medium sensitivity with a negligible magnitude of change to cultural significance, the effect upon the buildings is negligible. This is **not significant** in terms of the EIA Regulations.				

Plate 64: Close up of LB15213 and LB15214 from Figure 6.3 on left with aerial photograph on right

LB15215 Redscarhead, George Meikle Kemp Memorial (At Moy Hall)

LB15215 Category B Listed Redscarhead, George Meikle Kemp Memorial (At Moy Hall)					
Designation	Category B Listed Building	**Sensitivity (Value)**	Medium (Category B)	**Distance and Direction to Nearest Turbine**	4 km SE T3 (Figure 6.2)
Figure / Plate	Figure 6.2, Plate 65				
Summary of Asset and Cultural Significance	Sited on the west side of the A703, this memorial is dedicated to George Meikle Kemp (1795 - 1844), the designer of the Scott Monument in Princes Street, Edinburgh. It is incorporated into a gable standing at Moy Hall, the L-plan former workshop of Andrew Noble, joiner and millwright. The memorial was erected in Redscarhead because Kemp was, as a 14-year-old shepherd's son from Moorfoot, apprenticed to Noble. Upon finishing his apprenticeship, Kemp (whilst he was on his way to Galashiels to start a new job) had been befriended by Walter Scott, who had offered him a lift in his carriage. Kemp joined an Edinburgh office of architects in 1826, after working in France and England. The original design for the Scott Monument had come from Rickman & Hutchinson, an English firm, but Meikle Kemp's design was built, as he was a "native" like Scott. Kemp drowned in the Union Canal before the completion of the Scott monument. This memorial was erected in 1932 on the centenary of Scott's death. The design of the bronze tablet is based on the bust of Kemp, by Alexander Handyside Ritchie, found in the Scott Monument Museum. To the left is a miniature of the actual monument. This new gable, based upon the lines of the Scott Monument, was added to the building. Originally it has crowsteps similar to those at Abbotsford, but these are now lost along with the tall gable head finial.[11] The listed building is culturally significant for its architectural and historic value and association with George Meikle Kemp.				
Definition of Setting and Contribution to Cultural Significance	The setting is defined by its location on the west side of A703 and within the enclosed farmstead of Moy Hall. This creates an insular feel within the farmyard with limited connection to the more distant landscape and no key designed views other than those in close proximity towards the memorial.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but is in part of the upland landscape to the north-west characterised by modern commercial forestry. The Development is not within any key views and wooded policies that surround the farmstead to the north will largely screen visibility of the Development. The introduction of the turbines to the north-west (noting that the consented scheme view was similar) results in a negligible change to the understanding, appreciation or experience of the heritage asset. This represents a negligible change to the cultural significance of the listed buildings.				
Statement of Significance of Effect	As listed buildings are of medium sensitivity with a negligible magnitude of change to cultural significance, the effect upon the buildings is negligible. This is **not significant** in terms of the EIA Regulations.				

Plate 65: Close up of LB15215 from Figure 6.3 on left with aerial photograph on right

[11] LB15215 Category B Listed Redscarhead, George Meikle Kemp Memorial (At Moy Hall). [Online] Available at: http://portal.historicenvironment.scot/designation/LB15215 (Accessed 31/03/2021)

Wester Happrew and Brownsland Group

LB15375 Category C Listed Brownsland **LB19744 Category C Listed Wester Happrew (not in ZTV)**					
Designation	Category C Listed Building	**Sensitivity (Value)**	Medium (Category C)	**Distance and Direction to Nearest Turbine**	5 km SSW T2 (Figure 6.2)
Figure / Plate	Figure 6.2, Plate 66				
Summary of Asset and Cultural Significance	Brownsland is a simple 2 storey 18th century farmhouse. Wester Happrew is a two storey, early 19th century farmhouse. The listed buildings are culturally significant for their architectural and historic value associated with post-medieval agricultural settlement.				
Definition of Setting and Contribution to Cultural Significance	The setting is defined by the surrounding agricultural context with both farmsteads located on the west side of the Lyne Water. This setting is fairly localised with the two farms in close proximity with rugged moorland to the west and agricultural land on the opposite side of the river leading towards Hamildean Hill. This agricultural setting contributes to the understanding and appreciation of the rural valley farmstead with long distance views limited by rising elevations of the valley sides.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but is in part of the upland landscape to the north characterised by modern commercial forestry that is markedly different from the improved pastures around the farmstead and rough open moorland on the valley sides. The Development is not within any key views along the valley so that the introduction of the turbines to the north (noting that the consented scheme view was similar) results in a negligible change to the understanding, appreciation or experience of the heritage asset. This represents a negligible change to the cultural significance of the listed buildings.				
Statement of Significance of Effect	As listed buildings are of medium sensitivity with a negligible magnitude of change to cultural significance, the effect upon the buildings is negligible. This is **not significant** in terms of the EIA Regulations.				

Plate 66: Close up of LB15375 and LB19744 from Figure 6.3 on left with aerial photograph on right

LB19723 Halmyre House

LB19723 Category B Listed Halmyre House					
Designation	Category B Listed Building	**Sensitivity (Value)**	Medium (Category B)	**Distance and Direction to Nearest Turbine**	2.8 km NW T12 (not in ZTV) (Figure 6.2)
Figure / Plate	Figure 6.2, Plate 67				
Summary of Asset and Cultural Significance	Halmyre House is a baronial style mansion with a large walled garden at the side and the remains of a lean-to dovecote. The core of the mansion is of 16th or 17th century date and the ground floor of the main block contains a vaulted under croft. The listed building is culturally significant for their architectural and historic value associated country estates in this part of Scotland.				
Definition of Setting and Contribution to Cultural Significance	The setting is defined by its location on the north side of the A701. The house is surrounded by wooded polices except to the south-east with views extending towards the tree lined A701.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but is in part of the upland landscape to the south-east characterised by modern commercial forestry. The building does not lie within the ZTV as shown on Figure 6.2 so the key views towards the A701 would not contain turbines. Due to the building being surrounded on other sides by wooded policies, there would not be any views towards or across the listed buildings that would contain the Development. As such, there is no change to the cultural significance of the listed buildings.				
Statement of Significance of Effect	As listed building of medium sensitivity with no change to its cultural significance, there is no effect upon the listed building. This is **not significant** in terms of the EIA Regulations.				

Plate 67: Close up of LB19723 from Figure 6.3 on left with aerial photograph on right

6.7 SELECTED LISTED BUILDINGS AND CONSERVATION AREAS BEYOND 5 KM STUDY AREA

Beyond the 5 km Study Area, there are 9 further Listed Buildings and five conservation areas that have been selected for further consideration as shown in EIA Report Figure 6.3 and detailed in Table A6.3.5. These have been assessed in numerical order by their HES designation number and in groups, where appropriate, as detailed in Table A6.3.5 with the full detailed assessment in subsequent tables.

Table A6.4.3.5 Selected Listed Buildings and Conservation Areas Beyond 5 km Assessment Summary

Assessment Order and Group	HES Ref.	Title	Category	ZTV	X	Y	Sensitivity	Magnitude of Change	Significance of Effect
Neidpath	13857	Neidpath Castle, Entrance Gateway to Courtyard, Courtyard Buildings (South Range), Walled Garden	A	N	323646	640512	High	Negligible	Negligible and Not Significant
NA	15348	Haswellsykes	B	Y	320798	639302	Medium	Negligible	Negligible and Not Significant
NA	15359	Kirkton Manor, Manor Parish Church	C	Y	322022	637984	Medium	Negligible	Negligible and Not Significant
Barns	15361	Barns House	B	N	321628	639246	Medium	Negligible	Negligible and Not Significant
Barns	15363	Barns Tower	B	N	321520	639133	Medium	Negligible	Negligible and Not Significant
Hallyards	15368	Hallyards	B	N	321618	637563	Medium	Negligible	Negligible and Not Significant
Hallyards	15369	Hallyards, Sundial	B	N	321579	637584	Medium	Negligible	Negligible and Not Significant
Hallyards	15370	Hallyards, Statue	B	N	321647	637583	Medium	Negligible	Negligible and Not Significant
NA	19729	Peebles, Edinburgh Road, Venlaw Castle Hotel	B	Y	325287	641236	Medium	Negligible	Negligible and Not Significant
		Peebles Conservation Area					Medium	Negligible	Negligible and Not Significant
		West Linton Conservation Area					Medium	Negligible	Negligible and Not Significant
		Howgate Conservation Area					Medium	Negligible	Negligible and Not Significant
		Carlops Conservation Area					Medium	Negligible	Negligible and Not Significant
		Penicuik Conservation Area					Medium	Negligible	Negligible and Not Significant

This page intentionally left blank

Neidpath Castle Group

LB13857 Category A Listed Neidpath Castle, Courtyard Buildings (South Range), Entrance Gateway to Courtyard; and Walled Garden.					
Designation	Category A Listed Buildings	**Sensitivity (Value)**	High (Category A)	**Distance and Direction to Nearest Turbine**	6.4 km SE T3 (not in ZTV)
Figure / Plate	Figure 6.3, Plate 68				
Summary of Asset and Cultural Significance	The Castle was initially built as a fortified tower house around 1190[12], however this structure was burnt down in the 13th century and rebuilt in the 14th century. Around 1700[13] the Castle was converted into the appearance today with the building of the entrance gateway, courtyard buildings and walled garden. As such the Castle and related buildings are an example of historical architectural styles, inside and outside of the Castle, according to the fashions of the time. The listed buildings are culturally significant for their architectural and historic value which contribute to the history and understanding of the survival and evolution of fortified tower houses in the part of the Scottish Borders.				
Definition of Setting and Contribution to Cultural Significance	The setting of these Listed Buildings is defined by their location between the A72 and the River Tweed (Figure 6.3). The buildings lie on the south side of the A72 and on the north side of the River Tweed. The tower house lies on a bend in the river with views west and south over the river. The courtyard entrance lies to east of the tower and the courtyard buildings to the south. The walled garden lies along the tree lined drive to the its north. Key views are along the river and over the wooded policies to the north (Jedderfield Plantations) and south (South Park Wood).				
Magnitude of Change to Cultural Significance	The Development is not within the setting but is in part of the upland landscape to the north. None of the buildings lie within the ZTV as shown on Figure 6.3 and due to the wooded policies and elevations surrounding them, there would not be any views towards or across the listed buildings that would contain the Development. As such, there is no change to the cultural significance of the listed buildings.				
Statement of Significance of Effect	As listed buildings of high sensitivity with no change to cultural significance, there is no effect upon the heritage assets. This is **not significant** in terms of the EIA Regulations.				

Plate 68: Close up of LB13857 from Figure 6.3 on left with aerial photograph on right

[12] Neidpath Castle History. [Online] Available at: https://www.neidpathcastle.com/history. (Accessed 31/03/2021)
[13] Neidpath Castle Including Courtyard Buildings, Gateway, Former Walled Garden and Boundary Wall. [Online] Available at: https://portal.historicenvironment.scot/designation/LB13857. (Accessed 31/03/2021)

LB15348 Haswellsykes

LB15348 Category B Listed Haswellsykes					
Designation	Category B Listed Building	**Sensitivity (Value)**	Medium (Category B)	**Distance and Direction to Nearest Turbine**	6.7 km S T2
Figure / Plate	Figure 6.3, Plate 69				
Summary of Asset and Cultural Significance	Haswell sykes is a two-storey farmhouse dating to the mid-18th century. The listed building is culturally significant for its architectural and historic value associated with post-medieval agricultural settlement.				
Definition of Setting and Contribution to Cultural Significance	The setting is defined by the surrounding agricultural context with the farmstead located on the west side of the River Tweed (Figure 6.3). This setting is fairly localised with the agricultural land focuses along the bend in the river and the rising elevations of the valley. This agricultural setting contributes to the understanding and appreciation of the rural valley farmstead with long distance views limited by rising elevations of the valley sides.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but is in part of the upland landscape to the north characterised by modern commercial forestry that is markedly different from the improved pastures around the farmstead and rough open moorland on the valley sides. The Development is not within any key views along the valley so that the introduction of the turbines to the north (noting that the consented scheme view was similar) results in a negligible change to the understanding, appreciation or experience of the heritage asset. This represents a negligible change to the cultural significance of the listed buildings.				
Statement of Significance of Effect	As listed buildings are of medium sensitivity with a negligible magnitude of change to cultural significance, the effect upon the buildings is negligible. This is **not significant** in terms of the EIA Regulations.				

Plate 69: Close up of LB15348 from Figure 6.3 on left with aerial photograph on right

LB15359 Kirkton Manor, Manor Parish Church

LB15359 Category C Listed Kirkton Manor Parish Church					
Designation	Category C Listed Building	**Sensitivity (Value)**	Medium (Category C)	**Distance and Direction to Nearest Turbine**	8.2 km SSE T2
Figure / Plate	Figure 6.3, Plate 70				
Summary of Asset and Cultural Significance	Kirkton Parish Church is a simple rectangular building of sandstone dated 1874 that is still in use as an ecclesiastical building. The listed building is culturally significant for its architectural and historic value associated with ecclesiastical use.				
Definition of Setting and Contribution to Cultural Significance	The setting is defined by the churchyard which creates an insular ecclesiastical settlement distinctly different from the surrounding houses and farms which it would serve. This setting is fairly localised with the road to the north and Manor Water to the south with farmstead and residences to the east and west (Figure 6.3).				
Magnitude of Change to Cultural Significance	The Development is not within the setting but is in part of the upland landscape to the north characterised by modern commercial forestry that is markedly different from the surrounding agricultural context of the Manor Valley. The Development is not within any key views along the valley so that the introduction of the turbines to the north (noting that the consented scheme view was similar) results in a negligible change to the understanding, appreciation or experience of the heritage asset. This represents a negligible change to the cultural significance of the listed buildings.				
Statement of Significance of Effect	As listed buildings are of medium sensitivity with a negligible magnitude of change to cultural significance, the effect upon the buildings is negligible. This is **not significant** in terms of the EIA Regulations.				

Plate 70: Close up of LB15359 from Figure 6.3 on left with aerial photograph on right

Barns Group

LB15361 Category B Listed Barns House **LB15363 Category B Listed Barns Tower**					
Designation	Category B Listed Building	**Sensitivity (Value)**	Medium (Category B)	**Distance and Direction to Nearest Turbine**	6.9 km SSE T2 (not in ZTV)
Figure / Plate	Figure 6.3, Plate 71				
Summary of Asset and Cultural Significance	Barns house is a small Georgian mansion on the south bank of the Tweed dating to the 18th century. Barns tower is well preserved tower forming a rectangular keep. The listed buildings are culturally significant for their architectural and historic value associated with settlement of the Tweed River Valley.				
Definition of Setting and Contribution to Cultural Significance	The setting of the listed buildings is defined by their location on the south side of the River Tweed surrounded by wooded policies within the agricultural context of the valley floor (Figure 6.3). This setting is fairly localised with the two listed buildings generally surrounded by wooded polices though there are views southwards from Barns House over the adjacent agricultural field.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but is in part of the upland landscape to the north. None of the buildings lie within the ZTV as shown on Figure 6.3 and due to the wooded policies and elevations surrounding them, there would not be any views towards or across the listed buildings that would contain the Development. As such, there is no change to the cultural significance of the listed buildings.				
Statement of Significance of Effect	As listed buildings of medium sensitivity with no change to cultural significance, there is no effect upon the heritage assets. This is **not significant** in terms of the EIA Regulations.				

Plate 71: Close up of LB15361 and LB15363 from Figure 6.3 on left with aerial photograph on right

Hallyards Group

LB15368 Category B Listed Hallyards **LB15369 Category B Listed Hallyards Sundial** **LB15370 Category B Listed Hallyards Statue**					
Designation	Category B Listed Building	**Sensitivity (Value)**	Medium (Category B)	**Distance and Direction to Nearest Turbine**	6.9 km SSE T2 (not in ZTV)
Figure / Plate	Figure 6.3, Plate 72				
Summary of Asset and Cultural Significance	Hallyards is a rambling composite house of some size in limewashed harling originally dating to the 17ty century with numerous later extensions and remodels. The sundial is in the garden on the west side of the house and dates to 1803 and to the east lies a statue of the Black Dwarf dating to 1836. The listed buildings are culturally significant for their architectural and historic value associated with settlement of the Manor Water Valley.				
Definition of Setting and Contribution to Cultural Significance	The setting of the listed buildings is defined by their location on the west side of the Manor Water surrounded by wooded policies within the agricultural context of the valley floor (Figure 6.3). This setting is fairly localised with the listed buildings generally surrounded by wooded polices.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but is in part of the upland landscape to the north. None of the buildings lie within the ZTV as shown on Figure 6.3 and due to the wooded policies and elevations surrounding them, there would not be any views towards or across the listed buildings that would contain the Development. As such, there is no change to the cultural significance of the listed buildings.				
Statement of Significance of Effect	As listed buildings of medium sensitivity with no change to cultural significance, there is no effect upon the heritage assets. This is **not significant** in terms of the EIA Regulations.				

Plate 72: Close up of LB15368, LB15369 and LB15370 from Figure 6.3 on left with aerial photograph on right

LB19729 Peebles, Edinburgh Road, Venlaw Castle Hotel

LB19729 Category B Listed Venlaw Castle Hotel					
Designation	Category B Listed Building	**Sensitivity (Value)**	Medium (Category B)	**Distance and Direction to Nearest Turbine**	6.8 km SE T3
Figure / Plate	Figure 6.3, Plate 73				
Summary of Asset and Cultural Significance	Venlaw Castle Hotel is country house dating to 1872 with later extensions and remodels. It stands on the site of Smithfield Castle. It was used as a WWI hospital and became a hotel in 1949 though is permanently closed with proposals to be converted into flats. The listed building is culturally significant for its architectural and historic value associated with country estates and its evolving usage.				
Definition of Setting and Contribution to Cultural Significance	The setting of the hotel is defined by its location on the west slopes of Ven Law Hill within its associated tree lined estate grounds. It lies to the east of the Eddleston Water with more modern residences to its west beyond the treeline (Figure 6.3). The wooded policies surrounding the hotel creates an insular country estate feel and limits long distance views. This enclosed woodland context is purposeful to separate the estate from the settled valley (Peebles) to the west and south.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but is in part of the upland landscape to the north characterised by modern commercial forestry that is markedly different from the surrounding enclosed estate context with Peebles to the south and west. The Development is not within any key views from, towards or across the listed building so that the introduction of the turbines to the north (noting that the consented scheme view was similar) results in a negligible change to the understanding, appreciation or experience of the heritage asset. This represents a negligible change to the cultural significance of the listed buildings.				
Statement of Significance of Effect	As listed buildings are of medium sensitivity with a negligible magnitude of change to cultural significance, the effect upon the buildings is negligible. This is **not significant** in terms of the EIA Regulations.				

Plate 73: Close up of LB19729 from Figure 6.3 on left with aerial photograph on right

Peebles Conservation Area[14]

Peebles Conservation Area					
Designation	Conservation Area	**Sensitivity (Value)**	Medium	**Distance and Direction to Nearest Turbine**	6.8 km SE T3
Figure / Plate	Figure 6.3, Plate 74				
Summary of Asset and Cultural Significance	The Peebles Conservation Area covers the historic core and town centre of Pebbles with numerous listed buildings within it (Figure 6.3). Peebles has a long history dating back to the 12th century when the town was awarded its status of Royal Burgh. Peebles flourished with the arrival of the industrial revolution, and in particular the expansion of the woollen industry and the introduction of the railway. The Town Centre takes in parts of both The Old Town and The New Town including the High Street with its rich assortment of commercial properties and churches. It is evident that within the Peebles Conservation Area there is a wide range of building types, styles and periods. These all reflect the history, diversity and development of the town. Properties range from single storey and upwards, depending on location. Building materials vary from whin stone, sandstone, harl, slate and in some instances a flat red clay tile. Architectural details range significantly, transom lights, fanlights, rybats, margins, dormers, quoins, along with a wide range of other elaborate details such as turrets within the Conservation Area.				
Definition of Setting and Contribution to Cultural Significance	The setting of the listed buildings is the conservation area boundary due to the surrounding infill development around the historic core. This more modern infill development, most notably to the north and south, limits the connection of the conservation area to the more distant landscape context beyond the Tweed Valley. Key views are restricted to within the designation boundary and do not include long distance views to the surrounding landscape due to the built-up nature of the conservation area and surrounding infill development.				
Magnitude of Change to Cultural Significance	The Development is not within the setting of the Tweed Valley but part of the more distant upland landscape context to the north that is characterised by commercial forestry. This is markedly different from the settled valley floor and the agricultural context along the river valley beyond the conservation area. Visibility is limited within the conservation area by surrounding development, most notably that which extends up the Eddleston Water Valley. The introduction of the turbines to the north (noting that the consented scheme view was similar) results in a negligible change to the understanding, appreciation or experience of the conservation area. This represents a negligible change to the cultural significance of the conservation Area.				
Statement of Significance of Effect	As conservation area of medium sensitivity with a negligible magnitude of change to cultural significance, the effect upon the conservation area is negligible. This is **not significant** in terms of the EIA Regulations.				

Plate 74: Close up of Peebles Conservation Area from Figure 6.3 on left with aerial photograph on right

[14] Scottish Borders Council (2021) Peebles Conservation Area. [Online] Available at https://www.scotborders.gov.uk/directory_record/26008/peebles (Accessed 05/04/2021)

West Linton Conservation Area[15]

West Linton Conservation Area					
Designation	Conservation Area	**Sensitivity (Value)**	Medium	**Distance and Direction to Nearest Turbine**	5.8 km NW T12
Figure / Plate	Figure 6.3, Plate 75				
Summary of Asset and Cultural Significance	West Linton Conservation Area includes a considerable part of the historic settlement including associated listed buildings as well as the tree-lined approach along Station Road (Figure 6.3). The narrow winding streets and paths that run through the village provide a distinctive spatial identity.				
Definition of Setting and Contribution to Cultural Significance	The setting of the listed buildings is the conservation area boundary due to the surrounding infill development around the historic core. This more modern infill development, most notably to the north south and east, limits the connection of the conservation area to the more distant landscape context beyond the Lyne Water Valley. Key views are restricted to within the designation boundary along the narrow winding streets with long distance views to the surrounding landscape largely obscured by the built-up nature of the conservation area and surrounding infill development.				
Magnitude of Change to Cultural Significance	The Development is not within the setting of the Manor Water Valley but part of the more distant upland landscape context to the east that is characterised by commercial forestry. This is markedly different from the settled valley floor and the agricultural context along the river valley beyond the conservation area which rises to upland moorland context backclothed by commercial forestry. Visibility is limited within the conservation area by surrounding development, most notably that which extends westwards and southwards beyond the conservation area boundary. The introduction of the turbines to the north (noting that the consented scheme view was similar) results in a negligible change to the understanding, appreciation or experience of the conservation area. This represents a negligible change to the cultural significance of the conservation Area.				
Statement of Significance of Effect	As conservation area of medium sensitivity with a negligible magnitude of change to cultural significance, the effect upon the conservation area is negligible. This is **not significant** in terms of the EIA Regulations.				

Plate 75: Close up of West Linton Conservation Area from Figure 6.3 on left with aerial photograph on right

[15] Scottish Borders Council (2021) West Linton Area. [Online] Available at: https://www.scotborders.gov.uk/directory_record/26017/west_linton (Accessed 05/04/2021)

Howgate Conservation Area[16]

Howgate Conservation Area					
Designation	Conservation Area	**Sensitivity (Value)**	Medium	**Distance and Direction to Nearest Turbine**	10 km NE T12
Figure / Plate	Figure 6.3, Plate 76				
Summary of Asset and Cultural Significance	Howgate Conservation Area covers the settlement in its entirety which runs in a north south direction on either side of the B7026 at its junction with the A6094 and includes adjacent agricultural fields to the east and west to protect the setting (Figure 6.3). Howgate is a small rural linear village that originated as a farming community with later development around the Old Howgate Inn as the first stage to change horses along the Edinburgh to Carlisle stage coach route. The focal points within the village are the Howgate Inn and church.				
Definition of Setting and Contribution to Cultural Significance	The setting of the listed buildings is the conservation area boundary with the setting of the conservation area the undulating countryside as this begins to fall towards the valley of the river North Esk. There are occasional attractive views out from the village especially westwards towards the Pentland Hills with views in other directions largely restricted by landform. Sequences of views from within the village are closed by the curves and undulations of the road but specially by the final upwards slopes to both the north and south. The approaching view from the south down the hill towards the village and the view from the A6094 east are both important aspects of setting.				
Magnitude of Change to Cultural Significance	The Development is not within the setting of the conservation area but part of the more distant upland landscape context to the south that is characterised by commercial forestry. This is markedly different from the settled agricultural context beyond the conservation area. The Development would not be in any of the key views from within the conservation area as these are north, south and east though the Development may be visible as part of the distant landscape from the northern portion of the conservation area; however, this is not a key view or sightline integral to the setting or appreciating the cultural significance of the conservation area. This represents a negligible change to the cultural significance of the conservation Area.				
Statement of Significance of Effect	As conservation area of medium sensitivity with a negligible magnitude of change to cultural significance, the effect upon the conservation area is negligible. This is **not significant** in terms of the EIA Regulations.				

Plate 76: Close up of Howgate Conservation Area from Figure 6.3 on left with aerial photograph on right

[16] Midlothian Council (2021) Conservation Area Appraisals. [Online] Available at: https://www.midlothian.gov.uk/info/1220/conservation/289/conservation_areas_in_midlothian/2 (Accessed 05/04/2021)

Carlops Conservation Area[17]

Carlops Conservation Area					
Designation	Conservation Area	**Sensitivity (Value)**	Medium	**Distance and Direction to Nearest Turbine**	8.2 km NW T12
Figure / Plate	Figure 6.3, Plate 77				
Summary of Asset and Cultural Significance	Carlops Conservation Area includes much of the north/south running linear village along the A702 (Figure 6.3). It was founded in 1784, when Robert Brown the Laird of Newhall established a cotton weaving industry laying out rows of weavers' cottages on either side of the main Edinburgh-Biggar Road.				
Definition of Setting and Contribution to Cultural Significance	The setting of the listed buildings is the conservation area boundary which is generally inward focused and enclosed due to the height of the quarry and surrounding rising elevations immediately to the east and west of the linear village and Patie's Hill to the north. Key views from within the village are north/south along the A702				
Magnitude of Change to Cultural Significance	The Development is not within the setting of the conservation area but part of the more distant upland landscape context to the south-east that is characterised by commercial forestry. The Development would not be in any of the key views north/south along the A702 from within the conservation area as these are north, south and east though the Development may be visible as part in periphery as part of the more distant landscape; however, this is not a key view or sightline integral to the setting or appreciating the cultural significance of the conservation area. This represents a negligible change to the cultural significance of the conservation Area.				
Statement of Significance of Effect	As conservation area of medium sensitivity with a negligible magnitude of change to cultural significance, the effect upon the conservation area is negligible. This is **not significant** in terms of the EIA Regulations.				

Plate 77: Close up of Carlops Conservation Area from Figure 6.3 on left with aerial photograph on right

[17] Scottish Borders Council (2021) Carlops Conservation Area. [Online] Available at: https://www.scotborders.gov.uk/directory_record/25980/carlops#:~:text=The%20Conservation%20Area%20of%20Carlops,the%20main%20Edinburgh%2DBiggar%20Road (Accessed 12/04/2021)

Penicuik Conservation Area[18]

Penicuik Conservation Area					
Designation	Conservation Area	**Sensitivity (Value)**	Medium	**Distance and Direction to Nearest Turbine**	11.4 km NE T12
Figure / Plate	Figure 6.3, Plate 78				
Summary of Asset and Cultural Significance	Penicuik Conservation Area is focused on the historic town centre on either side of the River North Esk (Figure 6.3). The core of the town centre was developed in the 18th and 19th centuries on the plateau above the valley of the river North Esk, formed around the main road to the south (the current A701).				
Definition of Setting and Contribution to Cultural Significance	The setting of the listed buildings is the conservation area boundary due to the surrounding infill development around the historic town centre, especially to the north. Key views are restricted to within the designation boundary along the High Street with long distance views to the surrounding landscape largely obscured by the built-up nature of the conservation area and surrounding infill development as well as the rising elevations along the River North Esk Valley.				
Magnitude of Change to Cultural Significance	The Development is not within the setting but part of the more distant upland landscape context to the south that is characterised by commercial forestry. The historic town centre is generally not within the ZTV except along its northern margin which is characterised by surrounding infill development. The introduction of the turbines to the south (noting that the consented scheme view was similar) results in a negligible change to the understanding, appreciation or experience of the conservation area. This represents a negligible change to the cultural significance of the conservation Area.				
Statement of Significance of Effect	As conservation area of medium sensitivity with a negligible magnitude of change to cultural significance, the effect upon the conservation area is negligible. This is **not significant** in terms of the EIA Regulations.				

Plate 78: Close up of Penicuik Conservation Area from Figure 6.3 on left with aerial photograph on right

[18] Midlothian Council (2021) CAA and Management Plan Penicuik. [Online] Available at: https://www.midlothian.gov.uk/downloads/file/3802/caa_and_management_plan_penicuik (Accessed 05/04/2021)

CLOICH FOREST WIND FARM

VOLUME 3: TECHNICAL APPENDICES

TECHNICAL APPENDIX A7.1: HABITAT SURVEYS

JUNE 2021

Prepared By:

Findlay Ecology Services

2 Blakelaw Farm cottages
Kelso
TD5 8PB
T +44 (0)1573 430 302 l **E** melanie.ingledew@btconnect.com
w www.findlayecologyservices.co.uk

on behalf of:

Arcus Consultancy Services

7th Floor
144 West George Street
Glasgow
G2 2HG
T +44 (0)141 221 9997 l **E** info@arcusconsulting.co.uk
w www.arcusconsulting.co.uk

Registered in England & Wales No. 5644976

Table of Contents

1. INRODUCTION

The survey was commissioned by Arcus Consultancy Services Ltd to provide information on the vegetation at the proposed wind farm site at Cloich Forest which lies to the east of West Linton.

Particular attention has been made to peatland and wetlands (Ground Water Dependent Terrestrial Ecosystems or GWDTEs) as they are protected by the Water Framework Directive. The Scottish Environmental Protection Agency (SEPA) has classified vegetation communities using the NVC classification into communities which are highly ground water dependent and moderately ground water dependent[1]. These have been highlighted in the report.

2. SURVEY METHODS

2.1 Phase 1 survey

A Phase 1 survey is a standard approach to identify and present habitats[2] and map their spatial extent. Habitats were classified according to Phase 1, and boundaries between habitats were mapped onto satellite images using a Phase 1 Habitat Toolkit app[3]. Additional information was recorded using target notes via the app.

Cloich Forest comprises commercial forestry. The aim of the survey was to identify features of interest and any significant habitats. Initially, satellite images were viewed to identify any areas of open ground and these were surveyed. The remainder of the plantation is a mix of forestry coupes of different ages/stages. Plant communities were surveyed by eye and classified to (sub) community level as per the National Vegetation Survey (NVC), where relevant. The ground was probed using a walking pole to gain a measurement of peat depth in key areas to assist with the classification of habitats, most notably those that were dominated by purple moor-grass and cotton-grasses.

Access permission was restricted at this site and so access on foot was only possible within the boundaries of Cloich Forest itself. Two small areas were out with the Forest and were not surveyed, Figure 1. Additionally, land siding the access road from the A703 in the east of the site to where it enters the forest could not be accessed, Figure 1. The Phase 1 data from the 2012 Environmental Statement[4] was checked and updated. There were limitations to this, in that some areas could not be seen, but the areas closest to the road were viewed.

Fieldwork was undertaken on 18th,27th,30th September 2019 and on 24th June 2020.

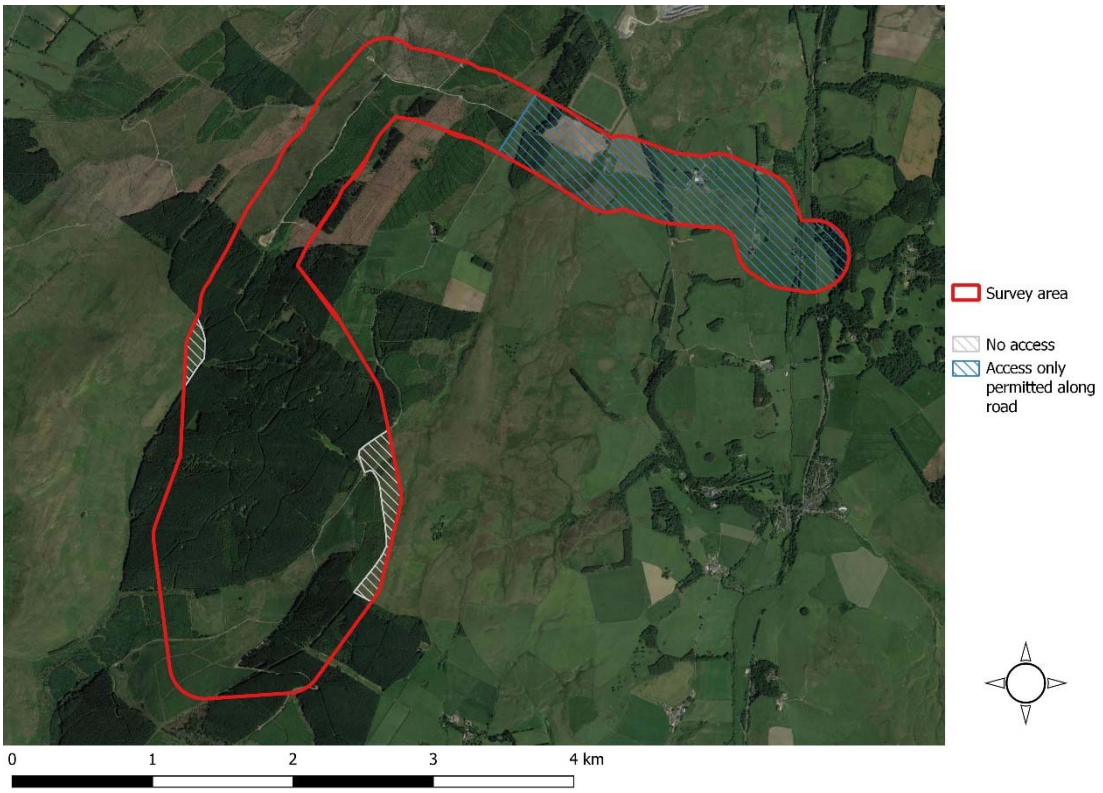
[1] SEPA (2014) Landuse Planning System Guidance note 31. Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems

[2] JNCC, (2010). Handbook for Phase 1 Habitat Survey - a Technique for Environmental Audit, ISBN 0 86139 636 7

[3] https://www.brookes.ac.uk/bms/specialist-services/ceec/phase-one-habitat-survey-toolkit/

[4] Partnerships for Renewables. (2012). *Cloich Forest Wind Farm Environmental Statement*. Planning application reference 12/01283/S36.

Figure 1. Access for vegetation surveys



2.1.1 Conditions

Conditions were variable for surveying, there was some heavy rain on 27th September 2019 but otherwise conditions were good for surveying, with no rain.

3. HABITATS AND COMMUNITIES

3.1 Summary

3.1.1 Within Cloich Forest

The spatial extent of habitats and communities in open ground is presented in Figures 2 to 4. Areas of open ground were few and small with the exception of the open ground around Courhope Farm in the south. This area comprises enclosed fields with most being improved pasture or marshy grassland. Most of these areas are species-poor mixes of rushes and tufted hair grass, but small areas of marshy grassland, with adjacent basic flushes, were identified as being species-rich (see Target notes 3 & 5).

In the rest of the plantation, open ground was found as thin strips siding small watercourses. Marshy grassland dominated these features and they were species-rich in places (see Target notes 7,8,9 & 10) including a small area of base enrichment at TN 9 associated with a small rocky fall. There were also some small areas of dry modified bog and heath in places, probably unplanted remnants from previously larger areas.

There has been some broad-leaved planting with native species within the forest. A stand was noted between TNs 15 & 16 comprising birch and alder with some juniper. This was at thicket stage and although the ground flora was disturbed, the new planting was established and offering habitat for birds and mammals.

3.1.2 Access track between forest and A703

Many of the habitats siding the access track between the forestry and the A703 have remained the same as in the 2012 Environmental Statement[4]. However, several fields are now arable comprising a rye grass mix which is cut for silage. It is likely that these have been resown since the 2012 survey as they were classed as improved or semi-improved in 2012. Additionally, there have been small areas of broad-leaved plantation.

The main features that could be impacted by any road widening along the access route is the small bridge across the Eddleston Water and the stone walls that sporadically form the field boundary between the road and some of the fields.

3.2 Habitat Descriptions

The main habitats are described briefly, although plantation woodland or self-set conifers (as at Courhope) are not described. The classification of semi-natural conifer woodland denotes areas of self-set conifers and was deemed the best Phase 1 category for these areas.

Improved grassland

These grasslands comprised areas where the sward was species-poor and which lacked any indicator species of either acid or base-rich grassland.

Acid grassland

Semi-improved, species-poor grasslands were primarily found on the drier, sloped, well-drained areas around Courhope Farm, and included species such as heath bedstraw, sheep's fescue and mat grass in places, although many areas on flatter ground had been subject to some improvement.

Unimproved neutral grassland

A linear swathe of coarse, unmanaged neutral grassland sides the Eddleston Water north of the bridge at Signal Cottage. This was dominated by false-oat grass with some cock's foot. Viewing this from the bridge, the grassland lacked any bulky herbs that would have been flowering. This together with the even, homogenous sward indicated relatively recent origin. The riverside was more diverse with reed canary grass, common valerian, meadowsweet and monkeyflower readily identifiable, see photo 1.

Photo 1. View upstream along the Eddleston Burn

Semi-improved neutral grassland

This included stands of species-poor tufted hair-grass and soft rush with Yorkshire fog which occurred in the south of the survey area in the enclosed fields around Courhope Farm.

Marshy grassland

Marshy grassland was the commonest habitat of the open ground within the plantation. It varied from stands of species-rich M23a *Juncus effusus/acutiflorus* - *Galium palustre* rush-pasture, *Juncus acutiflorus* sub-community, which supported a good range of herbs in with the sharp-flowered rush including yellow pimpernel, angelica, meadowsweet, marsh thistle, bugle, devil's bit scabious and grass of Parnassus to species-poor stands (M23b), dominated by soft rush, and purple moor-grass (M25) dominated areas by the Courhope Burn.

The species-rich areas were often associated with watercourses although a large patch was present at Courhope. At Courhope, there were also large areas of species-poor M23a/b marshy grassland. Elsewhere, more disturbed stands which were dominated by soft rush with tufted hair-grass and Yorkshire fog, see photo 2, were mapped as marshy grassland. These were similar to the vegetation mapped as semi-improved neutral grassland except they were wetter underfoot and had more soft rush.

Photo 2. Example of species-poor marshy grassland occurring on ground that had been ploughed for planting but left unplanted. The resultant vegetation is a species-poor mix.

There was also some small patches of purple moor-grass (M25) dominated vegetation at Courhope, by the Courhope Burn.

Dry heath

This was limited in extent, with relatively small stands found (H21 & H12 respectively), sometimes merging into more dry modified bog habitat (M19).

Photo 3. H21 dry heath at TN2 (which was merging into a more M19-type dry modified bog sub-community)

Dry modified Bog

This vegetation was similar to the dry heath except that there was a greater cover of hare's tail cotton grass mixed in with the heather and bilberry, with small areas of *Sphagnum capillifolium*, heath rush, wavy hair grass and purple moor grass, photo 4. No areas were on greater than 0.5m peat.

Photo 4. Area with dry modified bog vegetation near TN9. Probing found thin peat, less than 0.5m but the frequency and abundance of hare's tail cotton grass indicated bog habitat.

Acid/neutral flush
Tiny areas of acid flush were found in the south of the site near Courhope Farm. These were dominated by mixes of soft and sharp-flowered rushes with Sphagna.

Basic flush
Small areas of these flushes were found around the edges of marshy grassland, merging with more species-rich areas, especially at Courhope, and typically included species such as common yellow-sedge and carnation sedge.

Bracken
There were several areas of either continuous or scattered bracken in several sections of the more open ground between forestry blocks.

Other tall herb/fen – tall ruderal and non-ruderal
Tall herb areas were common around areas which had either seen some disturbance, through past forestry work, or were part of a semi-natural tall herb community. In the former case, these areas were dominated by rosebay willowherb and/or nettle, sometimes with scattered scrub regeneration too, as at Courhope, whilst in the latter case, greater wood-rush was the dominant species present.

3.3 Target Notes

TN No.	Grid ref	Notes
1	19962 46451	Small area of M10 vegetation within vegetated drain, with common yellow-sedge and carnation sedge
2	20770 46145	Area of heath on little peat but with frequent hare's-tail cottongrass as well as abundant heather, bilberry, crowberry and pleurocarpous mosses. Also frequent wavy hair-grass, with common sedge and very occasional purple moor-grass. *Sphagnum capillifolium* moss occasional and locally abundant on hummocks, with tormentil and heath bedstraw both rare. Considered closest to H21 heath but with M19 mire characteristics.
3	20886 46100	Species-rich M23a area with sharp-flowered rush, soft rush, sneezewort, marsh cinquefoil, ragged robin, marsh violet, tufted hair-grass.
4	20914 46082	M20 type-vegetation on 40cm peat, with hare's-tail cottongrass, wavy hair-grass, pleurocarpous mosses and Polytrichum moss.
5	20669 46525	Species-rich M23a area with sharp-flowered rush, soft rush, frequent meadowsweet, marsh thistle and occasional fen bedstraw and devil's-bit scabious, etc..
6	20693 46599	Deer fence beside linear muddy/stony open area, with some M10 patches, including common yellow-sedge, carnation sedge and jointed rush, alongside ragged robin, angelica and pale sedge.
7	20907 47616	Small area of H12 heath beside greater wood-rush and marshy areas by stream, with water-avens. Deer browsing evident in area.
8	20860 47644	Marshy area by stream, with abundant soft rush, angelica, meadowsweet, merging into tufted hair-grass, creeping buttercup and opposite-leaved saxifrage.
9	20146 48197	Small rocky fall with bryophytes. Local species include wild thyme, hard fern, bilberry, bugle, yellow loosestrife, tormentil, heather, sheep's fescue, common dog's violet, scaly male fern, broad buckler fern, lesser woodrush. H12 dry heath locally.
10	20285 48208	Thin strip of M23a along burn with sharp-flowered rush, meadow buttercup, tufted hair grass, meadowsweet and marsh bedstraw
11	20499 48451	Species-poor M23b. Lots of Yorkshire fog forming species-poor sward in places.
12	20467 49068	Quarry/borrowpit. Unvegetated except for small patches of rosebay willowherb, bent grasses and fox and hounds.

TN No.	Grid ref	Notes
13	20804 49573	Trackside vegetation. Stands of rosebay willowherb, soft rush and occasional purple moor grass. Shorter areas of vegetation with creepung buttercup, heath bedstraw, sweet vernal grass, sheeps sorrel, common cat's-ear, yellow rattle, white clover, bird's foot trefoil.
14	21439 50052	Soft rush and tufted hair grass dominant. Species poor
15	21869 50129	Sharp-flowered rush, tufted hair grass, Yorkshire fog, marsh thistle, broadleaved dock, sorrel, yarrow, sneezewort, marsh violet, marsh bedstraw, rosebay willowherb.
16	22215 49991	Recent extension of coniferous planting
17	22295 50029	Tormentil, tufted hair grass, patches of soft rush, mat grass, marsh bedstraw.
18	22299 49906	Small area of recent broad-leaved planting
19	22421 49840	This woodland was recorded as semi-natural woodland on the ES in 2012, but is beech plantation. This woodland is not listed as native woodland on the native woodland survey of Scotland.
20	22641 49716	This field is now arable, cut for silage.
21	22768 49573	Small hill/steep slope with unimproved acid grassland U4. The extent cannot be fully seen from the road and the polygon boundary has been interpreted from the satellite image.
22	23072 49588	This field is now arable, cut for silage.
23	23544 49454	Group of three craggy trees, one is sycamore, the others are possibly gean but too far from road to identify.
24	23811 49409	This field is now arable, cut for silage.
25	23982 49275	Both sides of the road have been planted with broad-leaved trees, mainly birch.
26	24266 48937	Bridge over Eddleston Water. Upstream of the bridge there is a broad corridor of unmanaged neutral grassland dominated by false-oat grass. The fields between the bridge and the A703 are no longer semi improved pasture. The northern field is improved past

Figure 1 Open ground vegetation in the south of Cloich Forest

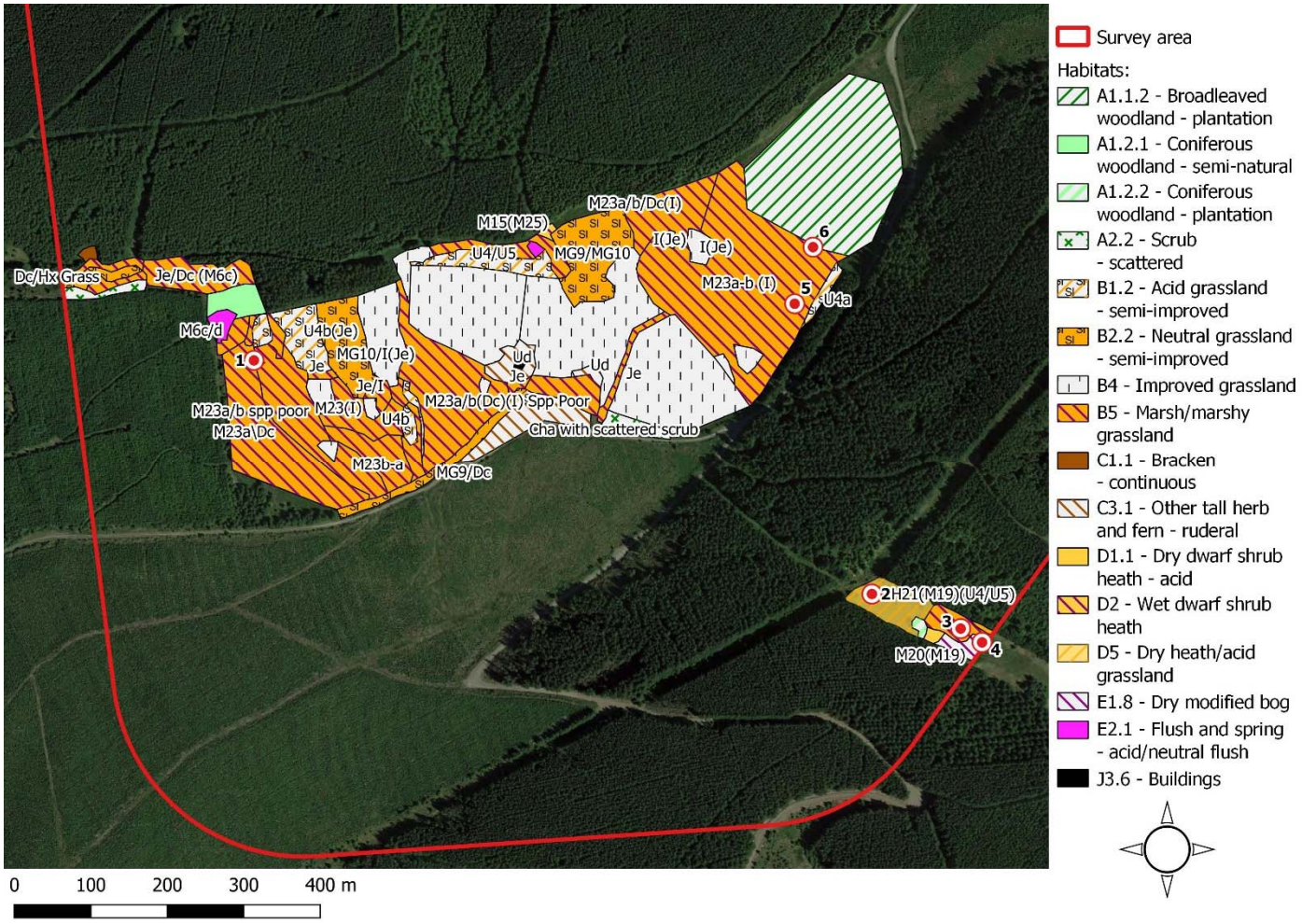


Figure 2 Open ground vegetation in Cloich Forest

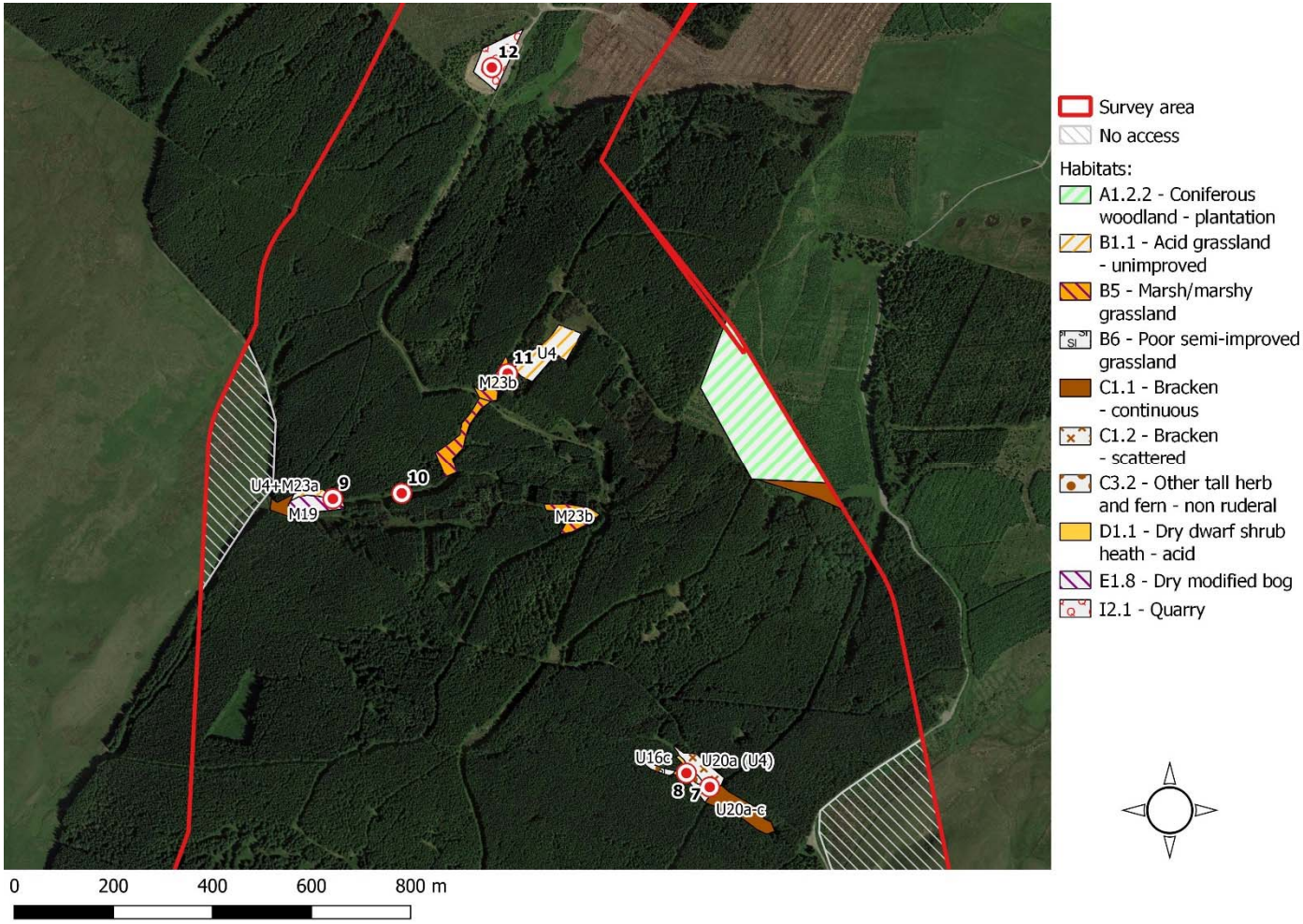
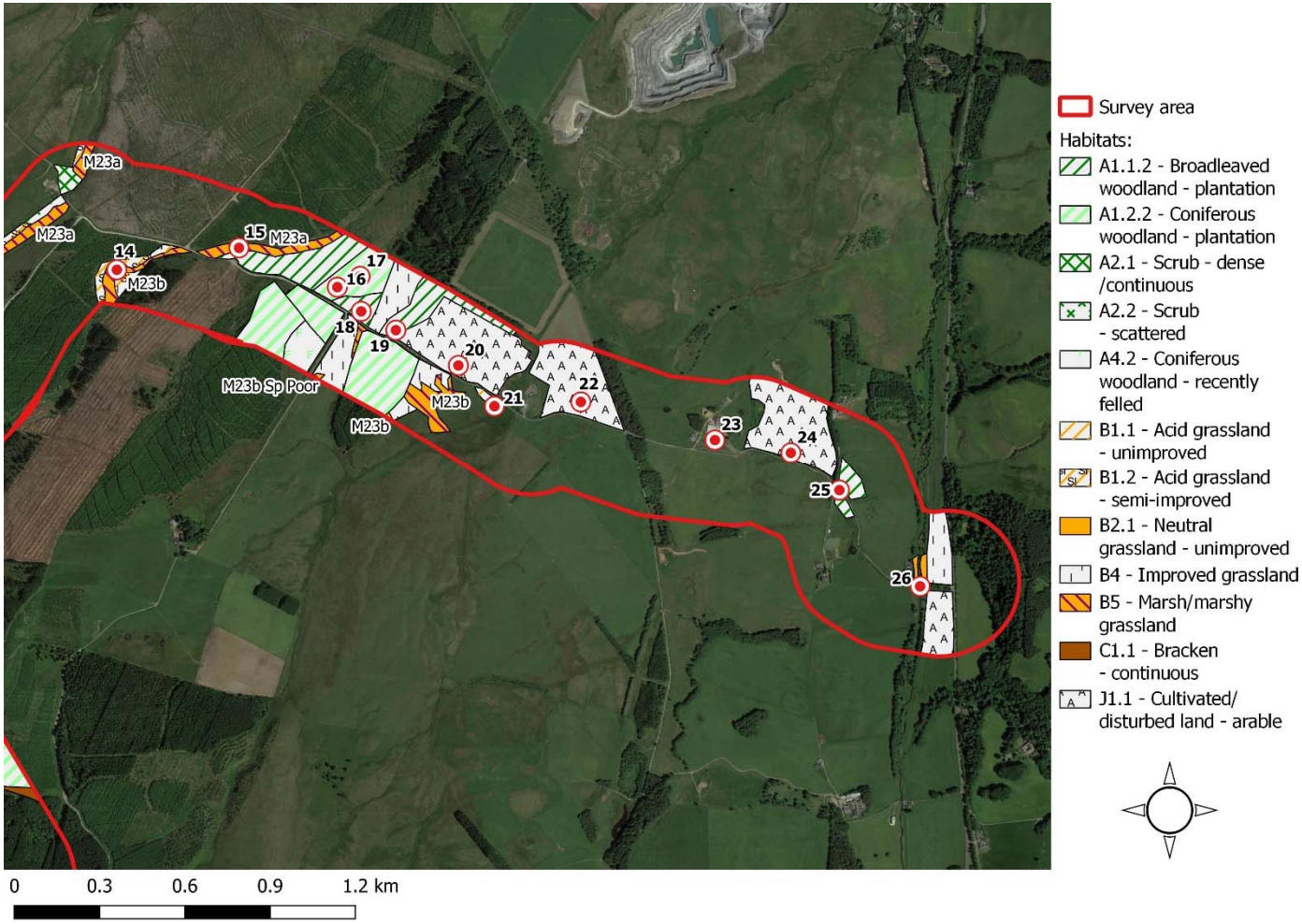


Figure 3 Changes in habitats since the 2012 wind farm application



4. SPECIES LIST

The following species were recorded during the survey and give a reasonable account of the species present, but do not represent a comprehensive species list. Planted trees and shrubs are excluded.

Latin	English
Achillea ptarmica	Sneezewort
Aegopodium podagraria	Ground elder
Agrostis canina	Velvet bent
Agrostis capillaris	Common bent
Ajuga reptans	Bugle
Angelica sylvestris	Angelica
Anthoxanthum odoratum	Sweet vernal grass
Arrhenatherum elatius	False-oat grass
Blechnum spicant	Hard fern
Calluna vulgaris	Heather
Carex demissa	Common yellow sedge
Carex nigra	Common sedge
Carex pallescens	Pale sedge
Carex panicea	Carnation sedge
Chamerion angustifolium	Rosebay willowherb
Chrysosplenium oppositifolium	Opposite leaved golden saxifrage
Cirsium arvense	Creeping thistle
Cirsium palustre	Marsh thistle
Dactylis glomerata	Cock's foot grass
Dactylorhiza maculata	Heath spotted orchid
Dactylorhiza purpurella	Northern marsh orchid
Deschampsia flexuosa	Wavy hair grass
Dryopteris affinis	Scaly male fern
Dryopteris dilatata	Broad buckler fern
Dryopteris felis mas	Male fern
Empetrum nigrum	Crowberry
Eriophorum vaginatum	Hare's tail cotton grass
Festuca rubra	Red fescue
Filipendula ulmaria	Meadowsweet
Galium palustre	Marsh bedstraw
Galium uliginosum	Heath bedstraw
Geum rivale	Water avens
Holcus lanatus	Yorkshire fog
Holcus mollis	Creeping soft grass
Hypochaeris radicata	Common cat's ear
Juncus acutiflorus	Sharp-flowered rush
Juncus articulatus	Jointed rush
Juncus effusus	Soft rush
Juncus squarrosus	Heath rush
Lathyrus montanus	Bitter vetchling

Luzula multiflora	Heath woodrush
Luzula pilosa	Hairy woodrush
Luzula sylvatica	Greater woodrush
Lychnis flos-cucculi	Ragged robin
Lysimachia nemorum	Yellow pimpernel
Mentha aquatica	Water mint
Molinia caerulea	Purple moor grass
Nardus stricta	Mat grass
Parnassia palustris	Grass of Parnassus
Phalaris arundinacea	Reed canary grass
Pilosella aurantiaca	Fox and hounds
Potentilla erecta	Tormentil
Ranunculus acris	Meadow buttercup
Ranunculus repens	Creeping buttercup
Rhinanthus minor	Yellow rattle
Rumex acetosa	Common sorrel
Thymus polytrichus	Wild thyme
Trifolium repens	White clover
Vaccinium myrtillus	Bilberry
Viola palustris	Marsh violet

Mosses

Rhytidiadelphus squarrosus

Polytrichum commune

Sphagnum capillifolium

Hylocomium splendens

CLOICH FOREST WIND FARM

VOLUME 3: TECHNICAL APPENDICES

TECHNICAL APPENDIX A7.2: PROTECTED SPECIES SURVEYS

JUNE 2021

Prepared By:

Arcus Consultancy Services

7th Floor
144 West George Street
Glasgow
G2 2HG
T +44 (0)141 221 9997 | **E** info@arcusconsulting.co.uk
w www.arcusconsulting.co.uk

Registered in England & Wales No. 5644976

TABLE OF CONTENTS

1 INTRODUCTION

This Technical Report describes the methods and results of Protected Species Surveys undertaken in 2020 to obtain baseline ecological information, to inform the Ecological Impact Assessment (EcIA) of the proposed Cloich Forest Wind Farm (the Development).

The aim of the Protected Species Surveys was to obtain detailed information regarding the occurrence and distribution of protected species within the Ecology Survey Area (ESA) (Figure 7.2.1, Annex A), to provide an accurate and robust baseline on which to base an EcIA.

The following terminology will be used throughout this TA:

- **The Development**: the whole physical process involved in the development of the land at Cloich Wind Farm, including the wind farm construction and operation (not a piece of land);
- **The Site**: all land with the potential to support the Development (shown as the red-line boundary on Figure 7.2.1, Annex A);
- **Ecology Survey Area (ESA)**: the land within which the Protected Species Surveys were undertaken (shown as the area within the survey buffers in Figure 7.2.1, Annex A).

1.1 Site Background

The Site is located within the Cloich Forest estate, approximately 5.5 kilometres (km) north-west of Peebles, in the Scottish Borders.

Habitats within the Site are dominated by coniferous plantation woodland of various ages, including large areas of recently felled woodland. However, the area around Courhope in the south of the Site consists of improved upland pasture, utilised for sheep grazing, and improved grassland which remains clear of forestry.

The Site encompasses the rolling Cloich Hills, including Peat Hill, Ewe Hill, White Rig and Crailzie Hill. The hills are dissected by a number of watercourses, including Middle Burn, Flemington Burn, Martyr's Dean, Courhope Burn and Harehope Burn. Those watercourses that flow southwest feed into the Flemington Burn on the west of the Site and eventually feeds into the River Tweed. Those watercourses that flow down to the northeast of the Site feed into Middle Burn and Shiplaw Burn which feeds into Eddlestone Water and eventually the River Tweed. There are no waterbodies within the Site.

2 METHODS

2.1 Desk Study

2.1.1 Protected Species

To provide local context to the EcIA, recent records (2000 - 2020) of protected and/or notable species were sought up to and within a 5 km buffer of the Site. In addition, the Desk Study aimed to identify recent records of invasive species located up to and within a 2 km buffer of the Site. This information was obtained from The Wildlife Information Centre.

2.1.2 Designated Sites

The Desk Study aimed to identify non-statutory and statutory designated sites of ecological conservation interest within 2 km and 5 km, respectively (Table 1). Information relating to designated sites was obtained from NatureScot Sitelink[1] and ArcGIS information system.

Table 1: Search Criteria for Designation Sites of Nature Conservation Interest

Level of Protection	Designation	Search Radius from Site Boundary
Non-Statutory	Site of Interest for Nature Conservation (SINC)	2 km
	Scottish Wildlife Trust (SWT) Reserve	
Statutory	Local Nature Reserve (LNR)	5 km
	National Nature Reserve (NNR)	
	Ramsar	
	Site of Species Scientific Interest (SSSI)	
	Special Area of Conservation (SAC)	

Sites designated for their bat, fish, floral or ornithological interest are considered in their respective reports and are therefore not discussed within this report.

2.2 Field Survey

Protected Species Surveys were undertaken by the following Arcus ecologists between February 2020 and September 2020: Matt Rea, James Allison, Laura Spence and Sallie Turnbull.

The Protected Species Surveys included specific surveys for the following:

- Badger (*Meles meles*);
- Great crested newt (*Triturus cristatus*);
- Otter (*Lutra lutra*);
- Pine marten (*Martes martes*);
- Red squirrel (*Sciurus vulgaris*); and
- Water vole (*Arvicola amphibius*).

Table 2 provides information relating to the key species surveyed, NatureScot recommended search areas and indicators of their presence.

A watching brief of protected and/or notable species was maintained throughout all Ecology Surveys. Where evidence was recorded, this is described within this report.

Table 2: Protected Species Survey Areas

Species	Search Area	Indicators of Presence
Badger	Within and up to 100 m from the Site	Setts (groups of holes), paths, snuffle holes, feeding signs, scratching posts, latrines (dung pits used as territorial markers), prints and hairs
Great crested newt	Within and up to 500 m from the Site	Freshwater ponds with nearby refuge habitat.

[1] *NatueScot Sitelink (2020). Available at: https://sitelink.nature.scot/home.* [Accessed 02/02/21]

Species	Search Area	Indicators of Presence
Otter	Watercourse within and up to 200 m from the Site	Spraint (droppings), prints, resting sites, paths, slides and feeding remains
Pine marten	Within and up to 250 m from the Site	Dens, scats, sightings and prints
Red squirrel	Within and up to 50 m from the Site	Sightings, dreys, feeding remains (characteristically chewed cones)
Water vole	Within and up to 50 m from the Site	Droppings, prints, burrows, feeding stations, runs, 'nests', lawns of short vegetation around burrow entrances and suitable habitat

2.2.1 Badger

All suitable habitats, located within the Site, and within a 100 m buffer, were surveyed from May to September 2020 to record field signs of badger in accordance with current best practice[2]. The survey aimed to identify and record any evidence of badgers including setts, foraging signs, latrines, prints, hairs and paths. Any setts present were categorised in accordance with best practice[3].

2.2.2 Great Crested Newt

A study using Ordinance Survey (OS) base-mapping identified five waterbodies located within, and up to a 500m buffer of, the Site.

Habitat Suitability Index (HSI)

A Habitat Suitability Index (HSI) assessment was undertaken on the waterbodies in accordance with relevant guidance[4]. The HSI assessed the potential suitability of the waterbodies to support great crested newts (GCN) based on 10 parameters. The waterbodies then received an overall HSI score between 0 and 1 (1 being most suitable to support GCN), as outlined in Table 3 below.

Table 3: HSI Scoring Criteria

Habitat Suitability Index Score	Pond Suitability to Support Great Crested Newt
<0.5	Poor
0.5-0.59	Below Average
0.6-0.69	Average
0.7-0.79	Good
>0.8	Excellent

For waterbodies that received an HSI score of 0.5 or above, further surveys were undertaken to confirm the presence of GCN, such as Environmental DNA (eDNA) analyses. Any waterbodies receiving an HSI score below 0.5 were considered of below average suitability to support GCN and were therefore scoped out of the need for further surveys.

[2] NatureScot (2020) Protected Species Advice for Developers: Badger. Available at https://www.nature.scot/species-planning-advice-badger. [Accessed 07/12/20]
[3] NatureScot (2018) Best Practice Badger Survey Guidance Note. Available at: https://www.nature.scot/sites/default/files/2018-05/Guidance-Licencing-Best-practice-badger-survey-methodology-%20on%20website.pdf [Accessed 07/12/20]
[4] ARG UK (2010) Great Crested Newt Habitat Suitability Index. Available at: https://www.arguk.org/info-advice/advice-notes/9-great-crested-newt-habitat-suitability-index-arg-advice-note-5/file. [Accessed 07/12/20]

Environmental DNA (eDNA) Analysis

Water samples were taken for eDNA analysis on 18th June 2020 from waterbodies which received an HSI score of 0.5 or above, in accordance with NatureScot and Natural England guidance[5]. Water samples were collected from the perimeter of each waterbody in strict accordance with Department for Environment, Food and Rural Affairs (DEFRA) technical advice note and were analysed by Surescreen Scientifics in strict accordance with eDNA analytical protocols.

2.2.3 Otter

All suitable watercourses and waterbodies located within the Site, and where accessible, within a 200 m buffer of the Site were surveyed for otter from May to September 2020. The survey aimed to record habitat suitability for otter, as well as evidence of otter presence, including spraint, prints, paths, slides, feeding signs and resting sites (lay-up sites, holts and couches) in accordance with recognised methodology[6].

2.2.4 Pine Marten

Suitable habitats (such as woodland) within the Site, and within a 250 m buffer of the Site, were surveyed from May to September 2020 to determine the presence of pine marten in accordance with NatureScot guidelines[7]. The survey aimed to record evidence of pine marten including denning sites, sightings, scats and prints.

2.2.5 Red Squirrel

Suitable habitat (such as mature woodland) located within the Site, and within a 50 m buffer, were surveyed for the presence of squirrel from May to September 2020, where possible, in accordance with current guidance[8]. The survey aimed to record evidence of squirrel including dreys, feeding remains and footprints.

2.2.6 Water Vole

All suitable watercourses and waterbodies located within the Site, and within a 50 m buffer, were surveyed, where possible, from May to September 2020 for water vole. The survey assessed the suitability of these watercourses and waterbodies to support water vole in accordance with recognised guidance[9]. In addition, the survey aimed to identify and record evidence of water vole including droppings, latrines, feeding remains, burrows and footprints.

2.2.7 Field Survey Limitations

Due to the dense nature of much of the plantation forestry there was limited access to some areas of woodland, reducing the ability to survey in detail. Access to some areas, including areas of wind-blown trees, was not possible for health and safety reasons. This was a minor survey limitation for those protected species more likely to be associated with woodland habitat such as badger, red squirrel and pine marten. However, it is also worth

[5] NatureScot (2020) *Protected Species Advice for Developers: Great Crested Newt.* Available at: https://www.nature.scot/species-planning-advice-developers-great-crested-newt. [Accessed 07/12/20]

[6] NatureScot (2020) *Protected Species Advice for Developers: Otter.* Available at: https://www.nature.scot/species-planning-advice-otter. [Accessed 07/12/20]

[7] NatureScot (2020) *Protected Species Advice for Developers: Pine Marten.* Available at: https://www.nature.scot/species-planning-advice-pine-marten. [Accessed 07/12/20]

[8] NatureScot (2020) *Protected Species Advice for Developers: Red Squirrel.* Available at: https://www.nature.scot/species-planning-advice-red-squirrel. [Accessed 07/12/20]

[9] NatureScot (2020) *Protected Species Advice for Developers: Water Vole.* Available at: https://www.nature.scot/species-planning-advice-water-vole. [Accessed 07/12/20]

noting that dense stands of coniferous woodland generally provide less favourable resources to these species.

3 RESULTS

3.1 Desk Study Results

3.1.1 Statutory Designated Sites

Four statutory designated sites were recorded within 5 km of the Site, information provided in Table 4 below and in Figure 7.2.2, Annex 1.

Table 4: Statutory Designated Sites within 5 km of the Site

Name	Designation	Distance to Development (km)	Designated Features
River Tweed	SAC	Adjacent to eastern access track. 0.4 km west of western Site Boundary.	• Atlantic salmon (*Salmo salar*) • Brook lamprey (*Lampetra planeri*) • River lamprey (*Lampetra fluviatilis*) • Sea lamprey (*Petromyzon marinus*) • Otter • Rivers with floating vegetation often dominated by water-crowfoot (*Ranunculus aquatilis*)
River Tweed	SSSI	5 km south	• Atlantic salmon • Brook lamprey • River lamprey • Sea lamprey • Otter • Beetle assemblage • Fly assemblage • Vascular plant assemblage • Trophic range river/stream
Whim Bog	SSSI	2 km north	- Raised bog
Dundreich Plateau	SSSI	3.3 km east	- Blanket bog - Subalpine flushes
Auchencorth Moss	SSSI	3.4 km north	- Raised bog

3.1.2 Non-statutory Designated Sites

Four non-statutory designated sites were recorded within 2 km of the Site, information provided in Table 5 below and in Figure 7.2.2, Annex 1.

Table 5: Non-Statutory Designated Sites within 2 km of the Site

Name	Designation	Distance to Development (km)	Summary
Cloich Bog	LBS	0 km east, bordering the site boundary	- Modified bog, burns and marsh - Noteable species; Several moss species, Small Pearl-bordered Fritillary (*Boloria selene*), Small Heath (*Coenonympha pamphilus*), Brown Hare (*Lepus europaeus*)
Shiphorn Quarry	LBS	0.26 km northeast	- Plantation woodland on former quarry pits.

			- Badger and common frog (*Rana temporaria*) named as notable species
Nether Stewarton Pools (Loch Potts)	LBS	0.62 km east	- Ponds, marsh and swamp - Common frog named as notable species.
Portmore Birchwoods	LBS	1.15 km northeast	- Semi-natural, moderately species-rich birch woodland on the banks of Portmore Loch. - Several moss species named as notable; including Blunt-leaved Bog-moss (*Sphagnum palustre*), A Bog-moss (*Sphagnum recurvum*) and Lustrous Bog-moss (*Sphagnum subnitens*)

3.1.3 Recent Ecological Records

Any protected, notable or invasive species noted during the desk study from The Wildlife Information Centre are detailed below in Table 6.

Table 6: Protected, Notable and Invasive Species Desk Study Results

Species	Conservation Status	Closest Record from ESA	Year of Record(s)
Mammals			
Mountain Hare (*Lepus timidus*)	WCA[10], EPS[11], SBL[12]	3.6 km east	2013 - 2017 (3 records)
Brown Hare (*Lepus europaeus*)	WCA, EPS, SBL	0.2 km east	2000 - 2015 (31 records)
Red squirrel	WCA, SBL	2.4 km east	2004 -2013 (14 records)
Pine marten	HR[13], SBL	2.6 km east	2004 - 2013 (3 records)
Otter	HR, SBL	0.3 km south	2002 – 2019 (27 records)
Badger	PBA[14]	In the centre of site near Courhope	2000 – 2019 (272 records)
West European Hedgehog (*Erinaceus europaeus*)	SBL	Where the access track meets the A703	2001 – 2019 (30 records)
Amphibians and Reptiles			
Common Toad (*Bufo bufo*)	WCA, SBL	1.2 km east	2004 – 2015 (11 records)
Great Crested Newt	WCA, HR, SBL	Within 1 km northwest	2006 (1 record)

[10] Wildlife and Countryside Act (1981) Available at http://www.legislation.gov.uk/ukpga/1981/69. [Accessed 02/12/20]

[11] European Protected Species, Habitats Regulations (1994) Available at http://www.legislation.gov.uk/uksi/1994/2716/contents/made. [Accessed 02/12/20]

[12] Scottish Biodiversity List. Available at http://www.gov.scot/Topics/Environment/Wildlife-Habitats/16118/Biodiversitylist/SBL. Accessed on 02 December 2020.

[13] Habitats Regulations (1994) Available online at http://www.legislation.gov.uk/uksi/1994/2716/contents/made [Accessed 18/12/19]

[14] Protection of Badgers Act (1992). Available online at: https://www.legislation.gov.uk/ukpga/1992/51/contents [Accessed 19/12/19]

Species	Conservation Status	Closest Record from ESA	Year of Record(s)
Common Lizard (*Zootoca vivipara*)	WCA, SBL	In the west of Site	2000 – 2016 (13 records)
Fish			
European Eel (*Anguilla Anguilla*)	SBL	River where the access track meets the A703	2000 – 2006 (17 records)
Atlantic Salmon	SBL	River where the access track meets the A703	2000 – 2012 (31 records)
Brown Trout (*Salmo trutta*)	SBL	In Shiplaw Burn in the northeast of Site	2000 -2006 (29 records)
Invasive Species			
Eastern Grey Squirrel (*Sciurus carolinensis*)	INNS	1.4 km east	2011 – 2014 (4 records)
Sika Deer *(Cervus nippon)*	INNS	0.26 km east	2014 (1 record)
Fallow Deer *(Dama dama)*	INNS	0.15 km east	2001 – 2018 (16 records)
Rainbow Trout *(Oncorhynchus mykiss)*	INNS	1.9 km northeast in Portmore Reservoir	2002 (2 records)

Key:
EPS: European Protected Species
HR: The Conservation (Natural Habitats, &c.) Regulations 1994 (European Protected Species)
INNS: Invasive Non-native Species
PBA: Protection of Badgers Act 1992
SBL: Scottish Biodiversity List
WCA: Wildlife and Countryside Act 1981

3.2 Field Survey Results

Results of the field surveys are provided below with reference to figures provided in Annex 1 and photographs in Annex 2.

3.2.1 Badger

Numerous badger setts and signs were found in the ESA.

Detailed results of the Badger Survey are presented in the Confidential Annex and on Confidential Figure 1.

3.2.2 Great Crested Newt

The ponds (as shown on Figure 7.2.3, Annex 1) had possible suitability for GCN and were surveyed using eDNA analysis to determine presence, however no evidence was recorded. Surrounding terrestrial habitat provided opportunities for foraging and shelter.

The summary of the results of the HSI and eDNA analyses are provided in Table 7, below. A full set of HSI data is provided in Annex 3.

Table 7: HSI Scores and eDNA Results

Waterbody Number	Pond Name	HSI Score	Prediction (Likelihood of GCN)	eDNA Analysis Undertaken	DNA Detected
1	C1	0.76	Good	Yes	No
2	C2	0.61	Average	Yes	No
3	C3	0.61	Average	Yes	No
4	C4	0.61	Average	Yes	No
5	C5	0.61	Average	Yes	No

Due to the absence of GCN eDNA in suitable ponds, this species was considered unlikely to be present within the ESA, and no further surveys (such as pond population assessment survey) were undertaken.

3.2.3 Otter

Evidence of otter was observed in the north and southwest of the ESA (Figure 7.2.3, Annex 1), which confirmed their presence. This consisted of several spraints which were found mainly on the banks of a watercourse running along the western edge of the Site (see Photographs 1 and 2). One spraint in the north was found under an old stone bridge (see Photograph 3).

Watercourses within the Site and a 200 m buffer varied in their suitability for otter. Burns in the west of the ESA were generally of more moderate suitability to support otter populations, with many providing opportunity for foraging and commuting. Courhope Burn was suitable in most parts with a moderate flow (Photograph 4), but became less suitable as it progressed (Photograph 5).

3.2.4 Pine Marten

Pine marten signs were recorded numerous times within the ESA (Figure 7.2.3, Annex 1).

Records of probable pine marten scat were mainly focused in the centre and south of Site. Both fresh (Photograph 7) and old (Photograph 8) scat was observed at the edge of paths and tracks.

Habitats within the ESA varied in their suitability to support pine marten, with immature and semi-mature coniferous plantation woodland considered of limited suitability to support denning pine marten due to the absence of elevated tree canopies. The mature conifer plantation woodland was also considered to be of limited suitability to support denning pine marten due to the lack of ground crevices. However, areas of felled plantation and open habitat in the ESA were suitable for foraging and denning. Areas of windblow and uprooted trees typically provide suitable denning locations for pine marten.

3.2.5 Red Squirrel

No evidence of squirrel was recorded in the ESA.

Habitats within the ESA were considered suitable for red squirrel, having a mix of coniferous plantation of various ages offering good foraging, commuting and shelter to red squirrel.

Numerous records of red squirrel were also identified during the Desk Study, with the species' main range encompassing the Site[15].

3.2.6 Water Vole

No evidence of water vole was recorded within the ESA, or found in the Desk Study.

Watercourses within the ESA varied in their suitability for water vole. Some were too fast-flowing and lacked vegetated banks to support populations (Photograph 4), while others were very suitable, with slow flowing, vegetated riparian banks (Photograph 5 and 6). Overall, the ESA had the potential to support water vole.

3.2.7 Other Species

Several common frogs were recorded during the Protected Species Surveys, indicating that the ponds present within the ESA provide ample breeding habitat for common amphibian species, such as common frog and common toad (*Bufo bufo*). Felled woodland, recorded within the ESA, may provide suitable foraging, refuge and hibernacula opportunities for reptiles, however none were recorded.

Common reptile and amphibian species are likely to be present throughout the ESA.

4 SUMMARY

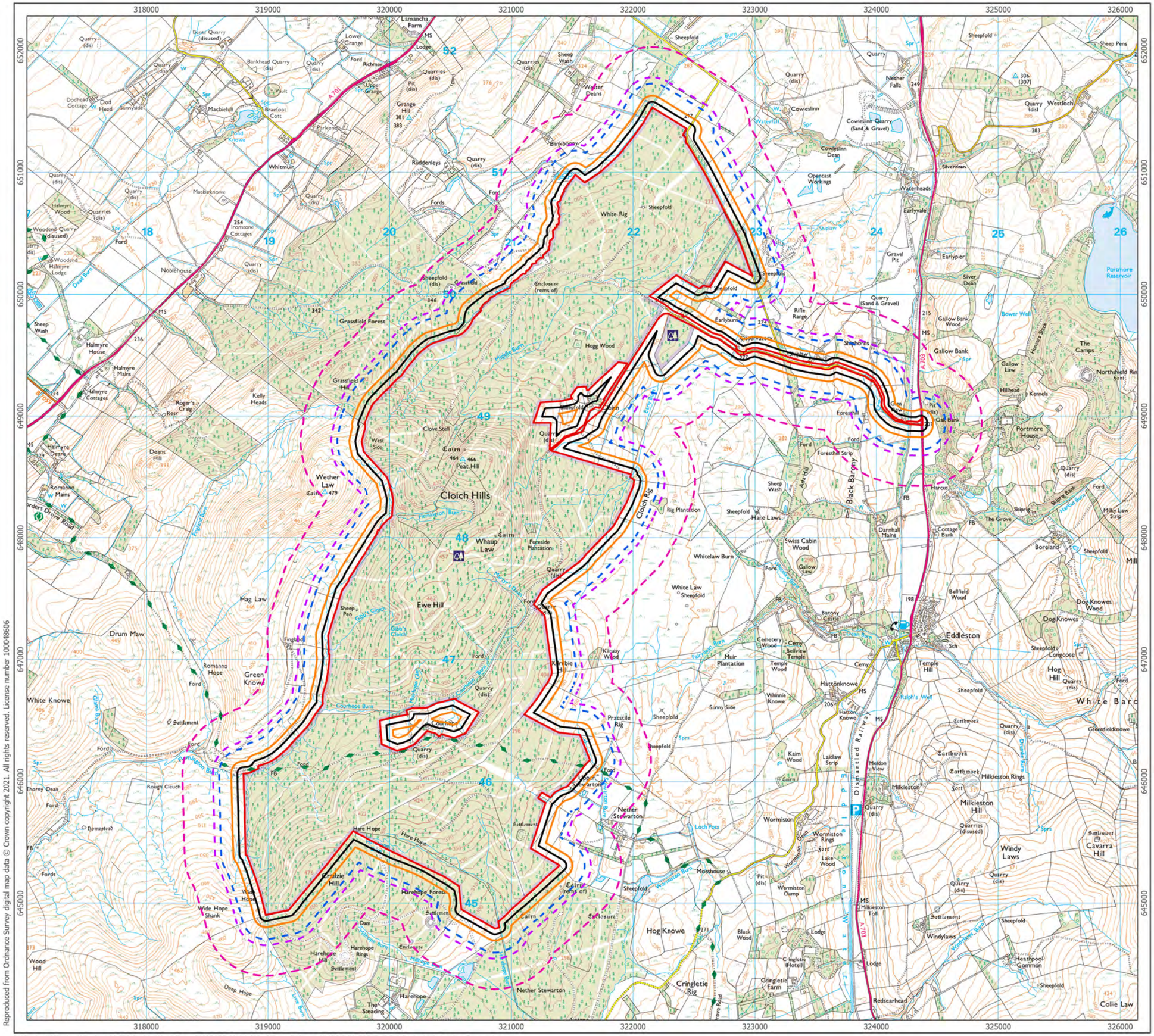
Overall, the Site had a mix of habitats which varied in their suitability to support protected species. However, badger, otter and pine marten were confirmed to be present on Site.

Areas of woodland within the ESA presented suitable habitat for badger and pine marten. Riparian habitats offered suitable habitat for otter and water vole, however, only signs of otter were located within the ESA with no evidence of water vole.

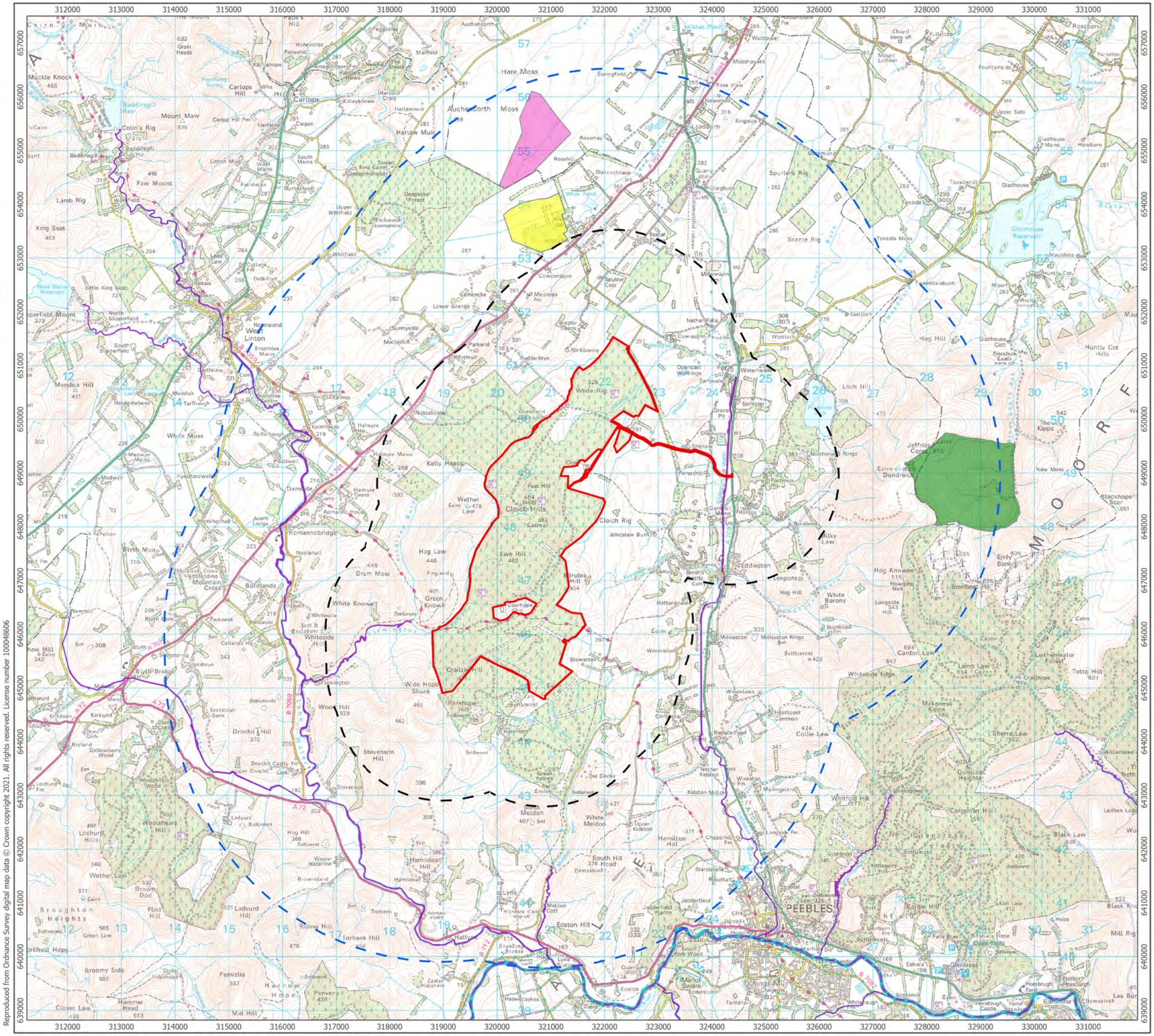
[15] NatureScot (2010). Naturally Scottish: Red Squirrels. Available at: https://www.nature.scot/naturally-scottish-red-squirrels#:~:text=Believed%20to%20have%20been%20in,survived%20good%20times%20and%20bad.&text=Home%20to%2075%25%20of%20the,red%20squirrels%20in%20the%20UK. [Accessed on 07 December 2020.]

ANNEX 1: FIGURES

- Figure 7.2.1: Protected Species Survey Areas
- Figure 7.2.2: Designated Sites within 5km
- Figure 7.2.3: Protected Species Survey Results



P:\Projects\Ecology\Projects\3439 Cloich Wind Farm EIA\3439 Cloich Wind Farm EIA.aprx\3439-REP-070 Fig7.2.1 Protected Species Survey Areas



P:\Projects\Ecology\Projects\3439 Cloich Wind Farm EIA\3439 Cloich Wind Farm EIA.aprx\3439-REP-071 Fig7.2.2 Designated Sites within 5km

eDF renewables

ARCUS

Site Boundary

Survey Areas

2km Buffer

5km Buffer

Auchencorth Moss SSSI

Dundreich Plateau SSSI

River Tweed SSSI

Whim Bog SSSI

River Tweed SAC

1:68,000 Scale @ A3

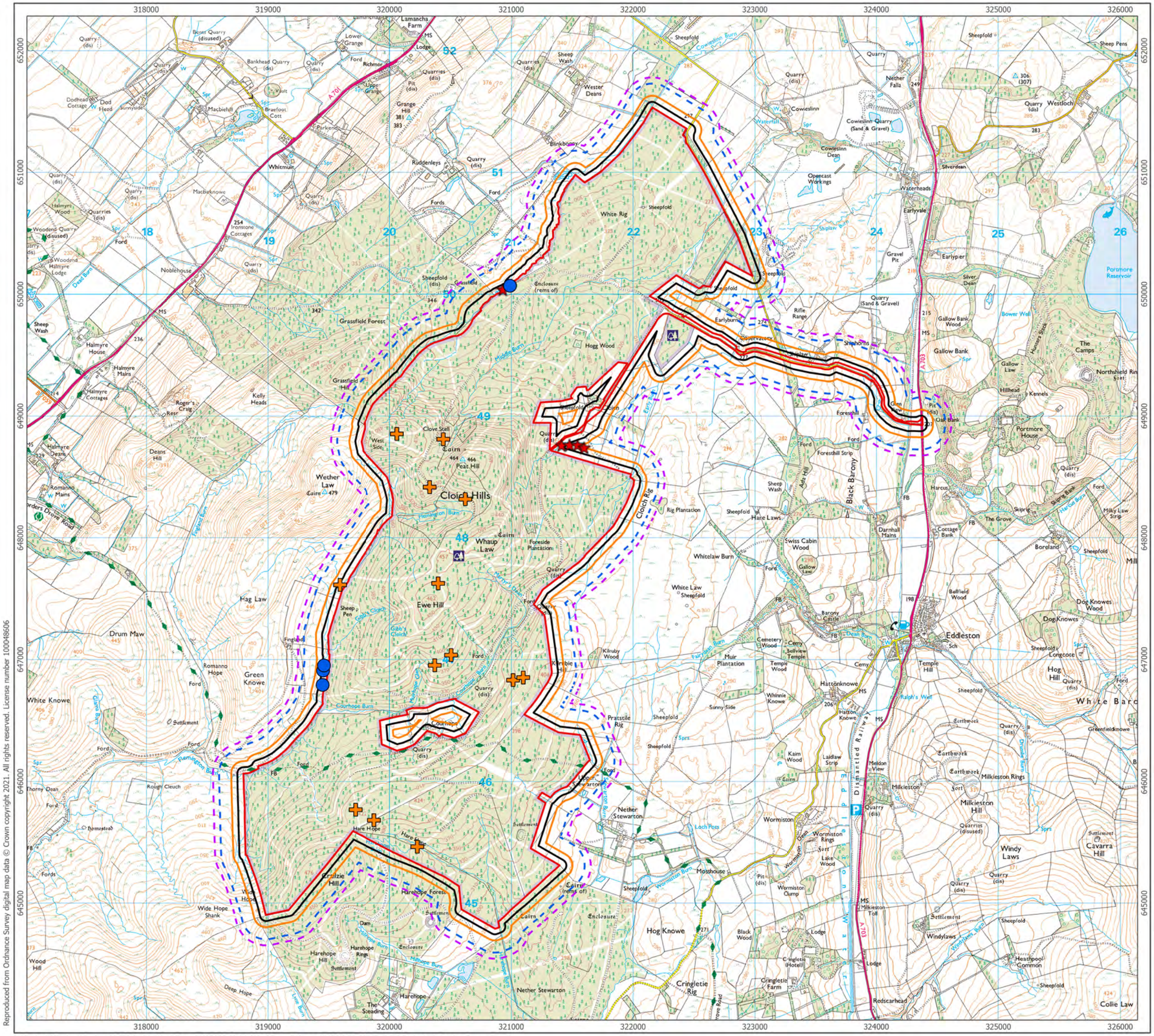
0 1 2 km

NORTH

Produced By: ST	Ref: 3439-REP-071
Checked By: SC	Date: 11/06/2021

Designated Sites within 5km
Figure 7.2.2

Cloich Forest Wind Farm
Protected Species Survey



P:\Projects\Ecology\Projects\3439 Cloich Wind Farm EIA\3439 Cloich Wind Farm EIA.aprx\3439-REP-072 Fig7.2.3 Protected Species Survey Results

eDF renewables

ARCUS

Site Boundary

Survey Areas

- Red Squirrel and Water Vole (50m Buffer)
- Badger (100m Buffer)
- Otter (200m Buffer)
- Pine Marten (250m Buffer)

Protected Species Signs

- Otter
- Pine marten
- GCN HSI Ponds

1:30,000 Scale @ A3

0 0.5 1 km

NORTH

Produced By: ST	Ref: 3439-REP-072
Checked By: SC	Date: 11/06/2021

Protected Species Survey Results
Figure 7.2.3

Cloich Forest Wind Farm
Protected Species Survey

ANNEX 2: PHOTOLOG

Photograph 1: Dried otter spraint on the bank of a burn (Photograph 2) on the western edge of Site.

Photograph 2: Burn in the southwest of the ESA, with small minnow, but likely only used for commuting.

Photograph 3: Otter spraint found under old stone bridge in north of ESA.

Photograph 4: Courhope Burn, suitable for otter commuting.

Photograph 5: Courhope Burn, becoming more sub-optimal for otter, suitable for water vole.

Photograph 6: Flemington Burn; suboptimal for otter, suitable for water vole

	
Photograph 7: Dried scat found in east of Site.	Photograph 8: Fresh scat found in the south of Site

ANNEX 3: HSI SCORES

Water Body Number	Pond Name	Grid Reference	Location	Area (sq m)	Pond Permanence	Water Quality	Shade (%)	Waterfowl	Fish	Pond Density	Terrestrial Habitat Quality	Macrophyte Cover (%)	Final HSI Score
1	C1	NT 20904 50022	0.5	0.85	1.00	0.67	1.00	1.00	0.67	0.6	0.67	0.8	0.76
2	C2	NT 21415 48756	0.5	0.5	0.5	0.67	1.00	0.67	0.67	1	0.33	0.6	0.61
3	C3	NT 21480 48761	0.5	0.5	0.5	0.67	1.00	0.67	0.67	1	0.33	0.6	0.61
4	C4	NT 21545 48755	0.5	0.5	0.5	0.67	1.00	0.67	0.67	1	0.33	0.6	0.61
5	C5	NT 21598 48738	0.5	0.5	0.5	0.67	1.00	0.67	0.67	1	0.33	0.6	0.61

CLOICH FOREST WIND FARM

VOLUME 3: TECHNICAL APPENDICES

TECHNICAL APPENDIX A7.3: BAT SURVEYS

MARCH 2021

Prepared By:

Arcus Consultancy Services

7th Floor
144 West George Street
Glasgow
G2 2HG

T +44 (0)141 221 9997 l **E** info@arcusconsulting.co.uk
w www.arcusconsulting.co.uk

Registered in England & Wales No. 5644976

TABLE OF CONTENTS

1 INTRODUCTION

This Technical Appendix (TA) describes the methods and results of the Bat Surveys undertaken to obtain baseline ecological information, to inform the Ecological Impact Assessment (EcIA) of the proposed Cloich Forest Wind Farm (the Development).

This TA presents the methods and results of Bat Surveys undertaken in 2020, and supports the Environmental Impact Assessment Report (EIA Report) - Chapter 7: Ecology in addition to:

- TA 7.1: Habitat Surveys;
- TA 7.2: Protected Species Surveys, and;
- TA 7.4: Fisheries Surveys.

The aim of the Bat Surveys was to obtain detailed information regarding the occurrence and distribution of bats within the Bat Survey Area (BSA) (Figure 7.3.1, Annex A), to provide an accurate and robust baseline on which to base the EcIA.

The following terminology is used throughout this TA:

- **The Development:** the whole physical process involved in the development of the land at Cloich Forest Wind Farm, including the wind farm construction and operation (not a piece of land);
- **The Site:** all land with the potential to support the Development (as shown by the red-line boundary in Figure 7.3.1, Annex A);
- **Bat Survey Area**: the land within which the bat surveys were undertaken (shown in Figure 7.3.1, Annex A). In accordance with Bat Conservation Trust (BCT) survey guidelines (2016)[1] and current NatureScot guidance[2], the Bat Survey Area (BSA) is defined as an area a minimum of 200 metres (m) of the proposed Turbine Layout. As the final Turbine Layout was not defined at the time of survey, the BSA represents the extent of the boundary of the Site with a 200 m buffer applied.

1.1 Site Background

The Site, centred on NGR 320648 647881, is located between Penicuik and Peebles in the Scottish Borders. The A701 which connects Penicuik to Moffat is located to the north west of the Site, and the A703, connecting Penicuik to Peebles runs to the east. The Site location and red-line boundary (Site Boundary) are shown in (Figure 7.3.1, Annex A).

The Site as existing consists of plantation woodland, which comprises a mixture of recently felled areas, and coniferous woodland at varying degrees of maturity. Vegetation across the Site includes forestry and open grassland. The plantation is largely comprised of commercially stocked mature Sitka spruce (*Picea sitchensis*).

Several watercourses and associated tributaries flow across the Site; these include Middle Burn, Martyr's Dean, Flemington Burn, Courhope Burn and Harehope Burn. The watercourses which flow southwest feed into the Flemington Burn on the west of the Site and eventually feeds into the River Tweed. The watercourses which flow down to the northeast of the Site feed into Middle Burn and Shiplaw Burn which in turn feeds into Eddlestone Water and eventually the River Tweed.

The topography of the Site and immediate vicinity is varied, with elevation ranging from approximately 280 m Above Ordnance Datum ('AOD') in the northeast part of the Site to 476 m approx. AOD at the peak of Crailzie Hill to the south.

[1] Hundt, L. (2016). Bat Surveys for Professional Ecologists – Good Practice Guidelines 3rd edition. Bat Conservation Trust, London.

[2] Joint Publication NatureScot, Natural England, et al. (2019) Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation

1.2 The Development

The Development would comprise up to 12 three-bladed horizontal axis turbines up to 149.9 m tip height. The Development also incorporates associated ancillary infrastructure comprising hardstanding areas, transformers, access tracks, cabling, a substation, temporary construction compound, borrow pits and an anemometry mast.

2 BASELINE METHODS

2.1 Desk Study

To provide context for the results of the Bat Surveys, a search for recent (0-20 years) biological records was carried out via the publicly available resources, such as the National Biodiversity Network (NBN) database[3]. A search radius of 5km from the BSA was applied to bat species of low to medium risk from wind turbines[2] with a 10km search radius applied to species of high potential vulnerability, such as Leisler's bat (*Nyctalus leisleri*), noctule bat (*Nyctalus noctula*), Nathusius' pipistrelle (*Pipistrellus nathusii*).

The criteria applied for the search of designated sites of ecological interest is provided in Table 1, below. Details for the designations of sites were sought from the NatureScot Site Link website[3].

Table 1: Search Criteria for Designated Sites of Relevance to Bats

Protection	Designation	Search radius
Non-statutory	Ancient Woodland Inventory (AWI) Site of Interest for Nature Conservation (SINC) Local Nature Reserves (LNR)	2km
Statutory	Sites of Special Scientific Interest (SSSI) National Nature Reserves (NNR)	5km
	Ramsar Sites Special Area of Conservation (SAC)	10km

2.2 Field Survey

Bat Surveys were carried out with reference to NatureScot guidelines[2], between April and October 2020 (the Survey Season), with all survey work undertaken by Arcus. The Site was considered to be of low risk to bats. This was established with consideration of the site risk assessment criteria as presented within NatureScot survey guidelines (reproduced below in Table 2 for reference) in conjunction with the professional opinion of Arcus bat ecologists, as detailed below.

With a maximum of 12 turbines, the Development is considered to be a medium-sized development with regards to the guidance detailed Table 2 below. Within this guidance, medium-sized developments are described as having between 10 and 40 turbines and therefore the Development would be on the lower end of the risk scale.

The majority of the habitat within the Site Boundary is comprised of coniferous plantation woodland. Due to the growth form of the trees typically used in commercial forestry (e.g. Sitka spruce), which generally lack any potential roost features (e.g. cracks, holes, crevices) for bats, coniferous plantation woodland is considered to be of low value to roosting bats[4]. Several small, pockets of broadleaved woodland exist within the Site Boundary, however, all but two of these lie in the north-east of the Site Boundary, far outwith the proposed

[3] *National Biodiversity Network Atlas Scotland.* Available at: https://scotland.nbnatlas.org/. [Accessed 4/02/21]

[4] Andrews, H. et al (2013). Bat Tree Habitat Key: Bat Roosts in Trees; A Guide to Identification and Assessment for Tree-care and Ecology Professionals. AEcol, Bridgwater.

turbine envelope. The two areas of broadleaved woodland in the south of the Site are very small and isolated from similar, suitable habitat to such an extent that neither area is considered a valuable resource for roosting bats. Overall, the habitat risk is considered to be low.

In line with the current NatureScot guidelines, a medium scale development combined with a low-risk habitat results in a 'Site Risk Leve' score of 2; a low-risk site.

Table 2: Site Risk Assessment Criteria for Wind Farm Developments *

Site Risk Level (1-5) **	**Project Size**			
Habitat Risk		Small	Medium	Large
	Low	1	2	3
	Moderate	2	3	4
	High	3	4	5
Key: Green (1-2) - low/lowest site risk; Amber (3) - medium site risk; Red (4-5) - high/highest site risk. ** Some sites could conceivably be assessed as being of no (0) risk to bats. This assessment is only likely to be valid in more extreme environments, such as above the known altitudinal range of bats, or outside the known geographical distribution of any resident British species.				

Habitat Risk	**Description**
Low	Small number of potential roost features, of low quality. Low quality foraging habitat that could be used by small numbers of foraging bats. Isolated site not connected to the wider landscape by prominent linear features
Moderate	Buildings, trees or other structures with moderate-high potential as roost sites on or near the site. Habitat could be used extensively by foraging bats. Site is connected to the wider landscape by linear features such as scrub, tree lines and streams.
High	Numerous suitable buildings, trees (particularly mature ancient woodland) or other structures with moderate-high potential as roost sites on or near the site, and/or confirmed roosts present close to or on the site. Extensive and diverse habitat mosaic of high quality for foraging bats. Site is connected to the wider landscape by a network of strong linear features such as rivers, blocks of woodland and mature hedgerows. At/near edge of range and/or on an important flyway. Close to key roost and/or swarming site.
Project Size	**Description**
Small	Small scale development (≤10 turbines). No other wind energy developments within 10km. Comprising turbines <50m in height.
Medium	Larger developments (between 10 and 40 turbines). May have some other wind developments within 5km. Comprising turbines 50-100m in height.
High	Largest developments (>40 turbines) with other wind energy developments within 5km.

	Comprising turbines >100m in height.
* As informed by published guidelines[2] current scientific research and professional opinion of Arcus ecologists.	

2.2.1 Roost Surveys within the BSA

2.2.1.1 Bat Roost Suitability Assessment

No specific Roost Surveys were carried out. However, initial walkover surveys of the Site, including during Extended Phase 1 Habitat Surveys and Protected Species Surveys, did not identify any features with high suitability to support roosting bats within the BSA. This was due to the dominance of habitats within the Site by coniferous plantation woodland. Coniferous trees generally show low to negligible potential to support bats due to their lack of potential roosting features[5].

2.2.2 Bat Activity Surveys

The survey season comprised of the following three seasonal Survey Sessions, as defined in current NatureScot guidance[2];

- Survey Session 1: April/May (Spring);
- Survey Session 2: June-mid-August (Summer); and,
- Survey Session 3: Mid-August-October (Autumn).

Remote Static Activity Surveys were undertaken across the three Survey Sessions in 2020 (see Table 4, below).

Table 4: Remote Static Survey Dates

Survey Session	Deployment Period	Survey Hours (per Anabat)	Survey Hours (per Session)
1 (spring)	30/04/2020 – 13/05/2020	120.25	1202.5
2 (summer)	08/07/2020 - 22/07/2020	103.92	1039.2
3 (autumn)	25/09/2020 - 09/10/2020	174.46	1744.6
Total			**3986.3**

A total of ten bat detectors, full spectrum Anabat Swift bat detectors (hereby referred to as Anabats), were deployed at ground level (detectors secured to 1 m high posts) for a minimum of ten consecutive nights across a range of habitat types, as per NatureScot guidance. The Anabats were set to record from approximately half an hour before sunset until approximately half an hour after sunrise.

In order to collect comparative data, all Anabats were deployed at the same ten Remote Static Survey Locations (RSSL) (labelled as RSSL A-J) across the three Survey Sessions (see Table 5). Anabats were also located to allow for comparisons in recorded bat activity between two broad dominant habitat types; these are defined as open (i.e. open areas lacking high value linear habitat features with 50 m), or edge (i.e. within 50 m of woodland edges, or a linear feature such as a hedgerow or watercourse).

Table 5: Remote Static Survey Locations

RSSL ID	Habitat Description	Habitat Type

[5] Andrews, H. (2018) Bat Roosts in Trees: A Guide to Identification and Assessment for Tree-Care and Ecology Professionals. Pelagic Publishing

A	Forestry ride in Sitka Spruce plantation	Edge
B	Old ride in clear fell plantation	Open
C	Forestry ride in Sitka Spruce plantation	Edge
D	Young regenerative open plantation	Open
E	Forestry ride in Sitka Spruce plantation	Edge
F	Forestry track in Sitka Spruce plantation	Edge
G	Path through forestry	Edge
H	Forestry ride in Sitka Spruce plantation	Edge
I	In clear fell area near forest edge	Edge
J	Forestry ride in Sitka Spruce plantation	Edge

2.2.2.1 Limitations

1. Two Anabats were stolen from their RSSLs. One during Survey Session 1 (RSSL E) and one during Survey Session 2 (RSSL D). This resulted in a loss of data for these respective Survey Sessions at these RSSLs. The remaining nine Anabats were positioned to capture bat activity across a range of habitat types and so the loss of data from one Anabat from a single Survey Session is perceived to be a relatively minor limitation.

2.3 Bat Roost Assessment of Trees outwith the BSA

Trees situated along the Development access track, which lies outwith the BSA, (including a 50 m buffer where accessible) were assessed from the ground, looking for potential roost features (PRFs) which could be used by roosting bats, such as holes, cracks and crevices[5]. The habitat surrounding the trees was also taken into consideration. The trees were then graded as to whether they contained negligible, low, moderate or high roost suitability as per Table 6 below, according to BCT guidance[6].

Table 6: Guidelines for Assessing Suitability Habitat Features for Roosting Bats

Suitability	Roosting Habitats	Foraging and Commuting Habitats
Negligible	No habitat features on site likely to be used by roosting bats.	No habitat features on site likely to be used by commuting or foraging bats.
Low	A tree of sufficient size and age to contain PRFs but with none seen from the ground or features seen with only very limited roosting potential.	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated and poorly connected to the surrounding landscape. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.

[6] Collins, J. (ed.) (2016). Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition). Bat Conservation Trust, London.

Moderate	A tree with one or more potential roost sites that could be used by bats due to the size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation statues (with respect to roost type only, not species conservation status).	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.
High	A tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.	Continuous, high-quality habitat, well connected to the wider landscape, that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge. High-quality habitat that is well connected to wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, tree-lined watercourses and grazed parkland. Site is close to and connected to known roosts.

2.4 Data Analysis

2.4.1 Bat Call Analysis

Ultrasonic recordings captured during all activity surveys were subject to detailed analysis using audio software such as Analook W, Bat Sound and Wave Surfer, with reference to bat species call identification guidance[7], to enable identification of bat species.

Although analysis of ultrasonic recordings does enable identification of bat species, there are some limitations associated with species identification from acoustic monitoring. Echolocation calls from bats in the same genus often exhibit a large degree of overlap in their call structures, making definitive identification difficult. Additionally, a bat will vary the structure of its echolocation calls to reflect its needs. This behaviour results in a large degree of variation in the call structure of any given bat species and can also result in the structure of echolocation calls overlapping with those of other bat species.

Other limiting factors which may affect the recording of a bat echolocation call include (but are not strictly limited to):

- The distance and direction of the bat in relation to a bat detector;
- The amount and type of 'clutter' in the vicinity of a bat detector;
- Weather conditions; and
- The frequency response of the bat detector microphone.

Species identification is therefore applied with a level of confidence, especially where deterministic call characteristics are not present within a recording.

There is significant overlap in the call parameters between the two most common Scottish bat species; soprano pipistrelle (*Pipistrellus pygmaeus*) and common pipistrelle (*Pipistrellus pipistrellus*)[7], therefore where this overlap exists, identifications may be restricted to genus level, and defined as *Pipistrellus* species (sp.).

Anabat bat detectors record bat echolocation as individual files containing bat calls within set periods of time (up to a maximum of 20 seconds), as opposed to the total individual bat calls. Additionally, it is often difficult (or not possible in the case of remote monitoring),

[7] Russ, J (2012) British Bat Calls: A Guide to Species Identification. Pelagic Publishing

to distinguish between a single bat passing the detector several times and several bats passing once in succession. Following identification and analysis, bat data is quantified as the number of files recorded containing bat calls (bat files), not the number of actual calls in real time. Following analysis, baseline data was interpreted to give an indication of bat activity. Remote Static Survey data was expressed using an index known as the Bat Activity Index (BAI).

2.4.2 Bat Activity Index (BAI)

The length of the night (hours of darkness) varies throughout the Survey Season by up to 40%, and thus the period over which bats may be active also varies significantly. As Remote Static Surveys are carried out over at least five nights, the survey period of each Survey Session will be seen to vary. In order to carry out more detailed interpretation of the results, this temporal bias requires some correction. To correct for temporal bias in levels of bat activity, all bat Remote Static Survey data was interpreted using the BAI.

Within this report, the value of the BAI is expressed as passes (i.e. bat files) per hour (pph). The BAI may not identify the overall abundance of bats (i.e. in terms of absolute number of registrations), but it helps to identify the highest intensities of habitat use by bats during the available recording time. Through the application of the BAI, data can be interpreted by RSSL, taxa, habitat feature or Survey Session, and used to determine spatial patterns in activity within the BSA, as well as temporal patterns across the Survey Season.

BAI was calculated for each RSSL by dividing the number of recorded Anabat files by the total number of sampling hours (between 0.5 hours before sunset to 0.5 hours after sunrise), to provide the mean number of bat pph.

The mean BAI for each Survey Session recorded across all RSSL was calculated by dividing the number of recorded Anabat files by the total number of detector hours per session (total session sampling hours multiplied by number of detectors).

The mean BAI across the Survey Season, for example BAI per species, was calculated by dividing the number of recorded Anabat files across the Survey Season per species, by the total number of detector hours across the total Survey Season (sampling hours multiplied by number of detectors).

A summary of the bat activity recorded during Remote Static Surveys expressed by BAI, is presented in Table 9. This table presents the mean BAI per RSSL across all Survey Sessions. A table presenting the levels of activity expressed as BAI per species at each RSSL during each Survey Session is presented in Annex B (Table A2).

3 BASELINE RESULTS

3.1 Desk Study

3.1.1 Designated Sites

Six statutory designated sites were recorded within 5 km of the Site, information relating to these is provided in Table 7 below.

Table 7: Statutory Designated Sites within 5 km of the Site

Name	Designation	Proximity to Site	Designated Features
River Tweed	SAC	Adjacent to eastern access track. 0.4 km west of western Site Boundary.	Atlantic salmon (*Salmo salar*) Brook lamprey (*Lampetra planeri*) Otter (*Lutra lutra*)

			River lamprey (*Lampetra fluviatilis*) Sea lamprey (*Petromyzon marinus*) Rivers with floating vegetation often dominated by water-crowfoot
River Tweed	SSSI	5 km south	• Atlantic salmon • Brook lamprey • River lamprey • Sea lamprey • Otter • Beetle assemblage • Fly assemblage • Vascular plant assemblage Trophic range river/stream
Whim Bog	SSSI	2 km north	Raised bog
Dundreich Plateau	SSSI	3.3 km east	Blanket bog Subalpine flushes
Auchencorth Moss	SSSI	3.4 km north	Raised bog

3.1.2 Non-statutory Designated Sites

Four non-statutory designated sites were recorded within 2 km of the Site, information relating to these is provided in Table 8 below.

Table 8: Non-Statutory Designated Sites within 2 km of the Site

Name	Designation	Proximity to Site	Relevant Key Features
Cloich Bog	Local Biodiversity Site (LBS)	Adjacent to eastern Site Boundary	• Modified bog, burns and marsh habitats • Small pearl-bordered fritillary (*Boloria selene*), small heath (*Coenonympha pamphilus*), Brown Hare (*Lepus europaeus*)
Shiphorn Quarry	LBS	0.3 km north-east	• Plantation woodland on former quarry pits. • Badger (*Meles meles*) and common frog (*Rana temporaria*) named as notable species
Nether Stewarton Pools (Loch Potts)	LBS	0.6 km east	• Ponds, marsh and swamp habitats.
Portmore Birchwoods	LBS	1.2 km north-east	• Semi-natural, moderately species-rich birch woodland on the banks of Portmore Loch. • Several moss species named as notable; including Blunt-leaved Bog-moss (*Sphagnum palustre*), A Bog-moss (*Sphagnum recurvum*) and Lustrous Bog-moss (*Sphagnum subnitens*)

3.1.3 Bat Species Records

Table 8 (overleaf) provides a summary of bat species recorded within a 5 km radius of the BSA, as returned by a search of publicly available records. Both common pipistrelle and soprano pipistrelle, as high-risk bat species, were identified within 10km of the BSA.

Table 8: Bat Records within Desk Study Area

Species	Conservation Status	Distance and Direction from BSA	Year of Record(s)
Soprano Pipistrelle *(Pipistrellus pygmaeus)*	EPS[8]	0.5-10 km in all directions	2000 – 2019 (139 records)
Common Pipistrelle (*Pipistrellus pipistrellus*)	EPS	1-10 km in all directions	2000 - 2019 (79 records)
Natterer's Bat (*Myotis nattereri*)	EPS	4 km northwest	2019 (1 record)
Brown Long-eared Bat (*Plecotus auritus*)	EPS	4-5 km east and west	2002 and 2003 (2 records)

3.2 Field Surveys

3.2.1 Remote Static Activity Surveys

A total of 689 bat passes (see Table A1, Annex B) were recorded over a total of 3986.3 survey hours across the Survey Season, giving a total mean BAI of 0.17 passes per hour (pph) for the Site.

Of the activity recorded, the majority (85.62%) was attributed to soprano pipistrelle, with 11.18% attributed to common pipistrelle. *Nyctalus* sp. accounted for 1.45% of the total. *Myotis* sp., *Pipistrellus* sp. and brown long-eared bat (BLE) (*Plecotus auritus*) were recorded infrequently, making up 0.73%, 0.87% and 0.15% of activity recorded, respectively.

Therefore, the following species/genus were detected within the Bat Survey Area:

- Common pipistrelle;
- Soprano pipistrelle;
- *Nyctalus* sp;
- *Myotis* sp.;
- BLE; and
- *Pipistrellus* sp.

Table 9: Summary of Mean Bat Activity Index

RSSL	Myotis Sp.	Common Pip	Soprano Pip	Pip Sp.	BLE	Nyctalus Sp.	Mean Total
A	0.003	0.005	0.158	0.000	0.000	0.003	0.168
B	0.000	0.013	0.030	0.000	0.000	0.003	0.045
C	0.000	0.000	0.013	0.000	0.000	0.000	0.013
D	0.003	0.018	0.060	0.015	0.000	0.003	0.098
E	0.000	0.010	0.040	0.000	0.003	0.000	0.053
F	0.003	0.050	0.186	0.000	0.000	0.015	0.253
G	0.000	0.000	0.000	0.000	0.000	0.000	0.000
H	0.000	0.000	0.005	0.000	0.000	0.000	0.005
I	0.005	0.030	0.278	0.000	0.000	0.003	0.316

[8] European Protected Species, Habitats Regulations (1994) Available online at http://www.legislation.gov.uk/uksi/1994/2716/contents/made [Accessed 11/02/21]

J	0.000	0.068	0.710	0.000	0.000	0.000	0.778
Survey Session	**Myotis Sp.**	**Common Pip**	**Soprano Pip**	**Pip Sp.**	**BLE**	**Nyctalus Sp.**	**Mean Total**
1	0.000	0.003	0.017	0.000	0.000	0.001	0.022
2	0.002	0.029	0.187	0.000	0.000	0.003	0.220
3	0.002	0.025	0.215	0.003	0.001	0.003	0.249
Season	**0.001**	**0.019**	**0.148**	**0.002**	**0.000**	**0.007**	**0.173**

The design of Remote Static Surveys allowed for the collection of comparative datasets sufficient to draw robust conclusions on spatial and temporal distributions of bat activity across the Site during the Survey season. A summary of these distributions is detailed in Section 3.2.1.1 and 3.2.1.2.

3.2.1.1 Spatial Variation in Bat Activity

During the Survey Period bat activity was recorded at every RSSL, except G. Notable spatial variation in the level of activity was evident (Chart 1). A total of three RSSLs recorded mean activity levels above the overall survey mean (0.17 pph), these were; RSSLs F (0.253 pph), I (0.316 pph), and J (0.778 pph). Activity at these three RSSLs constituted 77.9% of all bat passes recorded, with RSSL J makes up 44.99% alone. All three RSSLs were situated within woodland edge habitat and in close proximity to watercourses (see Figure 7.3.1, Annex A).

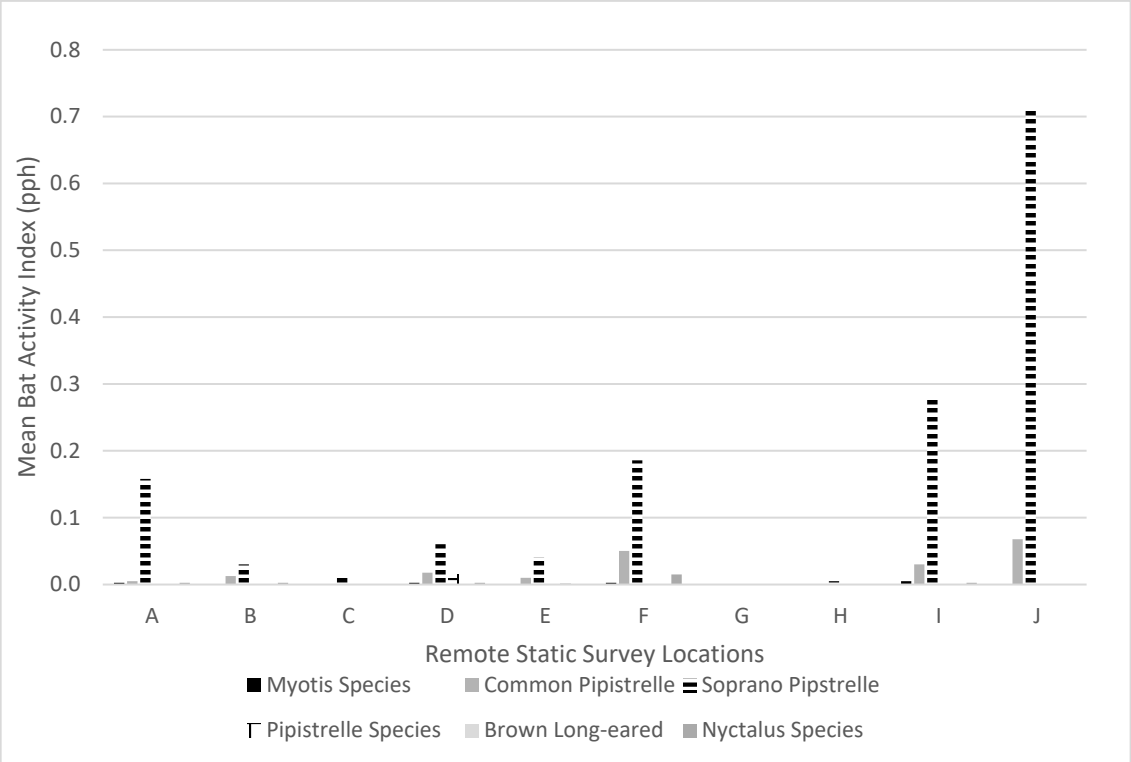


Chart 1: Spatial Variation in Total Bat Activity (mean BAI) across the Survey Season

3.2.1.2 Temporal Variation in Bat Activity

In addition to spatial variation, bat activity recorded notable temporal variation in the overall levels of activity, as well as the species abundances recorded, and the level of activity recorded spatially (as shown in Chart 2). The highest number of bat passes (434) was recorded in Session 3, this constituted 62.99% of all bats recorded (compared to 3.77% and 33.24% for Sessions 1 and 2 respectively). Once any temporal bias was corrected for (via the application of the BAI), Session 3 had a total mean BAI of 0.249 pph, which is almost equal to the BAI of Session 2 (0.220) despite Session 2 having almost half the bat passes; 229. Both sessions are higher than the mean average BAI (0.173 pph) for the Survey Period.

Species abundances were broadly consistent through the Survey Season; with soprano pipistrelle the most abundant species recorded in all sessions. However, brown long-eared bats were only recorded in Session 3.

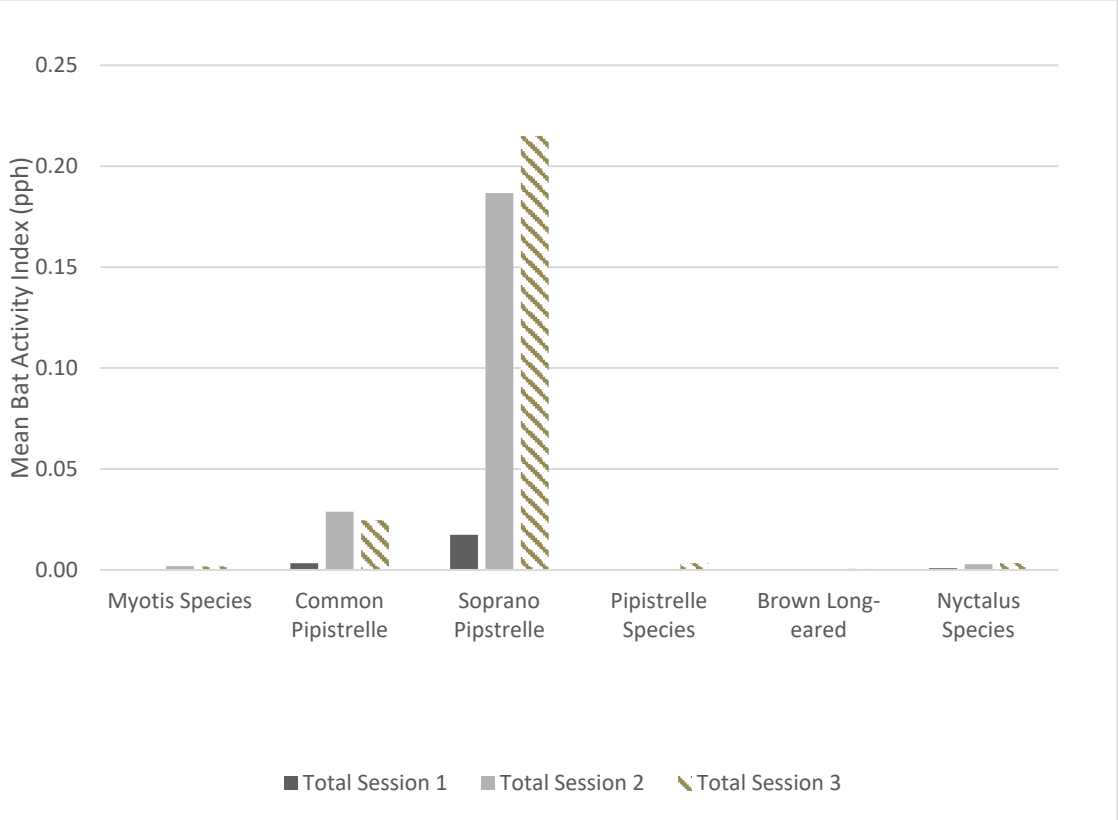


Chart 2: Temporal Variation in Total Bat Activity (mean BAI) across the Survey Season

3.2.2 Bat Roost Assessment of Trees outwith the BSA

In total eight trees along the Development access track were found to have low suitability for roosting bats. The trees, all either ash (*Fraxinus excelsior*) or beech (*Fagus sylvatica*), were classified as having a low suitability for roosting bats due to the fact that the features found within them contained limited roosting potential and therefore were unlikely to support a roost of high conservation status. Furthermore, the habitat surrounding the trees was overwhelmingly dominated by coniferous plantation woodland, a habitat deemed unlikely to support roosting bats due to their lack of potential roosting features[4]. BCT guidance[5] states that trees with a low suitability for roosting bats do not require further surveys; therefore, no further surveys are recommended at this time. Table 10 overleaf provides a summary of the trees identified as having low roost suitability during the assessment.

Table 10: Summary of Trees Identified as Having Low Bat Roost Suitability

OS Grid Ref	Species	Results	Roost Suitability	Further Survey Required
NT 24344 48942	Ash	Tree has a split limb at approximately 4.5 m facing south.	Low	No
NT 24344 48942	Ash	Tree has a rot hole at approximately 6 m facing west.	Low	No
NT 24344 48929	Ash	Dead ash tree, loose bark all over and rot/woodpecker holes.	Low	No
NT 24344 48929	Ash	Tree has a split limb at approximately 3 m facing north, possibly extends upwards into trunk.	Low	No
NT 23975 49335	Beech	Tree has a rot hole at approximately 6 m facing east.	Low	No
NT 23980 49373	Beech	Tree has a dead limb to the north. Various small rot holes and cervices.	Low	No
NT 23960 49268	Ash	Standing deadwood, potentially hollow trunk.	Low	No
NT 22378 49829	Beech	Tree has a split limb at approximately 5 m facing north east.	Low	No

3.2.3 Site Utilisation Summary

Overall, bat activity was low with a mean BAI of less than one bat pass per hour. Common and soprano pipistrelles were accountable for over 97% of all bat activity recorded, both of which are common and widespread species in Scotland.

The BSA was dominated by coniferous plantation, a habitat generally considered of low value to foraging, commuting and roosting bats compared to broadleaved woodland, or non-commercial coniferous woodland.

There are no known records of any hibernaculum (winter hibernation roosts) within the BSA or the wider local area. Pipistrelle bats have a tendency to hibernate in trees and buildings[9]. As such, as no buildings exist within the BSA and coniferous plantation generally offers poor roost potential, it is considered very unlikely that hibernation is taking place in close proximity to the BSA.

4 ECOBAT ASSESSMENT

Table 11 below shows the key metrics for each bat species recorded within the BSA. The reference range is the number of nights for each bat species that the data collected from the BSA was compared to using the Ecobat database. A recommended reference range of 200+ is required to be confident in the relative activity levels of species recorded. However, the reference range depends on the number of records held within the Ecobat database for a given species in a given area.

Table 11: Key Metric for Each Species Recorded Per Detector

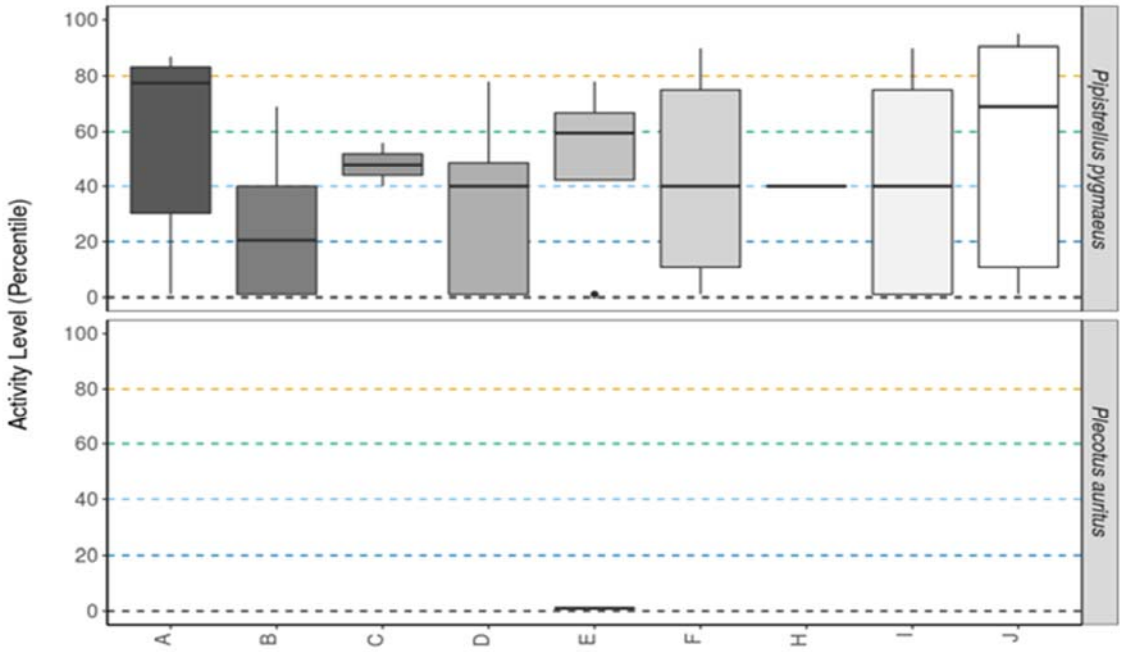
Detector Location	Species	Median Percentile	95% CIs	Max Percentile	Nights Recorded	Reference Range
A	*Myotis* sp.	1	0	1	1	3018

[9] Dietz, c & Keifer, A. (2016). Bats of Britain and Europe, Bloomsbury Publishing Plc, London ISBN: PB:978-1-4729-2202-1

Detector Location	Species	Median Percentile	95% CIs	Max Percentile	Nights Recorded	Reference Range
A	*Nyctalus* sp.	1	0	1	1	2087
A	*Pipistrellus pipistrellus*	1	1 – 1	1	2	6195
A	*Pipistrellus pygmaeus*	78	20.5 – 84.5	87	8	10032
B	*Nyctalus* sp.	1	0	1	1	2087
B	*Pipistrellus pipistrellus*	40	40 – 40	40	3	6195
B	*Pipistrellus pygmaeus*	21	1 – 40	69	6	10032
C	Pipistrellus pygmaeus	48	48 – 48	56	2	10032
D	*Myotis* sp.	1	0	1	1	3018
D	Nyctalus sp.	1	0	1	1	2087
D	*Pipistrellus* sp.	69	63 – 79	79	3	11985
D	*Pipistrellus pipistrellus*	40	1 – 63	63	3	6195
D	*Pipistrellus pygmaeus*	40	1 – 59	78	8	10032
E	*Pipistrellus pipistrellus*	63	0	63	1	6195
E	*Pipistrellus pygmaeus*	60	1 – 78	78	4	10032
E	*Plecotus auritus*	1	0	1	1	457
F	*Myotis* sp.	1	0	1	1	3018
F	*Nyctalus* sp.	21	1 – 40	40	4	2087
F	*Pipistrellus pipistrellus*	56	1 – 56	63	9	6195
F	*Pipistrellus pygmaeus*	40	20.5 – 69	90	14	10032
H	*Pipistrellus pygmaeus*	40	0	40	1	10032
I	*Myotis* sp.	40	0	40	1	3018
I	*Nyctalus sp.*	1	0	1	1	2087
I	*Pipistrellus pipistrellus*	1	1 – 20.5	69	7	6195

Detector Location	Species	Median Percentile	95% CIs	Max Percentile	Nights Recorded	Reference Range
I	*Pipistrellus pygmaeus*	40	28.5 – 63	90	21	10032
J	*Pipistrellus pipistrellus*	40	1 -62.5	79	9	6195
J	*Pipistrellus pygmaeus*	69	40 – 83	95	18	10032

The information within Table 9 is also represented graphically in the boxplot depicted by Chart 3 below and overleaf. The centre line indicates the median activity level whereas the box represents the interquartile range (the spread of the middle 50% of nights of activity).



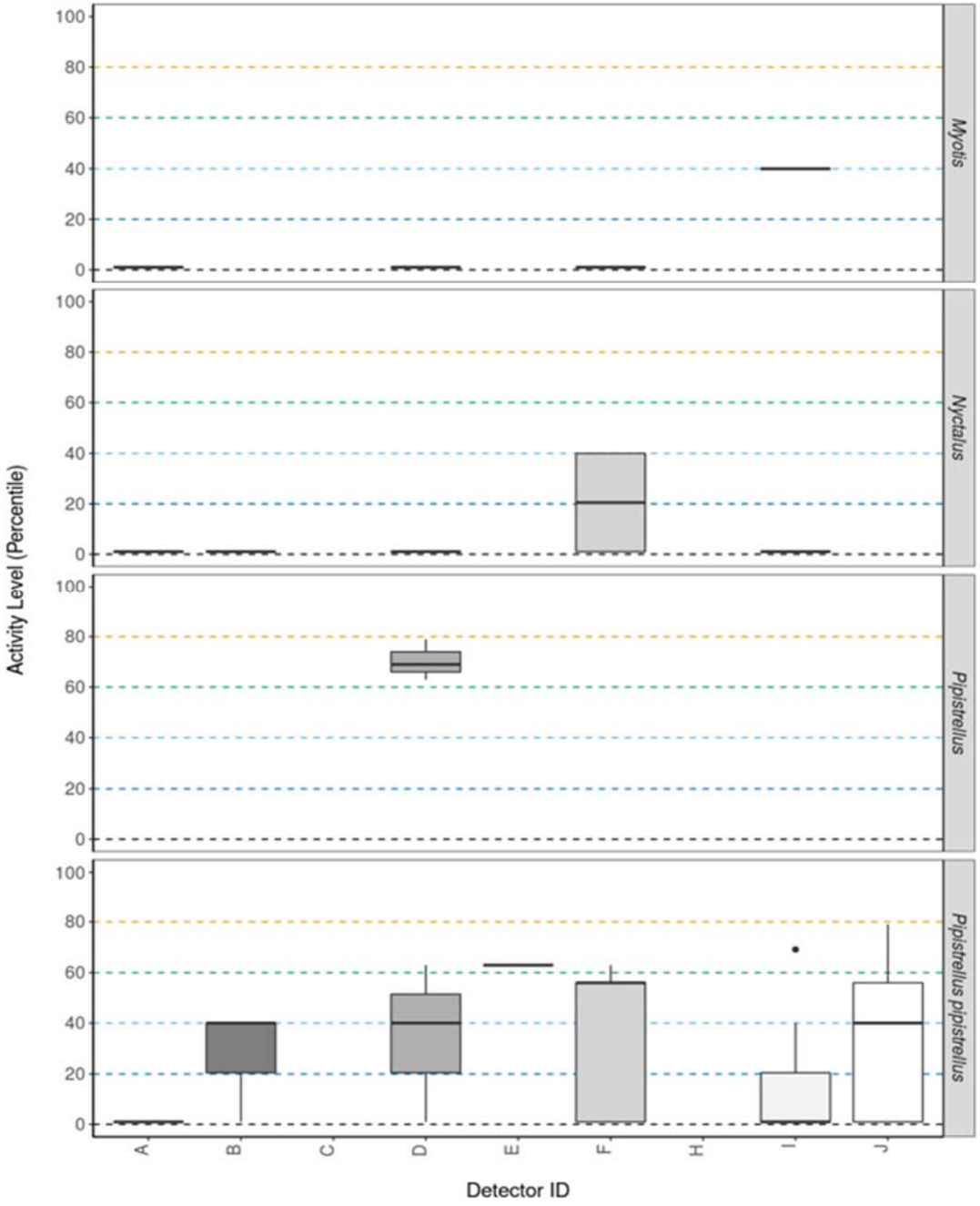


Chart 3: The activity level (percentile) of bats recorded across each night of the bat survey

Ecobat analysis looks at the relative activity levels of the bats recorded. It takes the total number of bat passes recorded within the BSA and then compares that value to the values in the Ecobat reference database 'the reference range'. Based on this comparison, a percentile is generated from which the relative level of bat activity can be categorised.

Ecobat uses the following categories to define bat activity:

- low activity: 0-20th percentiles;
- low to moderate activity: 21st-40th percentiles;
- moderate activity: 41st-60th percentiles;
- moderate to high activity: 61st-80th percentiles; and
- high activity: 81st-100th percentiles.

Using Table 9 and Chart 3, based on the median percentile for each species recorded, it can be seen that with the exception of common pipistrelle and soprano pipistrelle, all bat species fell within the low and low to moderate categories with respect to their relative activity levels. Both common and soprano pipistrelle fell within the category of moderate to high activity levels.

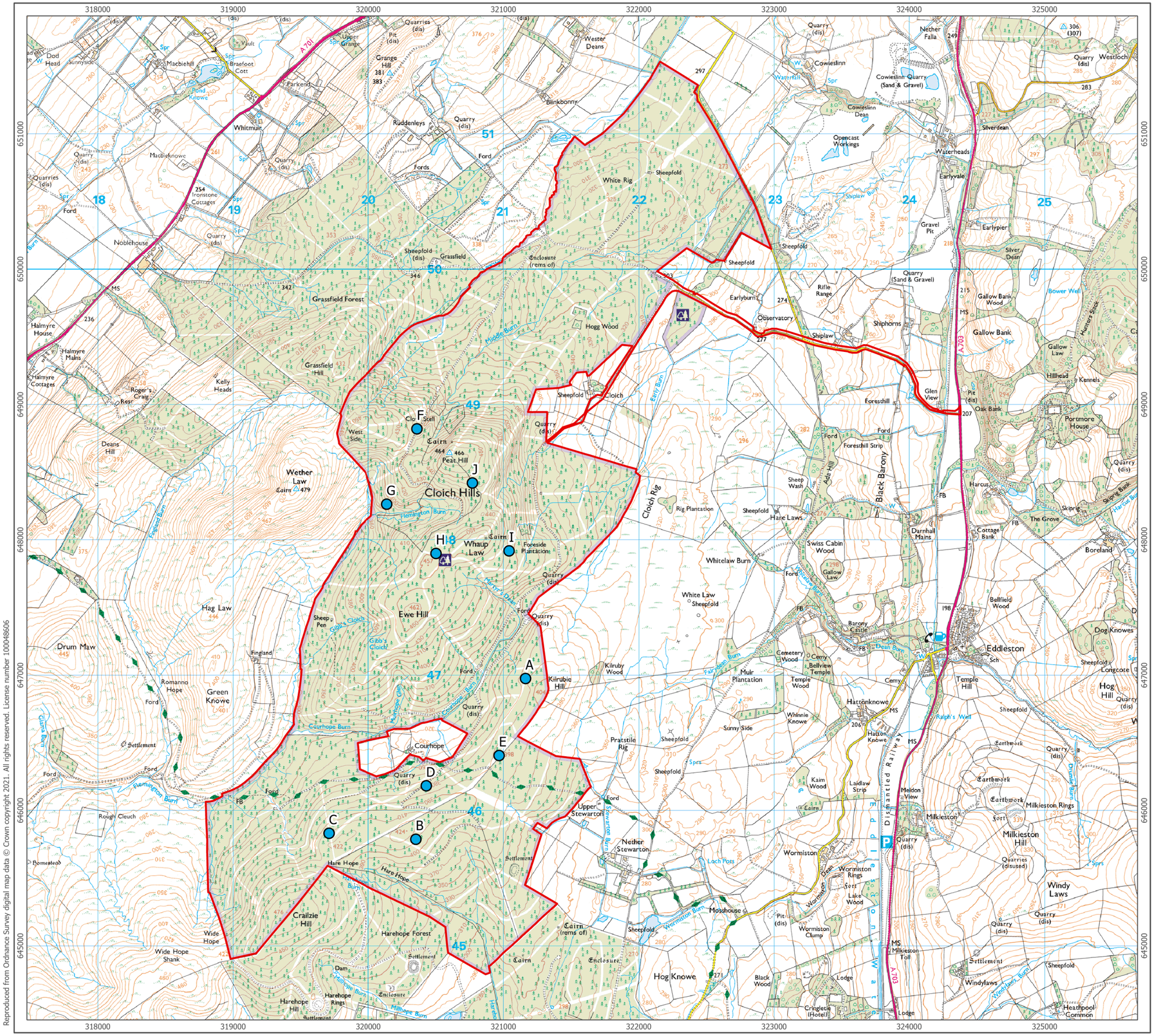
5 CONCLUSION

The levels of activity of both foraging and commuting bats recorded across the BSA was considered to be low to moderate overall, and dominated by common and widespread bat species (*Pipistrellus* sp.); considered to be of medium population vulnerability[2].

ANNEX A

Figures

- Figure 7.3.1: Bat Survey Area and Remote Static Survey Locations (RSSL)



ARCUS

Site Boundary

Remote Static Survey Locations

1:27,000 Scale @ A3

0 0.5 1 km

NORTH

Produced By: ST	Ref: 3439-REP-046
Checked By: SC	Date: 11/06/2021

Remote Static Survey Locations
Figure 7.3.1

Cloich Forest Wind Farm
Bat Surveys

P:\Projects\Ecology\Projects\3439 Cloich Wind Farm EIA\3439 Cloich Wind Farm EIA.aprx\3439-REP-046 Fig7.3.1 Bat Survey Area and Remote Static Survey Locations

ANNEX B

Detailed Survey Data

Table A1: Total Bat Passes recorded during Remote Static Activity Surveys, by Taxa and RSSL

RSSL	Myotis Sp.	Common Pipistrelle	Soprano Pipistrelle	Pipistrelle Sp.	Brown Long-eared	Nyctalus Sp.	Total per Location
Survey Session 1							
A	0	1	0	0	0	0	1
B	0	0	0	0	0	0	0
C	0	0	0	0	0	0	0
D	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
F	0	1	2	0	0	1	4
G	0	0	0	0	0	0	0
H	0	0	2	0	0	0	2
I	0	2	17	0	0	0	19
J	0	0	0	0	0	0	0
Total per Session	**0**	**4**	**21**	**0**	**0**	**1**	**26**
Survey Session 2							
A	1	1	49	0	0	1	52
B	0	0	0	0	0	0	0
C	0	0	2	0	0	0	2
D	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
F	1	11	26	0	0	2	40
G	0	0	0	0	0	0	0
H	0	0	0	0	0	0	0
I	0	8	31	0	0	0	39
J	0	10	86	0	0	0	96
Total per Session	**2**	**30**	**194**	**0**	**0**	**3**	**229**
Survey Session 3							
A	0	0	14	0	0	0	14
B	0	5	12	0	0	1	18
C	0	0	3	0	0	0	3
D	1	7	24	6	0	1	39
E	0	4	16	0	1	0	21

F	0	8	46	0	0	3	57
G	0	0	0	0	0	0	0
H	0	0	0	0	0	0	0
I	2	2	63	0	0	1	68
J	0	17	197	0	0	0	214
Total per Session	**3**	**43**	**375**	**6**	**1**	**6**	**434**
Grand Total	**5**	**77**	**590**	**6**	**1**	**27**	**689**

Table A2: Mean BAI recorded during Remote Static Activity Surveys, by Taxa and RSSL

RSSL	Myotis Sp.	Common Pipistrelle	Soprano Pipistrelle	Pipistrelle Sp.	Brown Long-eared	Nyctlaus Sp.	Total per Location
Survey Session 1							
A	0.00	0.01	0.00	0.00	0.00	0.00	0.01
B	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F	0.00	0.01	0.02	0.00	0.00	0.01	0.03
G	0.00	0.00	0.00	0.00	0.00	0.00	0.00
H	0.00	0.00	0.02	0.00	0.00	0.00	0.02
I	0.00	0.02	0.14	0.00	0.00	0.00	0.16
J	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total per Session	**0.00**	**0.00**	**0.02**	**0.00**	**0.00**	**0.00**	**0.02**
Survey Session 2							
A	0.01	0.01	0.47	0.00	0.00	0.01	0.50
B	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C	0.00	0.00	0.02	0.00	0.00	0.00	0.02
D	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F	0.01	0.11	0.25	0.00	0.00	0.02	0.38
G	0.00	0.00	0.00	0.00	0.00	0.00	0.00
H	0.00	0.00	0.00	0.00	0.00	0.00	0.00
I	0.00	0.08	0.30	0.00	0.00	0.00	0.38
J	0.00	0.10	0.83	0.00	0.00	0.00	0.92
Total per Session	**0.00**	**0.03**	**0.19**	**0.00**	**0.00**	**0.00**	**0.22**

Survey Session 3							
A	0.00	0.00	0.08	0.00	0.00	0.00	0.08
B	0.00	0.03	0.07	0.00	0.00	0.01	0.10
C	0.00	0.00	0.02	0.00	0.00	0.00	0.02
D	0.01	0.04	0.14	0.03	0.00	0.01	0.22
E	0.00	0.02	0.09	0.00	0.01	0.00	0.12
F	0.00	0.05	0.26	0.00	0.00	0.02	0.33
G	0.00	0.00	0.00	0.00	0.00	0.00	0.00
H	0.00	0.00	0.00	0.00	0.00	0.00	0.00
I	0.01	0.01	0.36	0.00	0.00	0.01	0.39
J	0.00	0.10	1.13	0.00	0.00	0.00	1.23
Total per Session	**0.00**	**0.02**	**0.21**	**0.00**	**0.00**	**0.00**	**0.25**
Grand Total	**0.00**	**0.02**	**0.15**	**0.00**	**0.00**	**0.01**	**0.17**

ARCUS

CLOICH FOREST WIND FARM

VOLUME 3: TECHNICAL APPENDICES

TECHNICAL APPENDIX A7.4: FISHERIES SURVEYS

JUNE 2021

FISH MONITORING REPORT
for the proposed Cloich Forest Wind Farm

Survey work carried out by The *Tweed* Foundation for Arcus Consultancy Services

Baseline survey carried out on the 3rd October 2019

Report completed on the 17th April 2020

Correspondence address :

The Tweed Foundation

Drygrange Steading

Melrose

Roxburghshire

TD6 9DJ

Tel 01896 848271. Email jhunt@tweedfoundation.org.uk

Declaration

This report has been prepared by The Tweed Foundation for Arcus Consultancy Services ("Arcus") and has been based on information provided by Arcus and the accepted tender. All information is correct to the best of our knowledge and collected following the standards and specifications detailed in the tender document.

Organisation

The Tweed Foundation (TF) is a charitable company limited by guarantee (SC366380) and a registered Scottish Charity (SC 011055) that has been in operation since 1987 and covers the Tweed and Eye district. TF has been involved in scoping and monitoring schemes for all wind farms in the Tweed District that have watercourses that contain fish. Examples of larger projects that TF have worked on (pre, construction and post construction monitoring) include Crystal Rig, Clyde (working in partnership with The Clyde Foundation) and Fallago Rig Wind Farms.

Contributors

James Hunt (BSc, MSc). The Tweed Foundation. Electro-fishing and report writer.

Contents

INTRODUCTION

The proposed Cloich Wind Farm development, situated to the Northwest of Peebles, lies between the Lyne Water and Eddleston Water, both tributaries of the River Tweed (Map 1). The Tweed Foundation (Fisheries Trust for the Tweed District) was commissioned by Arcus to undertake a fish survey as part of the Environmental Impact Assessment for the proposed windfarm. The electro-fishing sites that were sampled for the survey were selected to allow future monitoring, should this be required.

While fish surveys are a general requirement of all wind farm proposals where fish populations are likely to be found, an added consideration is that the River Tweed and primary tributaries (including the Eddleston and Lyne Water) are a SSSI and SAC for Salmon and Lamprey. In a wider context Atlantic salmon (*Salmo salar*) is an internationally important fish species which is listed under Annex II and V of the European Habitats Directive (1992) (only in freshwater), and Appendix III of the Bern Convention (1979) (only in freshwater). Atlantic salmon is also a species of conservation concern on a UK level. Brown trout/Sea trout (*Salmo trutta*) is a UK Biodiversity Action Plan species.

The Tweed also supports important adult Salmon and Sea trout fisheries with juvenile nursery areas found in proximity to the wind farm boundary. These fisheries generate important income to the local economy and depend on healthy nursery areas to maximise in-river production.

Small numbers of Eels are also likely to be present in local watercourses. There continue to be concerns across Europe over low eel stocks. It is currently unknown why there has been such a rapid decline but it is thought to be linked to over-exploitation, inland habitat loss, climate and ocean current changes, disease and pollution. The European Eel Regulations (EC) No 1100/2007 aim to establish measures to recover eel stocks. One such measure was the production of Eel Management Plans for the Scotland River Basin[1] and the Solway Tweed River Basin[2] Districts, in 2008 and 2010 respectively. Fishing or taking eels is illegal (unless licensed) under The Freshwater Fish Conservation (Prohibition on Fishing for Eels) (Scotland) Regulations 2008. The European eel is also a UKBAP priority species.

[1] Scottish Government (2008), Scotland River Basin Eel Management Plan http://www.gov.scot/Resource/Doc/1063/0076523.pdf

[2] Defra (2010), Eel Management Plans for the United Kingdom, Solway Tweed River Basin District http://webarchive.nationalarchives.gov.uk/20130402151656/http://archive.defra.gov.uk/foodfarm/fisheries/documents/fisheries/emp/solway.pdf

METHOD

Electro-fishing

There are different methods of electro-fishing that can be utilised for fisheries surveys and monitoring, each of which have advantages and disadvantages regarding the accuracy and precision of results and the number of sites that can be sampled per day. Quantitative methods for a delineated section of river (normally represented as number per 100m^2), typically involve electro-fishing the section one, two or three times to produce a density estimate. A three run method provides the highest level of accuracy and precision (with confidence limits) but is the most time consuming and labour intensive method. Index methods also exist that involve electro-fishing for a set period of time and are much quicker, but produce less accurate results. For wind farm fish monitoring, geographical coverage is important in order to sample the different sized watercourses and habitats at the site while attaining a reasonable level of accuracy for the results. A single run, semi-quantitative electro-fishing method was chosen as the most appropriate balance of attaining coverage and a reasonable level of accuracy.

Sampling was carried out in fast-flowing, relatively shallow areas, which are the preferred habitat of juvenile Salmon and Trout. Juvenile Salmon are usually commoner in main channels while Trout, by contrast, dominate the smaller burns where adult Trout spawn. Patches off fine sediment, if present, were also sampled to assess the distribution and abundance of larval Lamprey. A summary of the life history stages of Atlantic Salmon, Trout and Lamprey species is provided in Appendix 3.

Standards

Both surveyors that carried out the electro-fishing surveys are experienced electro-fishers and have undertaken training and refresher courses through The Scottish Fisheries Coordination Centre (www.sfcc.co.uk), following the agreed protocols[3].

Site selection

Based on local knowledge and historical data (electro-fishing and obstructions to fish migration), sites were located in watercourses where the principle species (juvenile Salmon, Trout, Lamprey and Eel) could be potentially found. Most of the watercourses within the boundary were too small to contain fish and these are marked on Map 1. The watercourses of the Middle Burn and Cowieslinn Burn, located at the northern part of the site are slightly larger near the boundary but both have waterfalls located further downstream (marked on the map) that are impassable to migratory fish. Sampling was therefore restricted to the Flemington Burn, which is the principle tributary that flows

[3] SFCC 2007. Electro-fishing team leader training manual. Fisheries management SVQ 3. Manage electrofishing operations

along the western boundary of the site and down into the Lyne Water. Historical records show that this watercourse contain juvenile Salmon, Trout and Eels.

All site locations are displayed in Map 1 and detailed in Appendix 1 (location and date) and are in the same locations as samples collected in 2011, although the previous sampling methodology used a timed index method rather than a one run semi-quantitative method. This change was made on request from Marine Scotland Science to increase the accuracy of the sampling in response to recent published research on the analysis of electro-fishing data.

All of the sites were photographed (Appendix 2) and accurately located using GPS (5 m accuracy). Effective monitoring relies on sampling exactly the same sections of river using an identical method to help reduce sampling error.

Any other fish species captured at a site are recorded and documented in the results.

RESULTS

Electro-fishing

To provide some context to the results, the average densities of salmonid fishes at these locations were checked against the regional juvenile densities (fish/100m^2) bands for the East region (Table 1.)[4], which were used for the most recent SAC condition assessments, including the Tweed SAC. The classified results are provided in Table 2.

Table 1. Quality bandings from the regional east model from Godfrey (2005)

Percentile	Salmon Fry	Salmon Parr	Trout Fry	Trout Parr
Zero density (%)	12.00	10.40	3.30	10.40
Min (Very Low)	0.69	0.69	0.85	0.30
20th percentile (Low)	6.89	3.05	4.31	1.86
40th percentile (Medium)	21.54	6.3	11.94	3.39
60th percentile (High)	43.38	10.16	26.21	7.46
80th percentile (Verq High)	104.58	19.7	72.10	13.85
Max	497.70	51.42	292.95	151

Table 2. Classified densities (per 100 m2) using the percentile categories in Table 1 for colour coding and the number of eels present

Site Code	Salmon Fry	Salmon Parr	Trout Fry	Trout Parr	Eel (number)	Lamprey
FL 01	18	3	63	5	1	1
FL 02	21	4	31	1	0	No habitat
FL 03	5	4	37	9	0	No habitat
FL 04	1	6	71	16	1	No habitat
FL 05	0	1	44	7	0	No habitat
FL 06	2	2	28	8	1	No habitat

Salmon

Table 2. shows that Salmon fry were present at five out of six sites and parr were present at all of the sites, although no result was higher than the 'Low' category used in table 1. Salmon fry densities were highest at the bottom of the Flemmington Burn (FL

[4] Godfrey (2005) Godfrey, J.D. (2005). *Site condition monitoring of Atlantic salmon SACs*. Report by the SFCC to Scottish Natural Heritage, Contract F02AC608.

01 and FL 02). The range of values for the parr results was less than for fry, with slightly higher results (categorised as 'Low') between FL 02 and FL 04.

Trout

Trout fry densities were all categorised as 'High', which captures a range of densities from 28 to 71 per 100 m2. Trout parr densities were much more variable, with results ranging from 'Low' to 'High', with no obvious spatial pattern in abundance.

Eels

A single Eel was found at sites FL 01, FL 04 and FL 06. The Eel at site FL 01 measured 130 mm. At the other two sites, a measurement was not taken as the Eel was only observed but wasn't captured.

Lamprey

Larval Lamprey were only detected at site FL 01. There was no suitable habitat (fine sediment) for sampling in close proximity to the other sites.

DISCUSSION OF RESULTS

Salmon and Trout

As a small burn, Salmon spawning is likely to be patchy and variable from one year to the next, depending on whether water flows the previous autumn allow access for adult fish. As a consequence, most Salmon fry are found in the lower part of the Flemmington Burn where access for spawning adults will be easier. Fry were present all the way up to site FL 06 in low numbers, but these fish may well be migrants from further downstream that have sought out areas with less competition for space. Salmon parr were found at all of the sites; similar to the fry results, parr in the middle and upper parts of the Flemmington Burn are probably migrants from further downstream. Evidence from other parts of the catchment suggest that most Salmon fry will drop out of the Flemmington Burn after one year, either to reside in the Tweed or Lyne Water, or to migrate to sea the following Spring.

The spatial distribution of Salmon for both age classes is similar to the upper extent of the Tweed SAC, which was based on historical data from the Flemmington Burn. Salmon will probably be absent just upstream of site FL 06 based on the size of watercourse and results from past surveys.

The 'High' density classification for Trout fry is consistent with results from other small tributaries in the Tweed catchment, which indicate that spawning by Brown trout and Sea trout has taken place in close proximity to all of these sites over the previous winter period. The breeding population structure of the Flemmington Burn (ratio of Brown trout to Sea trout) is currently unknown; isotope analysis and trapping work in other parts of the catchment indicate that proportions are geographically and temporally variable. Trout parr densities were variable, but this may just reflect the shallow run-riffle habitat that was sampled, which is the preferred by Trout fry. If deeper pools and glides were sampled, densities will probably have been higher and more consistent.

Lamprey and Eels

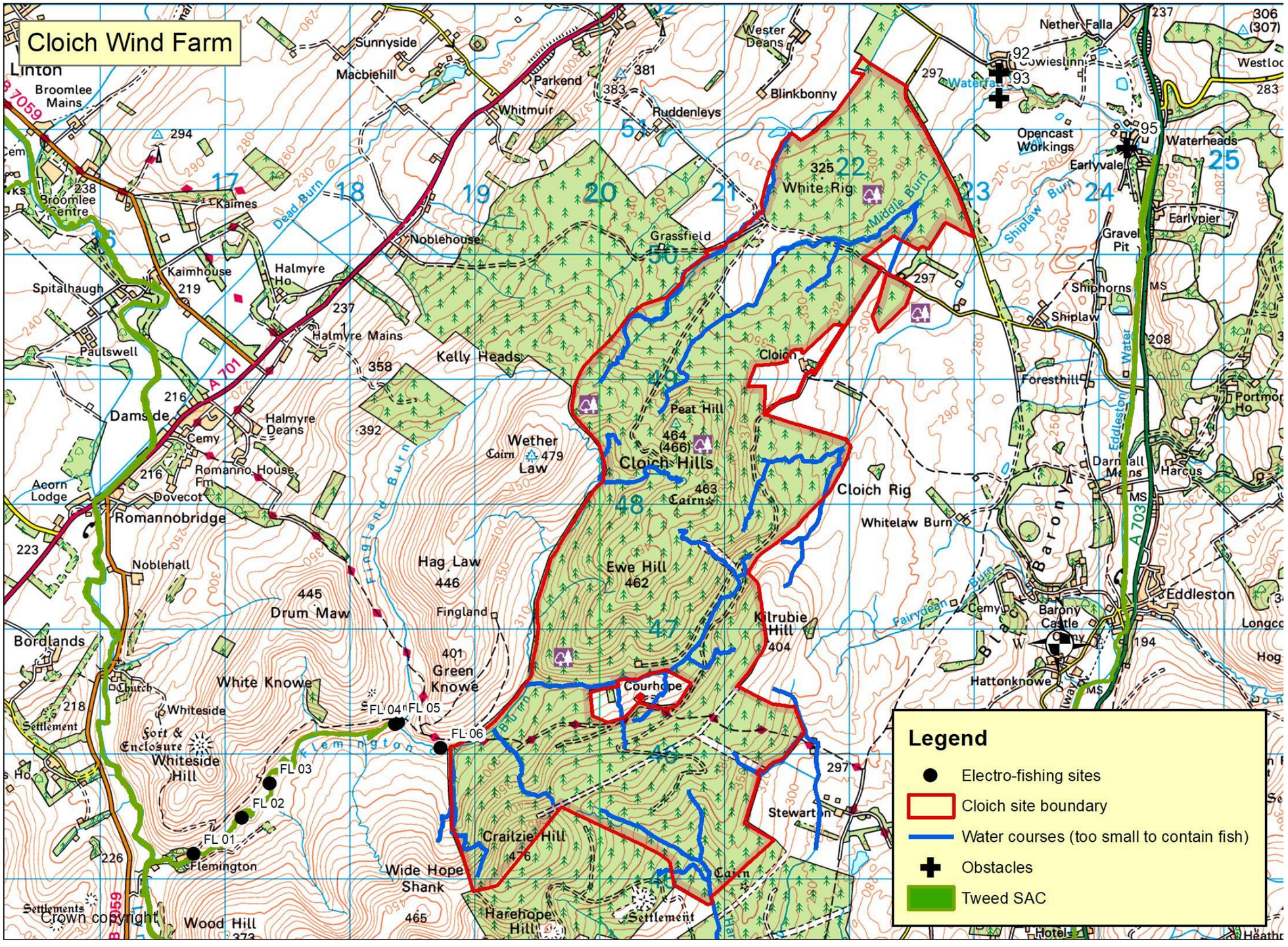
Larval Lamprey were only present at the bottom of the Flemmington Burn (site FL 01). The absence of suitable habitat at the remaining sites is consistent with other upland sites in the Tweed District. The detection of Lamprey at site FL 01 is therefore probably an accurate reflection of the actual distribution in the Flemmington Burn. The low number of Eels is also consistent with results from other parts of the catchment (and in Scotland).

CONCLUSIONS

- No SAC species (Salmon or Lamprey) will be present within the boundary of the proposed wind farm. A tiny number of Salmon migrants from further downstream will be found on the south-west edge of the boundary in the Flemmington Burn.
- If future monitoring is required, Trout fry in the Flemmington Burn are recommended as the principle species / age class for any future monitoring on

account of their consistently high abundance (all results classed as 'high'). This could be combined with other forms of water quality monitoring, including invertebrate sampling and water chemistry.

Map 1.


Cloich Wind Farm
Linton
Broomlee Mains
Sunnyside
Macbiehill
Parkend
Whitmuir
Ruddenleys
Wester Deans
Blinkbonny
Nether Falla
Cowieslinn
Waterfall
Opencast Workings
Earlyvale
Waterheads
Earlypier
Gravel Pit
Shiphorns
Shiplaw
Foresthill
Darnhall Mains
Harcus
Eddleston
Eddleston Water
Portmore Ho
Broomlee Centre
Kaimes
Dead Burn
Noblehouse
Grassfield
White Rig
Middle Burn
Shiplaw Burn
Kaimhouse
Halmyre Ho
Halmyre Mains
Spitalhaugh
Paulswell
Kelly Heads
Cloich
Peat Hill
Cloich Hills
Cloich Rig
Whitelaw Burn
Damside
Halmyre Deans
Cemy
Romanno House Fm
Acorn Lodge
Dovecot
Romannobridge
Wether Law
Cairn
Noblehall
Hag Law
Ewe Hill
Drum Maw
Fingland
Fingland Burn
Kilrubie Hill
Courhope
Bordlands
Church
Whiteside
Settlement
Fort & Enclosure
Whiteside Hill
White Knowe
Green Knowe
FL 01
FL 02
FL 03
FL 04
FL 05
FL 06
Flemington
Craitzie Hill
Wide Hope Shank
Harehope Hill
Wood Hill
Stewarton
Barony Castle
Cemy
Hattonknowe
Fairydean Burn
Black Burn
Hotels
A 701
A 703
B 7059
B 6368
Crown copyright
Legend
Electro-fishing sites
Cloich site boundary
Water courses (too small to contain fish)
Obstacles
Tweed SAC

Appendix 1. Electro-fishing site details

Site Code	Easting	Northing	Date	Order 2	Order 3	Reach	Area
FL 01	316750	645200	03/10/2019	Flemington Burn		30	108.5
FL 02	317139	645491	03/10/2019	Flemington Burn		40	130
FL 03	317358	645764	03/10/2019	Flemington Burn		50	99.17
FL 04	318365	646237	03/10/2019	Flemington Burn		50	98.33
FL 05	318387	646253	03/10/2019	Flemington Burn	Fingland Burn	50	76.67
FL 06	318729	646050	03/10/2019	Flemington Burn		50	50

Appendix 2. Electro-fishing site photos

FL01

FL02

FL03

FL04

FL05

FL06

Appendix 3. The life cycle of Salmon and Trout and Lamprey

To understand the results provided on the following pages, a brief guide to the life cycle of Salmon and Trout is provided:-

The Fry are "the young of the year" that are spawned in the Autumn and emerge out of the gravel around April / May. By summer these fish are 5 to 7 cm in length and are typically found in shallow, fast flowing water.

(picture – a Salmon fry recently emerged)

Parr are fish that have spent one or more winters in the stream. Features of Salmon parr that can be used to distinguish them from Trout parr include distinctive parr marks along the flank, a black spot on the gill cover, a more forked tail and generally an absence of red in the tail and adipose fin. Both Salmon and Trout Parr tend to be found in slightly deeper water than Fry, which includes glide and pool habitat units, particularly when there is bankside cover to hide under from predators.

(picture – Salmon Parr (top), Trout Parr (bottom))

Most Salmon Parr leave the river in the Spring as Smolts at a length of around 12 cm (generally after two winters in the river). Trout Parr on the other hand either drop down into the main river to become adult Brown Trout or become Smolts in spring time and go to sea to become Sea Trout.

(picture – Salmon smolt)

Adult Salmon and Sea Trout typically return from the sea after 1 or 2 winters, although some Sea Trout may return after the first summer.

(picture – adult Salmon (top), adult Sea Trout (bottom))

The Tweed system has 3 types of Lamprey – Brook, River and Sea.

Brook Lamprey will remain resident in the area that they are spawned and seldom grow any larger than the individual shown in the picture (about 12-14 cm). River Lamprey migrate down to the Estuary and coast and the Sea Lamprey (see picture left) out to sea to feed before returning to the river. River and Sea Lamprey larvae are typically found in the middle and lower reaches of the Tweed and it would be very unlikely to find them in the proposed wind farm area. Young lamprey (Ammocoetes) only live in silt, mud or fine sand

CLOICH FOREST WIND FARM

VOLUME 3: TECHNICAL APPENDICES

TECHNICAL APPENDIX A8.1: BASELINE ORNITHOLOGY REPORT 2019-20

JUNE 2021

Prepared By:

Arcus Consultancy Services

7th Floor
144 West George Street
Glasgow
G2 2HG

T +44 (0)141 221 9997 l **E** info@arcusconsulting.co.uk
w www.arcusconsulting.co.uk

Registered in England & Wales No. 5644976

TABLE OF CONTENTS

ABBREVIATIONS

AOD: Above Ordnance Datum

BoCC: Birds of Conservation Concern

BOU: British Ornithologists' Union

BTO: British Trust for Ornithology

CBC: Common Birds Census

FAS: Flight Activity Surveys

MBBS: Moorland Breeding bird Survey

NS: NatureScot

OS: Ordnance Survey

SBL: Scottish Biodiversity List

SPA: Special Protection Area

SSSI: Site of Special Scientific Interest

VP: Vantage Point

1 INTRODUCTION

1.1 Background

Arcus Consultancy Services Ltd (Arcus) was commissioned by EDF Renewables to evaluate the ornithological interest of the Site. The Site is located approximately 5.5 km north-west of Peebles within the Scottish Borders. The Site is centred on NGR 320514 647492, and lies between the A701 and A703, north of the A72. The Site Boundary is shown in Figure 8.1.1, Appendix 1; surveys were undertaken at a time where the Site Boundary did not include the access track. Survey areas were therefore based on this earlier Site Boundary (excluding the access track).

Baseline ornithology surveys were undertaken between 2011 and 2012 for an application submitted in 2012 on the same Site for the Consented Scheme (Planning and Environmental Appeals Division (DPEA) Reference: WIN-140-1) . Although the scheme was consented in 2016, a further year of ornithological surveys was completed in 2019-20 due to proposed changes to the Consented Scheme's footprint. Full details of previous ornithological surveys are available in the 2012 Environmental Statement[1].

The additional year of Baseline Ornithology Surveys of the Site and surrounding area commenced in March 2019 and were completed in February 2020. This report details the survey methods and results of all ornithological surveys undertaken during this period.

Species names used in this report follow the British List[2], which is maintained by the British Ornithologists' Union (BOU), with all species referred to by their British (English) vernacular name. A list of scientific names, as well as details of relevant legislation and conservation status, of all bird species referred to in this report is provided in Table A2.1, Appendix 2.

1.2 Site Description

The topography of the Site and immediate vicinity is complex, with elevation ranging from approximately 280 m Above Ordnance Datum (AOD) in the northeast part of the Site to approximately 476 m AOD at the peak of Crailzie Hill in the south. Vegetation across the Site largely consists of forestry and open moorland. The Site encompasses the rolling Cloich Hills, including Peat Hill (466m AOD), Ewe Hill (462m AOD), White Rig (325m AOD), and Crailzie Hill (476m AOD). The hills are dissected by a number of watercourses, including Middle Burn, Flemington Burn, Martyr's Dean, Corehope Burn and Harehope Burn. Those watercourses that flow southwest feed into the Flemington Burn on the west of the Site, which eventually feeds into the River Tweed. Those watercourses that flow down to the northeast of the Site feed into Middle Burn and Shiplaw Burn, both of which feed into Eddlestone Water and eventually the River Tweed.

There are no waterbodies within the Site Boundary, however there are some small pools to the south of the Site. The nearest large waterbody is Pormore Loch, located approximately 2.8 km to the east of the Site.

Coniferous plantation, at various stages of the planting, growing and felling cycle, is the primary land use within the Site. A relatively small area around Courhope in the south of the Site consists of improved upland pasture (utilised for sheep grazing) and improved grassland, and is unforested. This is not part of the Site Boundary, but is surrounded by the Site. A series of tracks provide access for management purposes and recreation, and the Cross Borders Drove Road cuts through the Site from east to west between Ewe Hill and Crailzie Hill.

[1] Partnerships for Renewables. (2012). *Cloich Forest Wind Farm Environmental Statement*. Planning application reference 12/01283/S36. Available on the Scottish Borders Council planning application search page: https://eplanning.scotborders.gov.uk/online-applications/

[2] British Ornithologists' Union. (2017). The British List: A Checklist of Birds of Britain (9th edition). *Ibis* 160: 190-240.

The wider area largely consisted of upland pasture with small areas of woodland present.

1.3 Statutory Sites Designated for Ornithological Features

Two statutory designated sites of international ornithological importance have been identified within 20 km of the Site. One statutory designated site of national ornithological importance was also identified within 10 km. Details are summarised in Table 1 below.

Table 1: Summary of statutory sites designated for ornithological interest within 20 km of the Site, listed in order of proximity

Site name	Designation(s)	Designated features	Description	Approximate distance to the Site*
Gladhouse Reservoir	Special Protection Area (SPA), Ramsar site and Site of Special Scientific Interest (SSSI)	Pink-footed goose, non-breeding	Located in the Moorfoot Hills, it is the largest freshwater body in the Lothians. When classified in 1988, it regularly supported a winter average of 10,500 pink-footed geese[3]	6.7 km to north-east
Westwater	SPA, Ramsar site and SSSI	Pink-footed goose, non-breeding; and Waterfowl assemblage, non-breeding	Located 320 m AOD in the Pentland Hills. The site is an artificial reservoir and supports large numbers of wintering pink-footed geese and over 20,000 individual wintering waterfowl[4]	8.4 km to north-west
Moorfoot Hills	SSSI	Golden plover (*Pluvialis apricaria,* breeding); and breeding bird assemblage.	Upland breeding bird assemblage includes ring ouzel, black and red grouse and nine species of breeding wader. Moorfoot Hills is also notified on account of its upland birch and bog habitats. It also qualifies as a Special Area of Conservation (SAC) on account of its upland habitats.	8.5 km to east
*From closest point				

1.4 Consultation with NatureScot (formerly Scottish Natural Heritage (SNH))

Two consultation documents were sent by Arcus to NatureScot (NS) during ornithological surveys, in part to discuss ornithological sensitivities at the Site and the proposed survey scope. These reports were as follows:

- Ornithology Consultation Report – March 2019[5]; and

[3] SNH (2018). Citation for Special Protection Area (SPA) Gladhouse Reservoir (UK9004231). Available online at: https://sitelink.nature.scot/site/8506

[4] SNH. (2018). Citation for Special Protection Area (SPA) Westwater (UK9004251). Available online at: https://sitelink.nature.scot/site/8591

[5] Arcus (2019) Cloich Forest Wind Farm Ornithology Consultation Report

- Ornithology Consultation Report – February 2020[6].

Further consultation with NS took place via email during March 2019.

Key information taken from relevant comments by NS relating to ornithological surveys is detailed in Table 2.

[6] Arcus (2020) Cloich Forest Wind Farm Ornithology Consultation Report

Table 2: NS comments in response to ornithological consultation

Type	Topic	Arcus Comments (and date)	NS comments (and date)
Consultation Report, March 2019	Vantage Point Locations	Feedback was requested from NS regarding the proposed survey programme and methods detailed in the Ornithology Consultation Report[5], particularly with respect to the Vantage Point (VP) locations and level of survey effort for geese. (06/03/19)	NS confirmed that they were content with the survey approach in general, and agreed that the VPs are well located and that passerine surveys are not required. NS commented that Cloich site is well within connectivity range of both the Westwater and Gladhouse SPAs and an Appropriate Assessment may be required. In order to do that it is important to understand if geese from the SPAs are commuting or otherwise flying over the Site. NS advised that goose surveys were repeated as the information provided from 2011-12 is too old to be of use in the assessment and numbers at both SPAs are known to have changed since. (12/03/19)
Consultation Report, March 2019	Additional Goose Surveys		
Consultation Report, March 2019	Passerine Surveys	Repeat breeding bird territory mapping surveys and breeding season point count surveys were not proposed because the Site is predominantly conifer plantation and current NS guidance, which has changed since the ornithological baseline surveys were carried out in 2011-12, is that survey of woodland passerines, especially in commercial conifer forest, is generally not required. (06/03/19)	
Consultation Report, March 2019	Moorland Breeding Bird Surveys (MBBS)	As there is only a very small area of open land within the Site (as well as open areas within the buffer) it is planned that any breeding moorland bird territories (such as waders) will be recorded if encountered during the raptor surveys (as we will be covering the same ground anyway). (13/03/19)	Due to the species present NS advised that MBBS should be carried out in the open parts of the study area. They stated there was no requirement to do this within the forested areas. (14/03/19)
Consultation Report, February 2020	Further Ornithology Surveys	Feedback was requested from NS on the requirement for a second year of bird surveys at the Site to inform submission of an EIA on basis of the information provided within the Ornithology Consultation Report (February 2020) and the data previously submitted for Hag Law Wind Farm and Kilrubie Wind Farm.	NS commented that they agreed that a second year of bird surveying would not be required (15/04/20)

2 METHODS

Based on the habitats present within and around the Site, the results of the 2011-12 baseline ornithological surveys[1], consultation with NS and professional judgement, the 2019-20 Baseline Ornithology Survey programme comprised the following:

- Flight Activity Surveys (FAS) (March 2019 to February 2020);
- Foraging Goose Surveys (September 2019 to February 2020).
- Black Grouse Surveys (April to May 2019);
- Breeding Raptor Surveys (March to July 2019); and
- MBBS (April to July 2019).

Full details of the methods followed for each of these surveys are provided below. Survey methods were based on current NS guidance[7], except where other methods are specified. Survey Areas are shown on Figure 8.1.1, Appendix 1.

2.1 Flight Activity Surveys

FAS were carried out between March 2019 and February 2020 (inclusive), using a series of watches from four VPs overlooking the Site, to record flight activity of target bird species. Target species included the following:

- All wild swan, goose, duck and grebe species;
- All raptors and owls listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended)[8] and/or Annex I of the Birds Directive[9];
- All wader species;
- Black grouse; and
- All heron species.

The flight lines of all target species were recorded on large scale maps with the flight height of target species recorded at 15 second intervals. Based on the proposed turbine specifications, the following three height bands were used:

- Height band 1: 0 to <20 m;
- Height band 2: 20 m to < 150 m; and
- Height band 3: >150 m.

In addition to recording target species flights, the number and activity of 'secondary' species was summarised every five minutes during each FAS. Secondary species included all other raptor species, all gull species, cormorant, raven and selected passerines in noteworthy numbers.

2.1.1 Vantage Point Locations

Four VP locations were identified to cover the area within the Site Boundary and an additional 500 m buffer. The VP locations and viewsheds are shown in Figure 8.1.2, Appendix 1.

2.1.2 Survey Effort

FAS were stratified to cover dawn and dusk periods during winter months to capture geese flying to and from roost sites. For each season, the minimum recommendation in NS guidance[7] of 36 hours per VP was matched or exceeded, with a minimum of 45 hours in the non-breeding season, and 36 hours per VP in the breeding season. Surveys comprised a series of three-hour watches, with a minimum 30-minute break in between watches (and

[7] NatureScot (2017) *Recommended bird survey methods to inform impact assessment of onshore wind farms,* (version 2, March 2017).NS.

[8] http://www.legislation.gov.uk/ukpga/1981/69 [Accessed 25/02/2020]

[9] Directive 2009/147/EC on the conservation of wild birds: https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:020:0007:0025:EN:PDF [Accessed 25/02/2020]

a maximum of six hours of watches completed during a single survey day). The extra survey effort (i.e. the additional hours above the recommended minimum) was concentrated in the months September to November (inclusive) to capture flights by wintering goose species. A breakdown of monthly FAS effort is presented in Table 3. Full details of survey dates, times and hourly weather conditions are presented in Table A3.1, Appendix 3.

Table 3: Breakdown of monthly FAS effort completed between March 2019 and February 2020

Month and year	Number of survey hours			
	VP 1	**VP 2**	**VP 3**	**VP 4**
Breeding Season				
March 2019	6	6	6	6
April 2019	6	6	6	6
May 2019	6	6	6	6
June 2019	6	6	6	6
July 2019	6	6	6	6
August 2019	6	6	6	6
Total breeding season hours	**36**	**36**	**36**	**36**
Non-breeding season				
September 2019	**6**	**6**	**6**	**9**
October 2019	**12**	**12**	**12**	**9**
November 2019	**9**	**9**	**9**	**9**
December 2019	**6**	**6**	**9**	**6**
January 2020	**6**	**6**	**6**	**6**
February 2020	**6**	**6**	**6**	**6**
Total non-breeding season hours	**45**	**45**	**48**	**45**

2.2 Foraging Goose Surveys

Due to the presence of Gladhouse Reservoir SPA 6.9 km to the north-east of the Site, and Westwater SPA 8.5 km to the north-west. Foraging Goose Surveys were completed during the non-breeding season, to determine whether any pink-footed geese were making regular use of the Site or surrounding area for foraging. All goose species observed were recorded, together with any other notable species (target/secondary FAS species).

In line with NS guidance[7], checks for foraging geese were completed twice per month between September 2019 and February 2020 (inclusive). The surveys involved checking suitable habitat for feeding geese within 3 km of the Site. Surveys followed the 'look-see' method[10], with the observer driving or walking the Survey Area and stopping regularly to scan visually for birds using binoculars and/or a telescope.

The Survey Area is shown in Figure 8.1.1, Appendix 1. Full details of survey dates, times and hourly weather conditions are presented in Table A3.2, Appendix 3.

[10] Bibby, C.J., Burgess, N.D., Hill, D.A. and Mustoe, S.H. (2000). *Bird Census Techniques*, 2nd edition. Academic Press, London.

2.3 Black Grouse Surveys

Black Grouse Surveys were completed between April and May 2019, based on methods detailed in Gilbert *et al*. (1998)[11]. Surveys covered all potentially suitable lekking habitat within the Site Boundary and a surrounding 1.5 km buffer (access permitting). The Survey Area is shown in Figure 8.1.1, Appendix 1.

Suitable habitat was identified during the course of other ornithology surveys and through inspection of Ordnance Survey (OS) maps and aerial imagery of the Site. Subsequently, two dawn/dusk visits to each area of suitable habitat were completed, with the aim of locating any black grouse leks.

Full details of survey dates, times and hourly weather conditions are presented in Table A3.3, Appendix 3.

2.4 Breeding Raptor Surveys

In line with NS guidance[7], walkover surveys including short VP watches of suitable areas of breeding habitat were undertaken between mid-March and late July 2019 to detect the presence of target raptors, primarily focusing on goshawk (target raptor species were those listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended)[12] and/or Annex I of the Birds Directive[13]. Surveys followed methods detailed in Hardey *et al*. (2013)[14]. The Survey Area comprised suitable habitat in accessible areas within 1 km of the Site Boundary for barn owl and goshawk, and within 2 km for all other raptor species.

During the 2011-12 baseline surveys, goshawk was considered to be a key sensitivity with an active breeding territory recorded within the Site, which successfully fledged three young in 2011[1]. Therefore, a proportion of the breeding raptor surveys were targeted towards detecting goshawk territories and activity within suitable habitat in the Survey Area. Other target raptor species included those associated with the habitats present within the Site, such as hen harrier, short-eared owl, barn owl and merlin, as well as all other Annex I (EU Birds Directive) and Schedule 1 (Wildlife and Countryside Act 1981 as amended) raptors. Although the surveys focused on target species, secondary raptor species were also recorded, particularly where observations related to potential breeding territories. All observations were mapped using standard British Trust for Ornithology (BTO) species codes, and relevant descriptive notes were taken (e.g. whether birds were hunting, performing display flights etc.).

The Survey Area is shown in Figure 8.1.1, and full details of survey dates, times and hourly weather conditions are presented in Table A3.4, Appendix 3.

2.5 Moorland Breeding Bird Surveys

A MBBS was undertaken between April and July 2019 to map breeding wader territories. The Survey Area comprised areas of open moorland within 500 m of the Survey Area (access permitting). In line with NS guidance[7], the survey followed an adapted Brown and Shepherd (1993) method[15] (designed to census upland breeding waders), with four survey visits completed (one per month). Wader registrations were recorded on large scale maps using standard BTO species codes, and Common Birds Census (CBC) symbology[16] to denote

[11] Gilbert, G., Gibbons, D, W. and Evans, Evans, E. (2012) *Bird Monitoring Methods: A Manual of Techniques for Key UK Species*. Pelagic Publishing. ISBN 1-901930-03-3.

[12] http://www.legislation.gov.uk/ukpga/1981/69 [Accessed 25/02/2020]

[13] Directive 2009/147/EC on the conservation of wild birds: https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:020:0007:0025:EN:PDF [Accessed 25/02/2020]

[14] Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B. and Thompson, D. (2013). *Raptors: a field guide to survey and monitoring*, 3rd edition. SNH, Inverness

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

[16] Marchant, J. (1983) *Common Birds Census Instructions*. British Trust for Ornithology, Thetford.

behaviour. Although the survey targeted breeding wader species, other bird species (particularly species of conservation concern) were also recorded where present.

The Survey Area is shown in Figure 8.1.1, Appendix 1 and full details of survey dates, times and hourly weather conditions are presented in Table A3.5, Appendix 3.

2.5.1 Breeding Territory Analysis

Upon completion of all four MBBS visits, an analysis was completed to determine the number and approximate location of breeding territories of wader species. All registrations of waders recorded on the field maps were transferred to produce 'species summary maps' from which the number and distribution of likely territories for each species could be determined. The method was based on that described by Bibby (2000)[17], and separation distances between territories were based on Brown and Shepherd (1993)[15], with an element of professional judgement.

A precautionary approach was followed with a bird deemed to be holding a territory if breeding behaviour (e.g. singing, alarm-calling, adults carrying food) was observed, or if pairs of birds were observed in suitable habitat, during just one of the four MBBS visits.

2.6 Survey Limitations

It is acknowledged that there was substantial overlap of VP viewsheds during FAS, as shown on Figure 8.1.2, Appendix 1. Due to the topography of the Site and relatively low rotor swept height (RSH) of the candidate turbines, it was necessary to have overlap of viewsheds to obtain good coverage of all turbines and a 500 m buffer following best practice[7]. On two occasions FAS were undertaken concurrently from VPs with overlapping viewsheds (both on 05/04/19). Although this is not in accordance with guidance, surveyors ensured that flightlines within overlapping areas were not "double-counted", and therefore flight activity was not overestimated. This is not considered to represent a significant limitation to the robustness of the baseline data obtained.

The majority of surveys were carried out in optimal weather conditions, with good visibility during diurnal surveys. However, the extensive survey programme meant that it was not always possible to avoid sub-optimal weather, especially when conditions varied from those forecast. This included periods of rain and snow, high winds, fog and reduced visibility. It is considered that undertaking surveys in a range of conditions is more likely to capture bird activity that is representative of the Site and surrounding area. As such, weather conditions are not considered to represent a significant limitation to the robustness of the baseline data obtained.

Due to surveyor illness, only one Foraging Goose Survey was undertaken during November 2019, with an additional survey undertaken during December 2019. Similarly, only one Foraging Goose Survey was undertaken during January 2020, however this is not considered to represent a significant limitation to the robustness of the baseline data obtained, due to the low numbers of geese present across surveys.

Additionally, land access was restricted during some of the surveys (i.e., due to fields with livestock and private gardens) and surveyor access was limited to nearby public roads and tracks in these cases. However, these access restrictions were not thought to considerably impact the surveyors' ability to detect any target species.

Although there were suitable buildings present with the potential to support nesting barn owl at Cloich Farm, to the east of the Site Boundary, there was no access to these buildings and no surveys could be undertaken.

There were various sources of disturbances during surveys, including dog walkers, felling and associated disturbance sources, other forestry operations and agricultural vehicle

[17] Bibby, C.J., Burgess, N.D., Hill, D.A. and Mustoe, S.H. (2000) Bird Census Techniques (2nd Edition)

movements. These were present during the majority of surveys, and it is considered that this range and level of activity is typical of the Site and surrounding area. As such, this is not considered to represent a significant limitation to the robustness of the baseline data obtained.

3 RESULTS

3.1 Flight Activity Surveys

3.1.1 Target Species Flights

A total of 88 flights by nine target species were recorded during the FAS. Of these, grey heron was recorded most frequently, with 24 flights. Twenty-two curlew flights were recorded, as well as frequent woodcock and snipe flights (14 and 10 flights respectively). All other species were recorded infrequently, with fewer than 10 registrations of each species. A summary of all target species flights, broken down by species, is provided in Table 4. Full details of each target species flight are presented in Table A4.1, Appendix 4 and flight lines are shown in Figures 8.1.3 to 8.1.6, Appendix 1. As goshawk is a sensitive Schedule 1 species, flight lines are shown within the Confidential Annex (Technical Appendix A8.2).

Table 4: Summary of target species flights recorded during the 2019-20 FAS

Species*	Total no. of flights	No. of birds per flight	Total no. of individuals recorded	Schedule 1/ Annex I listings	Conservation listing(s)**	Corresponding figure no.
Greylag goose	1	1	1	Sch1.2	Amber	**8.1.3**
Pink-footed goose	1	30	30		Amber	**8.1.3**
Mallard	7	1-2	13		Amber	**8.1.4**
Grey heron	24	1-2	27			**8.1.4**
Osprey	1	1	1	Sch1.1; Annex I	Amber; SBL	**8.1.5**
Goshawk	8	1-2	9	Sch1.1		**8.2.1 (Confidential Annex)**
Curlew	22	1-2	27		Red; SBL	**8.1.6**
Woodcock	14	1-2	17		Red; SBL	**8.1.6**
Snipe	10	1-2	11		Amber	**8.1.6**
Total no. of flights	**88**	**N/A**	**136**			

*Species names and order follow the British List maintained by the BOU[2].

** Sch1.1 = Schedule 1 of the Wildlife and Countryside Act 1981 (as amended)[8]

Ann1 = Annex 1 of the Birds Directive[9], Red = UK Red-listed Birds of Conservation Concern (BoCC)[18]; Amber = UK Amber-listed BoCC[18]; SBL = listed on the Scottish Biodiversity List (SBL)[19]

[18] Eaton MA, Aebischer NJ, Brown AF, Hearn RD, Lock L, Musgrove AJ, Noble DG, Stroud DA and Gregory RD (2015) Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. British Birds 108, 708–746

[19] https://www.nature.scot/scotlands-biodiversity/scottish-biodiversity-strategy/scottish-biodiversity-list [Accessed 28/02/20]

3.1.2 Secondary Species Registrations

A number of secondary species were recorded during the FAS, with herring gull, lesser black-backed gull, great black-backed gull and raven recorded most frequently. There were also regular registrations of buzzard, kestrel and sparrowhawk. Secondary species were generally recorded in low numbers, apart from gull species, with small flocks regularly recorded (peak count of 18 individuals).

3.2 Foraging Goose Surveys

During the Foraging Goose Surveys, small groups (five to 21 individuals) of greylag geese were recorded within the Survey Area in September 2019. Greylag geese were regularly loafing on Portmore Loch, with short associated flights recorded. Additionally, one group of five greylag geese was recorded foraging in a field adjacent to the western edge of the loch.

Greylag geese flocks were also recorded foraging during February 2020 surveys, with flocks of 36 and 68 individuals recorded immediately west of the A703 (north of Eddleston) during Visits 1 and 2 respectively. During February Visit 2, an additional flock of 30 greylag geese was foraging adjacent to the A703 at Hattonknowe.

Small numbers of mute swan, and one record of four whooper swan were recorded incidentally loafing on the loch.

3.3 Black Grouse Survey

Suitable habitat for lekking black grouse was present within 1.5 km of the Site Boundary, including areas of immature coniferous forestry and clearings, moorland and open rough grazing.

During targeted surveys to record lekking males, no black grouse were recorded. There were no registrations of this species during other surveys.

3.4 Breeding Raptor Surveys

3.4.1 Target Raptor Species

Goshawk and osprey were the only target species recorded during targeted raptor surveys. A goshawk pair was recorded in March and April of 2019, and a single male was also recorded during the same April survey.

Although no nests were recorded, it is possible that breeding attempts could have taken place early in the breeding season and failed before they could be detected by surveyors.

Two individual ospreys were recorded during April, both flying west over the Site. There was no evidence of this species breeding within the Survey Area, and no waterbodies or watercourses were present which could be used by foraging osprey.

An abandoned cottage at Courhope was searched for evidence of barn owl during Breeding Raptor Surveys, however no signs of barn owl were recorded. Buildings at Cloich Farm which had the potential to support nesting barn owl could not be surveyed due to access restrictions.

3.4.2 Secondary Species

Four secondary raptor species were observed during the surveys: sparrowhawk, buzzard, tawny owl and kestrel. Although these were not target species they were recorded by surveyors, and based on behaviour and suitable habitat present, the likelihood of breeding has been assessed.

Registrations of each species are briefly summarised below.

- **Sparrowhawk**: there were occasional registrations of a pair and a single male bird. It is likely that one pair was breeding within the Survey Area, but no nest sites were identified.
- **Buzzard**: Two pairs and up to two individual birds were frequently recorded, and two pairs were likely to be breeding within the Survey Area, but no nest sites were identified.
- **Tawny owl**: Individuals were recorded during three surveys, and this species was probably breeding within the Survey Area, but no nest sites were located.
- **Kestrel**: there were occasional registrations of a pair and a single male bird. It is likely that one pair was breeding within the Survey Area, but no nest sites were identified.

3.5 Moorland Breeding Bird Surveys

3.5.1 Breeding Waders and Wildfowl

Of the total 59 species recorded within the MBBS Survey Area, four were breeding waders: lapwing, curlew, woodcock and snipe. Additionally, mallard was recorded breeding to the north-west of the Site Boundary. Numbers of territories of each of these species are provided in Table 9 and locations are shown in Figure 8.1.7, Appendix 1.

Table 9: Summary of wader and wildfowl species of conservation concern assessed as breeding during the 2019 MBBS

Species*	Number of territories in MBBS Area			Relevant legislation/ conservation listings**
	Within Site Boundary	In 500 m buffer	Total	
Mallard	0	1	**1**	Amber
Lapwing	0	1	**1**	Red; SBL
Curlew	0	2	**2**	Red; SBL
Woodcock***	2	0	**2**	Red; SBL
Snipe	0	1	**1**	Amber

*Species names and order follow the British List maintained by the BOU[2].

**Red = UK Red-listed BoCC[18]; Amber = UK Amber-listed BoCC[18]; SBL = listed on the SBL[19]

*** As woodland habitats were not fully surveyed during the MBBS, it is possible that further breeding woodcock are present, but were not detected during surveys. Single woodcock were recorded during multiple visits and are therefore considered likely to be breeding within the Site.

3.5.2 Other Species

Other species recorded during surveys were red-legged partridge, pheasant, grey heron, buzzard, common gull, great black-backed gull, herring gull, woodpigeon, swift, great spotted woodpecker, kestrel, jay, magpie, carrion crow, raven, great tit, coal tit, blue tit, skylark, swallow, long-tailed tit, willow warbler, grasshopper warbler, whitethroat, goldcrest, wren, nuthatch, treecreeper, starling, blackbird, fieldfare, song thrush, mistle thrush, robin, whinchat, stonechat, wheatear, dipper, dunnock, grey wagtail, pied wagtail, meadow pipit, tree pipit, chaffinch, bullfinch, greenfinch, linnet, lesser redpoll, crossbill, siskin, yellowhammer and reed bunting.

Although not target species, many of the species listed above are species of conservation concern and are likely to be breeding within the Site. No detailed mapping of passerines

was completed during MBBS, however from surveyor notes and suitable habitats, probable breeders include red-listed species as follows: skylark, grasshopper warbler, starling, song thrush, mistle thrush, grey wagtail, tree pipit, whinchat, linnet and yellowhammer.

Two Schedule 1 species, crossbill and fieldfare, were recorded during surveys. Fieldfare is a very rare breeder in the UK, and the records within the survey area showed no evidence of holding territory and pertain to late migrants. Crossbill was not a target species, therefore territories have not been mapped. However, it is likely that this species is breeding throughout suitable habitat (coniferous plantation) within the Survey Area. Crossbill was recorded incidentally during surveys.

As the above were not target species, they have not been mapped. A list of all species recorded during ornithology surveys are listed in Appendix 2, Table A.2.1.

3.6 Incidental Records

A number of species were recorded incidentally during surveys. One notable record was of a barn owl which was recorded hunting to the north-east of VP 1 after the completion of FAS on 26/02/20. No barn owl building surveys were undertaken other than at an abandoned cottage at Courhope, however it is likely that barn owls are breeding within the surrounding area and may forage within land adjacent to the Site Boundary on occasion.

4 SUMMARY OF KEY FINDINGS

4.1 Flight Activity by Target Species

A total of 88 flights by nine identified target species were recorded during the FAS (Figures 8.1.3 to 8.1.7, Appendix 1), with grey heron the most frequently recorded species (24 flights and 27 individuals), followed by curlew (22 flights, 27 individuals).

All but three flights occurred at potential collision height. Collision Risk Modelling will be required for some species to determine the potential impacts of the Development.

4.2 Goose Surveys

Small flocks of greylag geese were recorded foraging during surveys. There were also regular records of greylag geese loafing on Portmore Loch during September 2019. Swan species were incidentally recorded infrequently loafing on the loch.

The habitat within the Site Boundary is unsuitable for foraging geese and swans, and no regular commuting routes through the Site were identified.

4.3 Black Grouse Survey

There were no records of black grouse during targeted surveys for this species, and no incidental records during any other surveys.

4.4 Breeding Raptor Surveys

Goshawk and osprey were the only target raptor species recorded during Breeding Raptor Surveys. Observations indicated that one goshawk territory was present within the Survey Area. No nests were recorded during surveys, however subsequent data provided by the local Raptor Study Group confirmed that goshawk was breeding within the Site. Further detail regarding goshawk is provided in the Confidential Annex (Appendix A8.2).

Osprey was not breeding within the Survey Area, but was recorded flying over the Survey Area on two occasions. Sparrowhawk, buzzard, tawny owl and kestrel were all highly probable breeders within the Survey Area.

Barn owl was recorded incidentally during the course of surveys, and is likely breeding within the wider area. No evidence of breeding barn owl was recorded within the barn owl survey area.

4.5 Moorland Breeding Bird Surveys

The breeding wader species assemblage within the Survey Area was typical of the Site location and habitats present. Breeding waders were recorded at low density with two curlew territories, a minimum of two woodcock territories and single territories of both lapwing and snipe. One mallard territory was recorded, which was the only breeding wildfowl species.

The Survey Area also supports a range of non-target breeding species typical of the habitats present. These include crossbill, which is a Schedule 1 species, and several red-listed passerine species of conservation concern.

APPENDIX 1 - FIGURES

Figure 8.1.1: Site Boundary and Survey Areas

Figure 8.1.2: Vantage Points and Viewsheds

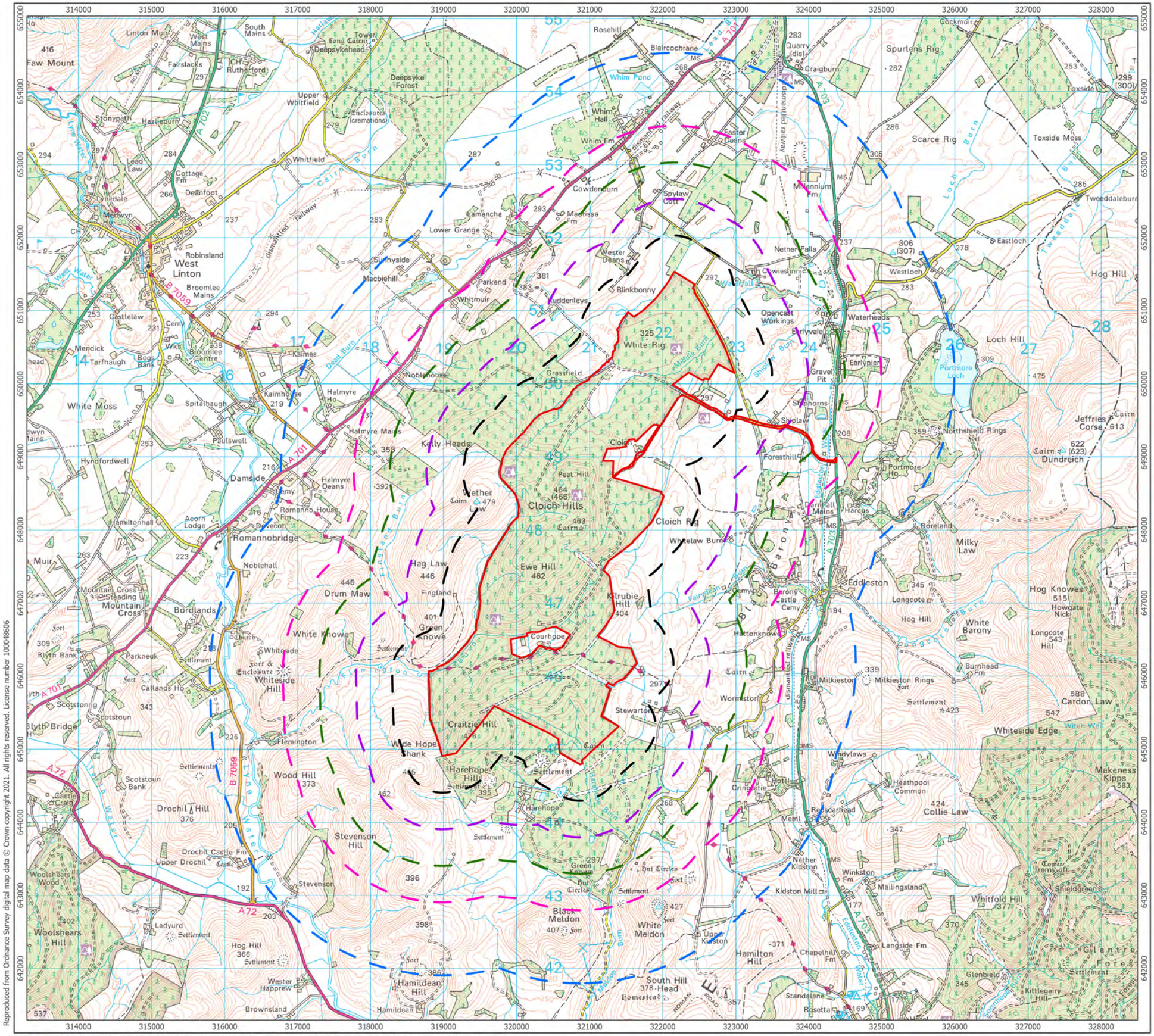
Figure 8.1.3: Target Species Flights – Geese

Figure 8.1.4: Target Species Flights – Mallard and Grey Heron

Figure 8.1.5: Target Species Flights – Osprey

Figure 8.1.6: Target Species Flights – Waders

Figure 8.1.7: Moorland Breeding Bird Territories



Reproduced from Ordnance Survey digital map data © Crown copyright 2021. All rights reserved. License number 100048606

P:\Projects\Ornithology\Projects\3122 Cloich Wind Farm\3122 Cloich Wind Farm.aprx\3122-REP-016 Fig8.1.1 Site Boundary and Survey Areas

EDF renewables

ARCUS

Site Boundary

Ornithology Survey Areas

- Moorland Breeding Bird Survey Area - 0.5 km Buffer of Site Boundary
- Goshawk and Barn Owl Survey Area - 1 km Buffer of Site Boundary
- Black Grouse Survey Area - 1.5 km Buffer of Site Boundary
- Breeding Raptor Survey Area - 2 km Buffer of Site Boundary
- Foraging Goose Survey Area - 3 km Buffer of Site Boundary

1:50,000 Scale @ A3

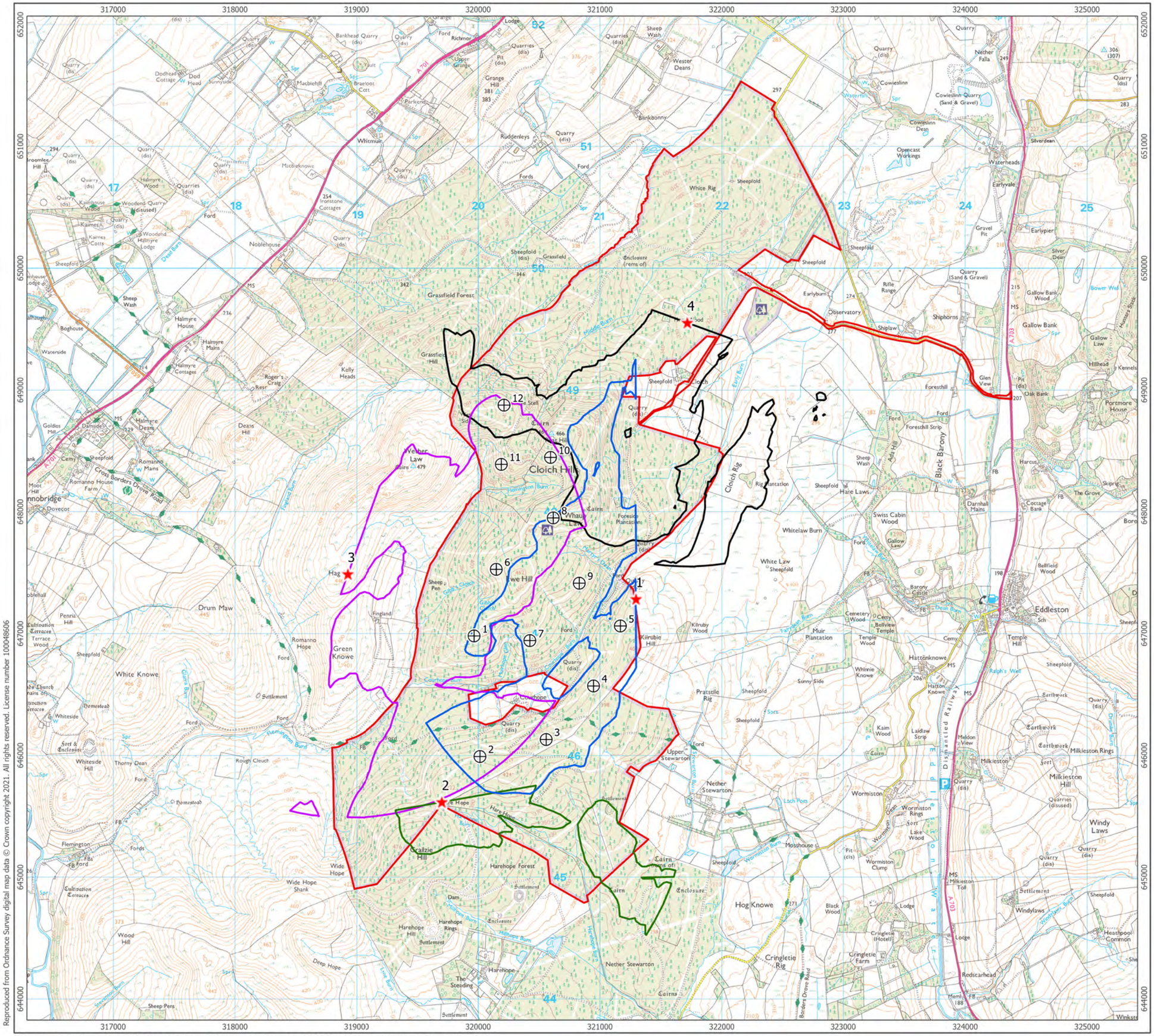
0 1 2 km

NORTH

Produced By: MR	Ref: 3122-REP-016
Checked By: SC	Date: 26/05/2021

Site Boundary and Survey Areas
Figure 8.1.1

Cloich Forest Wind Farm
Appendix A8.1: Baseline Ornithology Report 2019-20



Reproduced from Ordnance Survey digital map data © Crown copyright 2021. All rights reserved. License number 100048606

P:\Projects\Ornithology\Projects\3122 Cloich Wind Farm\3122 Cloich Wind Farm.aprx\3122-REP-017 Fig8.1.2 Vantage Points and Viewsheds

EDF renewables

ARCUS

- Site Boundary
- ⊕ Wind Turbines
- ★ Vantage Points
- VP1 Viewshed
- VP2 Viewshed
- VP3 Viewshed
- VP4 Viewshed

Viewsheds have been calculated using an estimated lowest rotor swept height on 14 m.

1:30,000 Scale @ A3

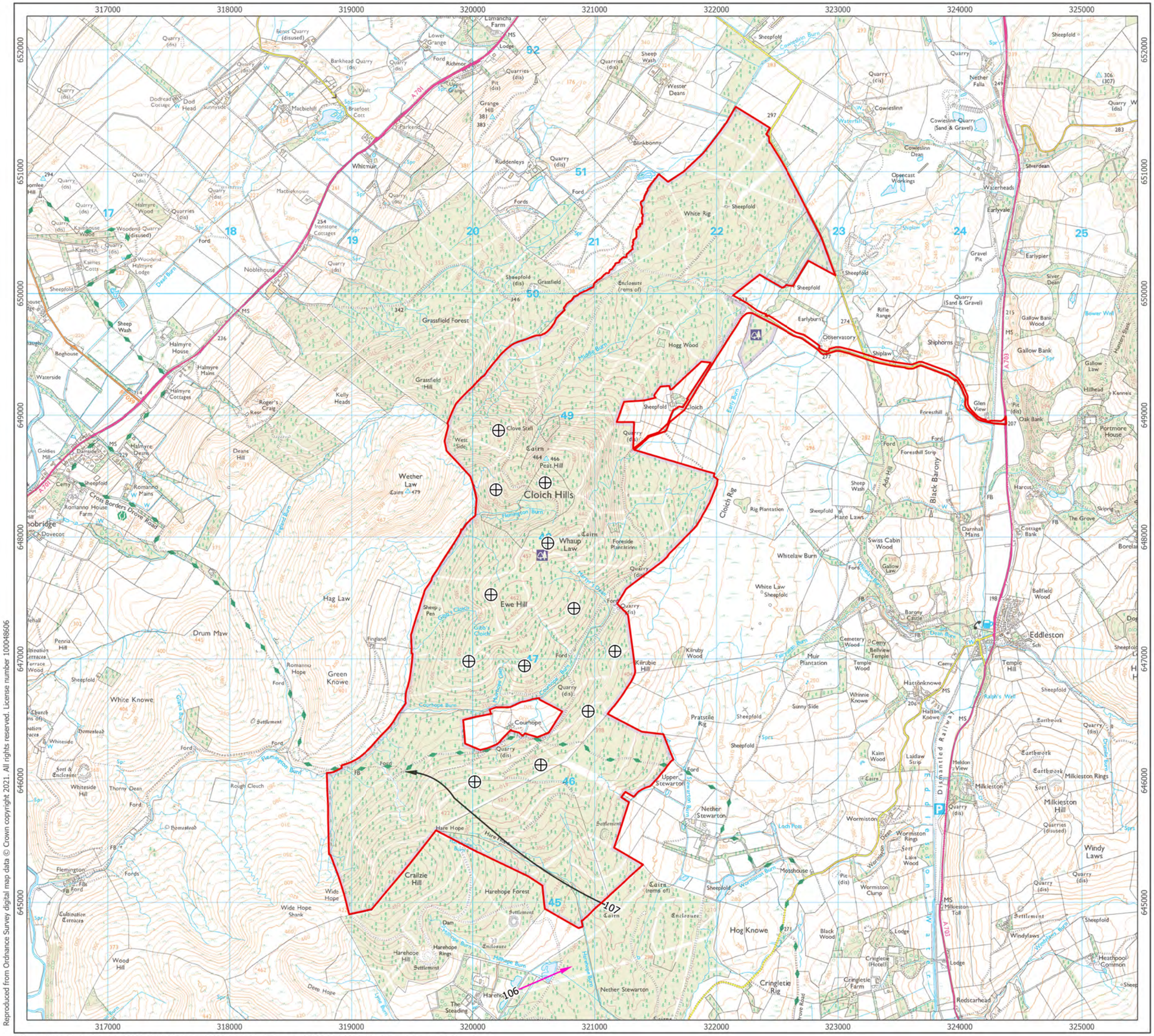
0 0.5 1 km

NORTH

Produced By: MR	Ref: 3122-REP-017
Checked By: SC	Date: 26/05/2021

Vantage Points and Viewsheds
Figure 8.1.2

Cloich Forest Wind Farm
Appendix A8.1: Baseline Ornithology Report 2019-20



Reproduced from Ordnance Survey digital map data © Crown copyright 2021. All rights reserved. License number 100048606

P:\Projects\Ornithology\Projects\3122 Cloich Wind Farm\3122 Cloich Wind Farm.aprx\3122-REP-023 Fig8.1.3 Target Species Flights - Geese

EDF renewables

ARCUS

Site Boundary

Turbine Locations

Species

Greylag Goose

Pink-footed Goose

1:30,000 Scale @ A3

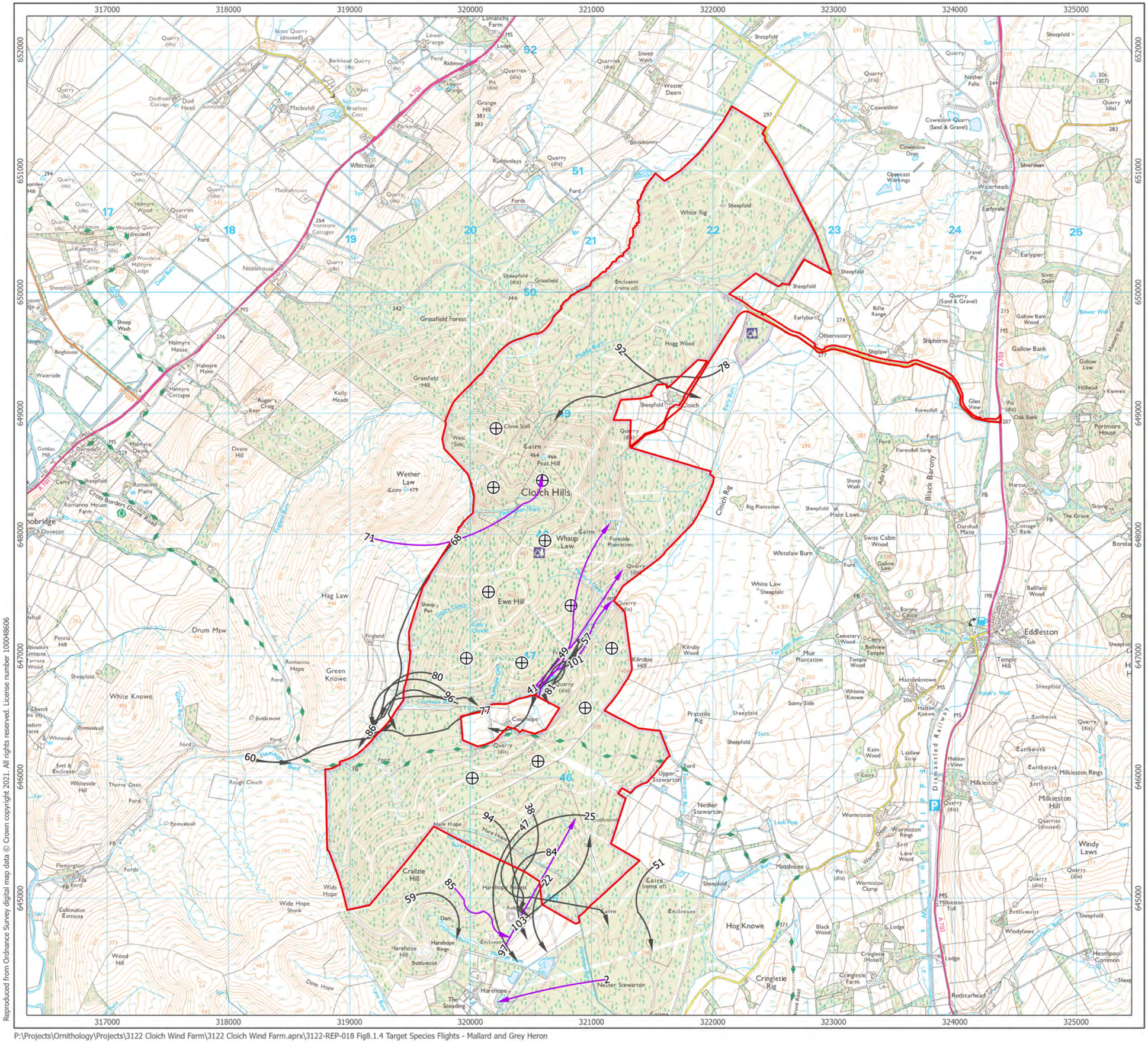
0 0.5 1 km

NORTH

Produced By: MR	Ref: 3122-REP-023
Checked By: SC	Date: 26/05/2021

Target Species Flights - Geese
Figure 8.1.3

Cloich Forest Wind Farm
Appendix A8.1: Baseline Ornithology Report 2019-20

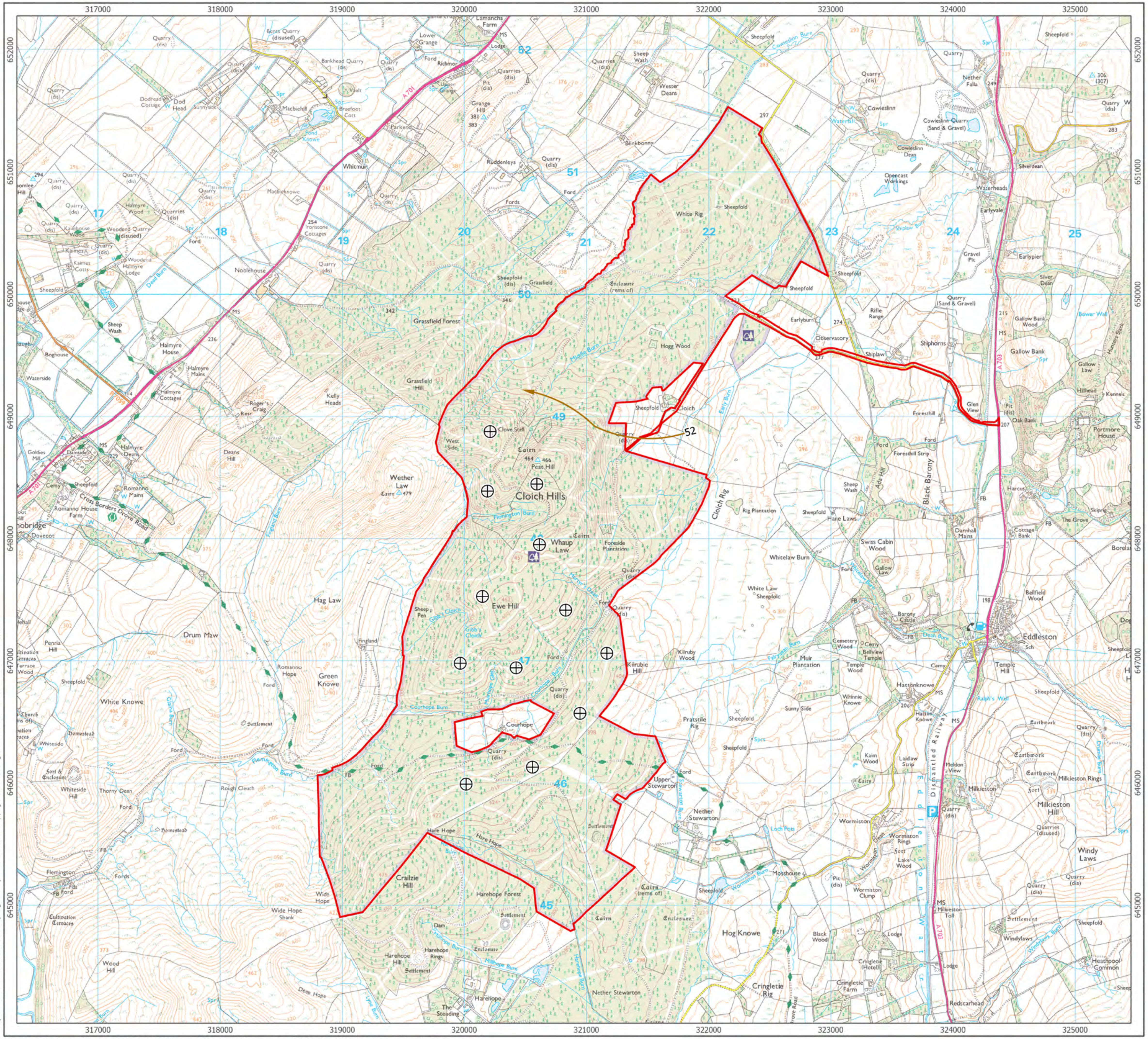


P:\Projects\Ornithology\Projects\3122 Cloich Wind Farm\3122 Cloich Wind Farm.aprx\3122-REP-018 Fig8.1.4 Target Species Flights - Mallard and Grey Heron

Produced By: MR	Ref: 3122-REP-018
Checked By: SC	Date: 26/05/2021

Target Species Flights - Mallard and Grey Heron
Figure 8.1.4

Cloich Forest Wind Farm Appendix A8.1: Baseline Ornithology Report 2019-20



Site Boundary

Turbine Locations

Species

Osprey

1:30,000 Scale @ A3

0 0.5 1 km

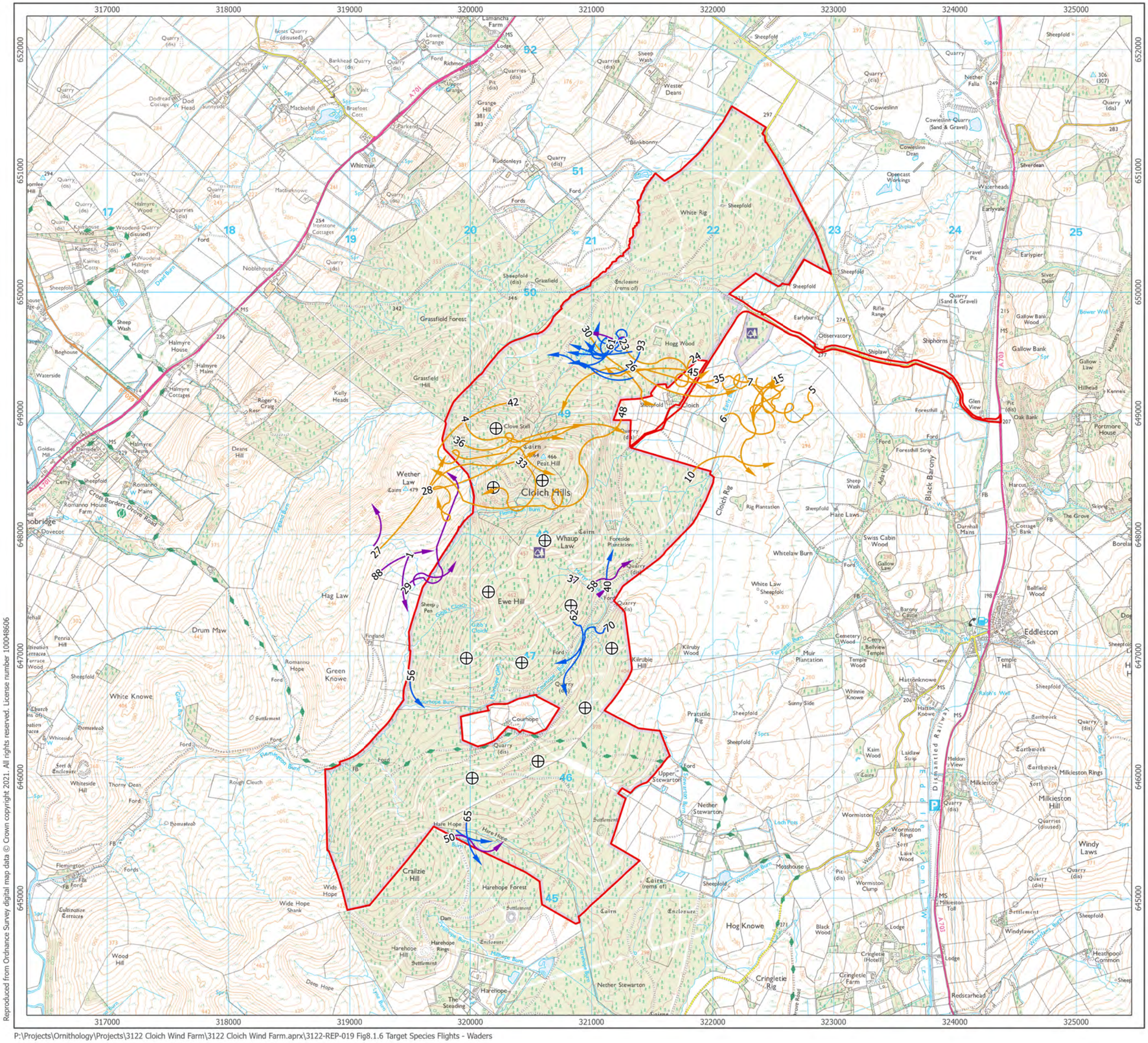
NORTH

Produced By: MR	Ref: 3122-REP-020
Checked By: SC	Date: 26/05/2021

Target Species Flights - Osprey
Figure 8.1.5

Cloich Forest Wind Farm
Appendix A8.1: Baseline
Ornithology Report 2019-20

P:\Projects\Ornithology\Projects\3122 Cloich Wind Farm\3122 Cloich Wind Farm.aprx\3122-REP-020 Fig8.1.5 Target Species Flights - Osprey

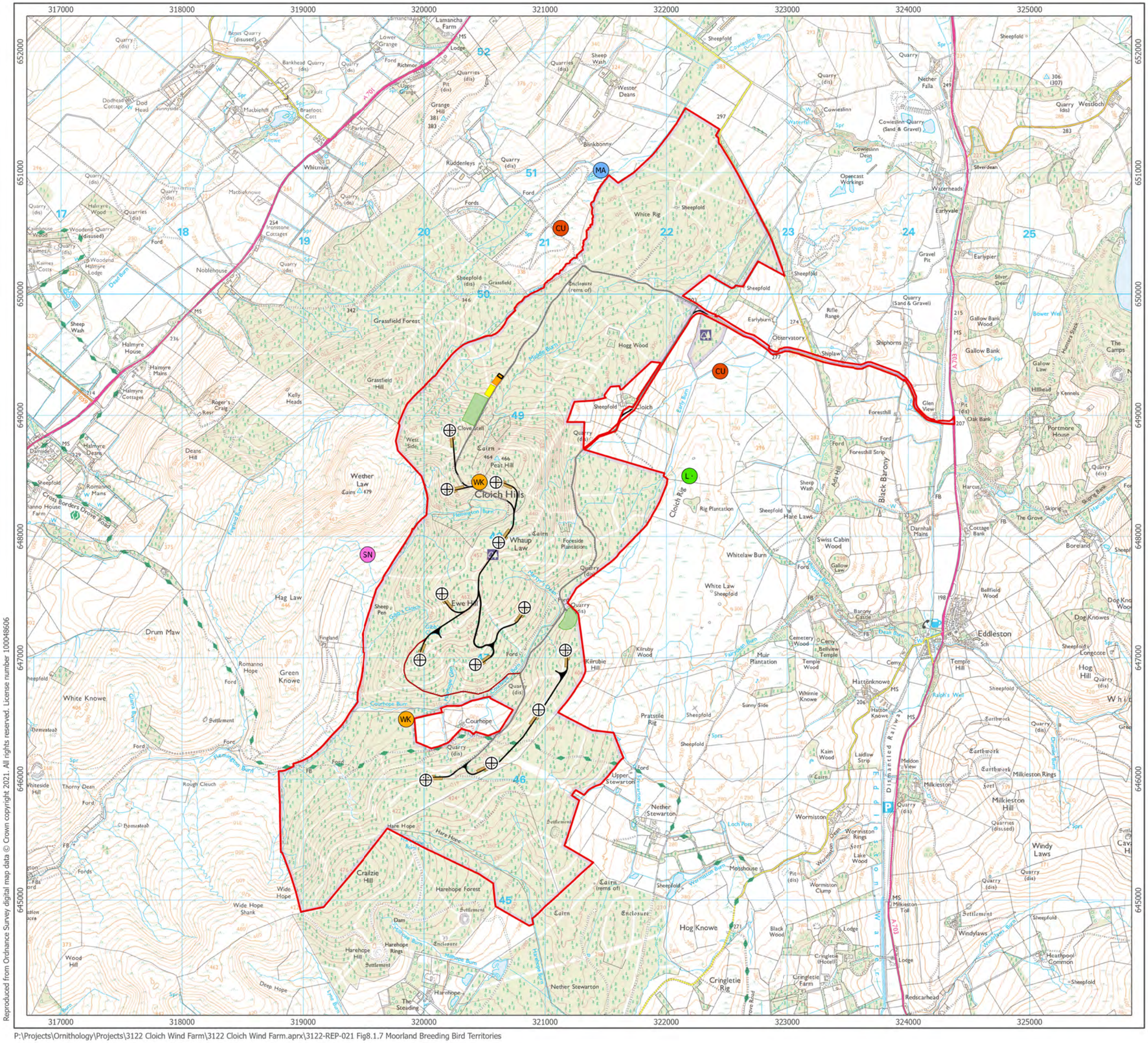


P:\Projects\Ornithology\Projects\3122 Cloich Wind Farm\3122 Cloich Wind Farm.aprx\3122-REP-019 Fig8.1.6 Target Species Flights - Waders

Produced By: MR	Ref: 3122-REP-019
Checked By: SC	Date: 26/05/2021

Target Species Flights - Waders
Figure 8.1.6

Cloich Forest Wind Farm
Appendix A8.1: Baseline Ornithology Report 2019-20



P:\Projects\Ornithology\Projects\3122 Cloich Wind Farm\3122 Cloich Wind Farm.aprx\3122-REP-021 Fig8.1.7 Moorland Breeding Bird Territories

eDF renewables

ARCUS

- Site Boundary
- Proposed Turbine Locations

Site Infrastructure

- Borrow Pit
- Construction Compound
- Crane Hardstanding
- Substation Compound
- BESS Location
- New Access Track
- New Track Used by Construction Traffic Only
- Existing Track (Subject to Localised Upgrades)
- Public Road (Subject to Widening Works)

Species

- CU Curlew
- L Lapwing
- MA Mallard
- SN Snipe
- WK Woodcock

1:30,000 Scale @ A3

0 0.5 1 km

NORTH

Produced By: MR	Ref: 3122-REP-021
Checked By: SC	Date: 26/05/2021

Moorland Breeding Bird Territories
Figure 8.1.7

Cloich Forest Wind Farm
Appendix A8.1: Baseline Ornithology Report 2019-20

APPENDIX 2 - BIRD SPECIES NAMES AND CONSERVATION DESIGNATIONS

Table A2.1 list provides English vernacular and scientific names for all bird species referred to in this report. Taxonomic order and nomenclature are based on the BOU 'British List'[2].

Table A2.1: List of English vernacular and scientific names of bird species recorded during surveys

Species*		Schedule 1/Annex I listings	Conservation listings**
English (British) vernacular name	**Scientific name**		
Greylag Goose	*Anser anser*		Amber
Mute Swan	*Cygnus olor*	Amber	
Whooper Swan	*Cygnus cygnus*	Sch1.1; Ann1;	Amber; SBL
Black Grouse	*Lyrurus tetrix*		Red; SBL
Red-legged Partridge	*Alectoris rufa*		
Pheasant	*Phasianus colchicus*		
Grey Heron	*Ardea cinerea*		
Osprey	*Pandion haliaetus*	Sch1.1; Ann1	Amber; SBL
Sparrowhawk	*Accipiter nisus*		
Goshawk	*Accipiter gentilis*	Sch1.1	
Buzzard	*Buteo buteo*		
Lapwing	*Vanellus vanellus*		Red; SBL
Curlew	*Numenius arquata*		Red; SBL
Woodcock	*Scolopax rusticola*		Red; SBL
Snipe	*Gallinago gallinago*		Amber
Common Gull	*Larus canus*		Amber
Black-headed Gull	*Chroicocephalus ridibundus*		Amber; SBL
Great Black-backed Gull	*Larus marinus*		Amber
Herring Gull	*Larus argentatus*		Red; SBL
Woodpigeon	*Columba palumbus*		
Barn Owl	*Tyto alba*	Sch1.1	SBL
Tawny Owl	*Strix aluco*		Amber
Swift	*Apus apus*		Amber; SBL
Great Spotted Woodpecker	*Dendrocopos major*		

Species*		Schedule 1/Annex I listings	Conservation listings**
English (British) vernacular name	**Scientific name**		
Kestrel	*Falco tinnunculus*		Amber; SBL
Jay	*Garrulus glandarius*		
Magpie	*Pica pica*		
Carrion Crow	*Corvus corone*		
Raven	*Corvus corax*		
Great Tit	*Parus major*		
Coal Tit	*Periparus ater*		
Blue Tit	*Cyanistes caeruleus*		
Skylark	*Alauda arvensis*		Red; SBL
Swallow	*Hirundo rustica*		
Long-tailed Tit	*Aegithalos caudatus*		
Willow Warbler	*Phylloscopus trochilus*		Amber
Grasshopper Warbler	*Locustella naevia*		Red; SBL
Whitethroat	*Sylvia communis*		
Goldcrest	*Regulus regulus*		
Wren	*Troglodytes troglodytes*		Amber
Nuthatch	*Sitta europaea*		
Treecreeper	*Certhia familiaris*		
Starling	*Sturnus vulgaris*	Red; SBL	
Blackbird	*Turdus merula*		
Fieldfare	*Turdus pilaris*	Sch1.1	Red
Song Thrush	*Turdus philomelos*		Red; SBL
Mistle Thrush	*Turdus viscivorus*		Red
Robin	*Erithacus rubecula*		
Whinchat	*Saxicola rubetra*		Red
Stonechat	*Saxicola rubicola*		
Wheatear	*Oenanthe oenanthe*		

Species*		Schedule 1/Annex I listings	Conservation listings**
English (British) vernacular name	**Scientific name**		
Dipper	*Cinclus cinclus*		Amber
Dunnock	*Prunella modularis*		Amber; SBL
Grey Wagtail	*Motacilla cinerea*		Red
Pied Wagtail	*Motacilla alba*		
Meadow Pipit	*Anthus pratensis*		Amber
Tree Pipit	*Anthus trivialis*		Red
Chaffinch	*Fringilla coelebs*		
Bullfinch	*Pyrrhula pyrrhula*		Amber; SBL
Greenfinch	*Chloris chloris*		
Linnet	*Linaria cannabina*		Red; SBL
Lesser Redpoll	*Acanthis cabaret*		Red; SBL
Crossbill	*Loxia curvirostra*	Sch1.1	
Goldfinch	*Carduelis carduelis*		
Siskin	*Spinus spinus*		SBL
Yellowhammer	*Emberiza citrinella*		Red; SBL
Reed Bunting	*Emberiza schoeniclus*		Amber; SBL

*Species names and order follow the British List maintained by the BOU[2]

** Sch1.1 = Schedule 1 of the Wildlife and Countryside Act 1981 (as amended)[8], Ann1 = Annex I of the Birds Directive[9], Red = UK BoCC Red list[18]; Amber = UK BoCC Amber list[18], SBL = listed on the SBL[19]

APPENDIX 3 - ORNITHOLOGY SURVEY TIMES AND WEATHER CONDITIONS

Full details of the 2019-20 Ornithology Surveys, including hourly weather conditions, are presented below in Tables A3.1 to A3.5.

Table A3.1: Survey times and hourly weather conditions during the 2019-20 FAS

Date	VP	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
23/03/2019	VP3	FMacF	09:15	12:15	1	2	NW	0	5	2	2	0	0	
					2	2	NW	0	5	2	2	0	0	
					3	2	NW	0	5	2	2	0	0	
23/03/2019	VP3	FMacF	12:45	15:45	1	2	NW	0	5	2	2	0	0	
					2	3	NW	0	6	2	2	0	0	
					3	3	NW	0	6	2	2	0	0	
25/03/2019	VP2	TD	10:00	13:00	1	1	NW	0	3	2	2	0	0	
					2	2	NW	0	3	2	2	0	0	
					3	2	NW	0	3	2	2	0	0	
25/03/2019	VP2	TD	13:30	16:30	1	2	NW	0	7	2	2	0	0	
					2	2	NW	0	7	2	2	0	0	
					3	2	NW	0	5	2	2	0	0	
28/03/2019	VP1	FMacF	09:45	12:45	1	2	NW	1	8	2	2	0	0	
					2	2	NW	0	8	2	2	0	0	
					3	2	NW	0	8	2	2	0	0	
28/03/2019	VP4	FMacF	13:15	16:15	1	1	NW	0	6	2	2	0	0	
					2	2	NW	0	6	2	2	0	0	
					3	1	NW	0	6	2	2	0	0	
29/03/2019	VP4	FMacF	09:15	12:15	1	3	NW	1	8	2	2	0	0	

Date	VP	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
					2	2	NW	0	8	2	2	0	0	
					3	3	NW	0	8	2	2	0	0	
29/03/2019	VP1	FMacF	12:45	15:45	1	2	NW	0	8	2	2	0	0	
					2	3	NW	0	8	2	2	0	0	
					3	2	NW	0	8	2	2	0	0	
04/04/2019	VP4	TD	09:50	12:50	1	3	NE	3	8	2	1	0	2	Snow showers
					2	3	NE	3	8	1	1	0	2	
					3	3	NE	0	7	2	2	0	2	
04/04/2019	VP1	TD	13:20	16:20	1	3	NE	0	7	1	2	0	1	3-5cm snow on ground
					2	3	NE	0	6	2	2	0	1	''
					3	3	NE	0	4	2	2	0	1	''
05/04/2019	VP2	FMacF	10:10	13:10	1	3	E	0	3	2	2	0	2	Snow patches present
					2	3	E	0	3	2	2	0	2	''
					3	3	E	0	3	2	2	0	2	''
05/04/2019	VP1	TD	10:30	13:30	1	3	E	0	2	2	2	0	2	Patchy snow on hills
					2	3	E	0	2	2	2	0	2	''
					3	3	E	0	2	2	2	0	2	''
05/04/2019	VP3	FMacF	13:40	16:40	1	3	E	0	2	2	2	0	0	
					2	4	E	0	2	2	2	0	0	
					3	4	E	0	2	2	2	0	0	
05/04/2019	VP4	TD	14:00	17:00	1	4	E	0	3	2	2	0	2	Snow patches present
					2	4	E	0	2	2	2	0	2	Snow patches present

Date	VP	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
					3	4	E	0	2	2	2	0	2	Snow patches present
06/04/2019	VP3	FMacF	09:10	12:10	1	4	E	0	7	2	2	0	2	
					2	4	E	0	8	2	2	0	2	
					3	4	E	0	8	2	2	0	2	
06/04/2019	VP2	FMacF	13:40	16:40	1	2	E	0	2	2	2	0	0	
					2	1	E	0	2	2	2	0	0	
					3	2	E	0	2	2	2	0	0	
24/05/2019	VP1	FMacF	10:30	13:30	1	3	NW	1	8	2	2	0	0	
					2	2	NW	1	8	2	2	0	0	
					3	3	NW	0	7	2	2	0	0	
24/05/2019	VP2	FMacF	11:15	14:15	1	3	SW	0	8	2	2	0	0	
					2	2	SW	0	7	2	2	0	0	
					3	2	SW	1	8	2	2	0	0	
24/05/2019	VP4	FMacF	14:00	17:00	1	3	NW	0	8	2	2	0	0	
					2	2	NW	1	8	2	2	0	0	
					3	2	NW	1	8	2	2	0	0	
25/05/2019	VP2	FMacF	09:10	12:10	1	2	W	0	8	2	2	0	0	
					2	3	W	0	7	2	2	0	0	
					3	2	W	0	7	2	2	0	0	
28/05/2019	VP4	FMacF	11:35	14:35	1	3	W	1	8	2	2	0	0	
					2	3	W	0	7	2	2	0	0	
					3	3	W	0	6	2	2	0	0	

Date	VP	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
28/05/2019	VP1	FMacF	15:05	18:05	1	2	W	0	5	2	2	0	0	
					2	2	W	0	6	2	2	0	0	
					3	2	W	0	5	2	2	0	0	
31/05/2019	VP3	FMacF	09:05	12:05	1	3	W	0	6	2	2	0	0	
					2	3	W	0	5	2	2	0	0	
					3	3	W	0	6	2	2	0	0	
31/05/2019	VP3	FMacF	12:35	15:35	1	3	W	0	6	2	2	0	0	
					2	3	W	0	5	2	2	0	0	
					3	3	W	0	5	2	2	0	0	
23/06/2019	VP4	FMacF	16:20	19:20	1	2	SW	0	4	2	2	0	0	
					2	2	SW	0	5	2	2	0	0	
					3	2	SW	0	5	2	2	0	0	
24/06/2019	VP2	FMacF	11:55	14:55	1	3	SW	1	8	2	2	0	0	
					2	3	SW	1	8	2	2	0	0	
					3	3	SW	0	6	2	2	0	0	
24/06/2019	VP3	FMacF	15:25	18:25	1	4	SW	0	4	2	2	0	0	
					2	4	SW	0	4	2	2	0	0	
					3	4	SW	0	4	2	2	0	0	
25/06/2019	VP1	FMacF	09:25	12:25	1	2	W	0	8	2	2	0	0	
					2	2	W	0	7	2	2	0	0	
					3	3	W	0	6	2	2	0	0	
27/06/2019	VP1	FMacF	11:35	14:35	1	2	SW	1	8	2	2	0	0	

Date	VP	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
					2	2	SW	1	8	2	2	0	0	
					3	2	SW	1	8	2	2	0	0	
28/06/2019	VP3	FMacF	07:45	10:45	1	3	SW	1	8	2	2	0	0	
					2	3	SW	2	8	2	2	0	0	
					3	3	SW	1	8	2	2	0	0	
28/06/2019	VP2	FMacF	11:15	14:15	1	2	SW	1	8	2	2	0	0	
					2	2	SW	0	8	2	2	0	0	
					3	2	SW	1	8	2	2	0	0	
13/07/2019	VP1	FMacF	10:15	13:15	1	3	SW	1	8	2	2	0	0	
					2	2	SW	0	8	2	2	0	0	
					3	2	SW	0	8	2	2	0	0	
13/07/2019	VP3	FMacF	13:45	16:45	1	4	SW	0	8	2	2	0	0	
					2	3	SW	0	8	2	2	0	0	
					3	3	SW	0	8	2	2	0	0	
25/07/2019	VP2	FMacF	10:55	13:55	1	3	NW	0	7	2	2	0	0	
					2	3	NW	0	6	2	2	0	0	
					3	3	NW	0	5	2	2	0	0	
25/07/2019	VP4	FMacF	07:25	10:25	1	3	NW	1	8	2	2	0	0	
					2	2	NW	0	7	2	2	0	0	
					3	2	NW	0	7	2	2	0	0	
26/07/2019	VP1	FMacF	10:50	13:50	1	2	SW	1	8	2	2	0	0	
					2	2	SW	0	8	2	2	0	0	

Date	VP	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
					3	2	SW	1	8	2	2	0	0	
26/07/2019	VP3	FMacF	07:20	10:20	1	3	SW	1	8	2	2	0	0	
					2	3	SW	1	8	2	2	0	0	
					3	3	SW	1	8	2	2	0	0	
28/07/2019	VP2	FMacF	09:15	12:15	1	3	SW	0	6	2	2	0	0	
					2	3	SW	0	5	2	2	0	0	
					3	3	SW	0	5	2	2	0	0	
28/07/2019	VP4	FMacF	12:45	15:45	1	2	SW	0	5	2	2	0	0	
					2	2	SW	0	4	2	2	0	0	
					3	3	SW	0	4	2	2	0	0	
20/08/2019	VP4	FMacF	08:45	11:45	1	3	SW	1	8	2	2	0	0	
					2	2	SW	0	8	2	2	0	0	
					3	2	SW	0	8	2	2	0	0	
20/08/2019	VP3	FMacF	12:15	15:15	1	3	SW	0	7	2	2	0	0	
					2	4	SW	1	8	2	2	0	0	
					3	3	SW	0	8	2	2	0	0	
21/08/2019	VP1	FMacF	10:55	13:55	1	2	S	0	5	2	2	0	0	
					2	2	S	0	4	2	2	0	0	
					3	2	S	0	4	2	2	0	0	
21/08/2019	VP2	FMacF	14:25	17:25	1	3	S	0	4	2	2	0	0	
					2	3	S	0	5	2	2	0	0	
					3	2	S	0	6	2	2	0	0	

Date	VP	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
22/08/2019	VP3	FMacF	09:45	12:45	1	3	SW	0	8	2	2	0	0	
					2	2	SW	1	8	2	2	0	0	
					3	2	SW	1	8	2	2	0	0	
22/08/2019	VP4	FMacF	13:15	16:15	1	2	SW	1	8	2	2	0	0	
					2	2	SW	1	8	2	2	0	0	
					3	3	SW	0	7	2	2	0	0	
23/08/2019	VP2	FMacF	10:30	13:30	1	2	W	1	8	2	2	0	0	
					2	3	W	0	8	2	2	0	0	
					3	2	W	1	8	2	2	0	0	
23/08/2019	VP1	FMacF	14:00	17:00	1	3	W	1	8	2	2	0	0	
					2	3	W	2	8	2	2	0	0	
					3	3	W	2	8	2	2	0	0	
27/09/2019	VP1	FMacF	13:30	16:30	1	3	SW	1	8	2	2	0	0	
					2	3	SW	1	8	2	2	0	0	
					3	2	SW	0	8	2	2	0	0	
27/09/2019	VP2	FMacF	17:00	20:00	1	2	SW	0	8	2	2	0	0	
					2	2	SW	0	8	2	2	0	0	
					3	3	SW	0	8	2	1	0	0	
28/09/2019	VP3	FMacF	06:10	09:10	1	4	SW	0	4	2	1	0	0	
					2	3	SW	0	2	2	2	0	0	
					3	3	SW	0	2	2	2	0	0	
28/09/2019	VP4	FMacF	16:55	19:55	1	2	SW	0	3	2	2	0	0	

Date	VP	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
					2	3	SW	0	2	2	2	0	0	
					3	3	SW	0	2	2	1	0	0	
29/09/2019	VP1	FMacF	16:55	19:55	1	2	S	0	6	2	2	0	0	
					2	2	S	0	5	2	2	0	0	
					3	2	S	0	4	2	1	0	0	
29/09/2019	VP2	FMacF	06:10	09:10	1	2	S	1	8	2	1	0	0	
					2	2	S	1	8	2	2	0	0	
					3	2	S	1	8	2	2	0	0	
30/09/2019	VP3	FMacF	16:50	19:50	1	4	SSW	1	8	2	2	0	0	
					2	4	SSW	0	8	2	2	0	0	
					3	4	SSW	1	8	2	1	0	0	
30/09/2019	VP4	FMacF	06:10	09:10	1	3	SSW	0	8	2	1	0	0	
					2	3	SSW	1	6	2	2	0	0	
					3	3	SSW	0	8	2	2	0	0	
30/09/2019	VP4	FMacF	09:40	12:40	1	2	SSW	1	8	2	2	0	0	
					2	2	SSW	1	8	2	2	0	0	
					3	3	SSW	0	8	2	2	0	0	
25/10/2019	VP3	FMacF	12:30	15:30	1	4	W	1	8	2	2	0	0	
					2	4	W	0	8	2	2	0	0	
					3	4	W	0	8	2	2	0	0	
26/10/2019	VP1	FMacF	07:05	10:05	1	4	W	1	8	2	1	0	0	
					2	3	W	1	8	2	2	0	0	

Date	VP	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
					3	3	W	0	7	2	2	0	0	
26/10/2019	VP4	FMacF	10:35	13:35	1	3	W	0	6	2	2	0	0	
					2	3	W	0	4	2	2	0	0	
					3	3	W	0	6	2	2	0	0	
26/10/2019	VP4	FMacF	15:50	18:50	1	2	W	0	4	2	2	0	0	
					2	3	W	0	3	2	2	0	0	
					3	2	W	0	3	2	1	0	0	
27/10/2019	VP3	FMacF	07:05	10:05	1	3	SW	0	2	0	1	0	0	
					2	3	SW	0	2	0	2	0	0	
					3	3	SW	0	4	0	2	0	0	
27/10/2019	VP1	FMacF	10:35	13:35	1	2	SW	1	8	2	2	0	0	
					2	2	SW	0	7	2	2	0	0	
					3	2	SW	1	8	2	2	0	0	
28/10/2019	VP2	FMacF	06:10	09:10	1	2	NW	0	8	2	1	0	0	
					2	2	NW	0	8	2	2	0	0	
					3	2	NW	0	8	2	2	0	0	
28/10/2019	VP2	FMacF	09:40	12:40	1	3	NW	0	8	2	2	0	0	
					2	3	NW	0	7	2	2	0	0	
					3	2	NW	0	6	2	2	0	0	
28/10/2019	VP3	FMacF	14:40	17:40	1	3	NW	0	8	2	2	0	0	
					2	2	NW	0	7	2	2	0	0	
					3	2	NW	0	6	2	1	0	0	

Date	VP	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
30/10/2019	VP1	FMacF	06:10	09:10	1	5	W	0	2	2	1	0	0	
					2	4	W	0	1	2	2	0	0	
					3	3	W	0	1	2	2	0	0	
30/10/2019	VP3	FMacF	09:40	12:40	1	4	W	0	1	2	2	0	0	
					2	3	W	0	2	2	2	0	0	
					3	3	W	0	2	2	2	0	0	
30/10/2019	VP2	FMacF	14:40	17:40	1	2	W	0	3	2	2	0	0	
					2	3	W	0	4	2	2	0	0	
					3	3	W	0	4	2	1	0	0	
31/10/2019	VP4	FMacF	06:15	09:15	1	1	SW	0	8	2	1	0	0	
					2	2	SW	0	6	2	2	0	0	
					3	2	SW	0	6	2	2	0	0	
31/10/2019	VP2	FMacF	09:45	12:45	1	2	SW	0	5	2	2	0	0	
					2	2	SW	0	4	2	2	0	0	
					3	2	SW	0	3	2	2	0	0	
31/10/2019	VP1	FMacF	14:45	17:45	1	3	SW	0	4	2	2	0	0	
					2	3	SW	0	5	2	2	0	0	
					3	3	SW	0	4	2	1	0	0	
25/11/2019	VP3	FMacF	07:05	10:05	1	2	SW	1	8	2	1	0	0	
					2	3	SW	0	8	2	2	0	0	
					3	2	SW	1	8	2	2	0	0	
25/11/2019	VP4	FMacF	10:35	13:35	1	2	SW	1	8	2	2	0	0	

Date	VP	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
					2	2	SW	0	8	2	2	0	0	
					3	2	SW	0	8	2	2	0	0	
25/11/2019	VP4	FMacF	14:50	17:50	1	3	SW	0	7	2	2	0	0	
					2	2	SW	0	7	2	2	0	0	
					3	3	SW	0	7	2	1	0	0	
27/11/2019	VP2	FMacF	07:10	10:10	1	2	W	0	4	2	1	0	0	
					2	3	W	0	3	2	2	0	0	
					3	2	W	0	3	2	2	0	0	
27/11/2019	VP1	FMacF	10:40	13:40	1	3	W	0	2	2	2	0	0	
					2	3	W	0	2	2	2	0	0	
					3	3	W	0	2	2	2	0	0	
27/11/2019	VP3	FMacF	14:50	17:50	1	4	W	0	3	2	2	0	0	
					2	4	W	0	4	2	2	0	0	
					3	4	W	0	5	2	1	0	0	
29/11/2019	VP1	FMacF	07:15	10:15	1	3	NW	0	4	2	1	0	0	
					2	4	NW	0	2	2	2	0	0	
					3	3	NW	0	2	2	2	0	0	
29/11/2019	VP3	FMacF	10:45	13:45	1	4	NW	0	4	2	2	0	0	
					2	4	NW	0	3	2	2	0	0	
					3	4	NW	0	4	2	2	0	0	
29/11/2019	VP2	FMacF	14:15	17:15	1	3	NW	0	5	2	2	0	0	
					2	3	NW	0	6	2	2	0	0	

Date	VP	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
					3	3	NW	0	8	2	1	0	0	
30/11/2019	VP4	FMacF	07:15	10:15	1	3	NW	0	7	2	1	0	0	
					2	2	NW	0	6	2	2	0	0	
					3	3	NW	0	6	2	2	0	0	
30/11/2019	VP2	FMacF	10:45	13:45	1	2	NW	0	6	2	2	0	0	
					2	3	NW	0	5	2	2	0	0	
					3	2	NW	0	4	2	2	0	0	
30/11/2019	VP1	FMacF	14:15	17:15	1	2	NW	0	6	2	2	0	0	
					2	3	NW	0	7	2	2	0	0	
					3	3	NW	0	6	2	1	0	0	
16/12/2019	VP3	FMacF	07:35	10:35	1	4	NW	1	8	2	1	0	0	
					2	4	NW	1	8	2	2	0	0	
					3	4	NW	1	8	2	2	0	0	
16/12/2019	VP4	FMacF	13:40	16:40	1	3	NW	1	8	2	2	0	0	
					2	2	NW	0	6	2	2	0	0	
					3	3	NW	0	4	2	1	0	0	
18/12/2019	VP1	FMacF	10:10	13:10	1	2	W	0	2	2	2	0	0	
					2	2	W	0	2	2	2	0	0	
					3	3	W	0	3	2	2	0	0	
18/12/2019	VP3	FMacF	13:40	16:40	1	3	W	0	4	2	2	0	0	
					2	3	W	0	5	2	2	0	0	
					3	3	W	0	6	2	1	0	0	

Date	VP	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
20/12/2019	VP3	FMacF	10:10	13:10	1	4	SW	1	8	2	2	0	0	
					2	3	SW	1	8	2	2	0	0	
					3	4	SW	1	8	2	2	0	0	
20/12/2019	VP2	FMacF	13:40	16:40	1	3	SW	1	8	2	2	0	0	
					2	3	SW	1	8	2	2	0	0	
					3	3	SW	1	8	2	1	0	0	
23/12/2019	VP4	FMacF	07:40	10:40	1	1	SW	0	8	2	2	0	0	
					2	1	SW	0	8	2	2	0	0	
					3	2	SW	0	8	2	2	0	0	
23/12/2019	VP2	FMacF	11:10	14:10	1	2	SW	0	8	2	2	0	0	
					2	2	SW	0	8	2	2	0	0	
					3	3	SW	0	8	2	2	0	0	
23/12/2019	VP1	FMacF	14:50	17:50	1	2	SW	0	8	2	2	0	0	
					2	3	SW	0	8	2	2	0	0	
					3	3	SW	0	8	2	1	0	0	
30/01/2019	VP2	FMacF	07:10	10:10	1	3	W	2	8	2	1	0	0	
					2	4	W	1	8	2	2	0	0	
					3	3	W	2	8	2	2	0	0	
30/01/2019	VP3	FMacF	10:40	13:40	1	4	W	2	8	2	2	0	0	
					2	4	W	2	8	2	2	0	0	
					3	4	W	1	8	2	2	0	0	
31/01/2020	VP3	FMacF	11:15	14:15	1	3	W	1	8	2	2	0	0	

Date	VP	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
					2	2	W	2	8	2	2	0	0	
					3	3	W	1	8	2	2	0	0	
31/01/2020	VP2	FMacF	14:45	17:45	1	2	W	1	8	2	2	0	0	
					2	2	W	1	8	2	2	0	0	
					3	3	W	1	8	2	1	0	0	
28/01/2020	VP4	AM	11:10	14:10	1	3	WSW	2	7	2	2	0	1	3 degrees; fresh snow on Site
					2	3	WSW	0	7	1	2	0	1	2 degrees
					3	3	WSW	3	7	1	2	0	1	Heavy sleet/snow showers
28/01/2020	VP4	AM	14:40	17:40	1	2	WSW	0	7	2	2	0	1	2 degrees
					2	3	WSW	3	7	1	1	0	1	2 degrees
					3	3	WSW	0	7	2	2	0	1	2 degrees
29/01/2020	VP1	AM	10:45	13:45	1	4	WSW	0	7	2	2	0	1	2 degrees
					2	4	WSW	0	7	2	2	0	1	3 degrees
					3	4	WSW	2	8	2	2	0	1	3 degrees
29/01/2020	VP1	AM	07:15	10:15	1	3	WSW	0	5	2	2	1	1	1 degree
					2	4	WSW	0	5	2	2	1	1	1 degree
					3	4	WSW	0	7	2	2	0	1	2 degrees
06/02/2020	VP3	AM	11:30	14:30	1	3	SW	0	4	2	2	0	0	5 degrees
					2	2	SW	0	3	2	2	0	0	6 degrees
					3	2	SW	0	3	2	2	0	0	6 degrees
06/02/2020	VP3	AM	15:00	18:00	1	2	SW	0	3	2	2	0	0	6 degrees
					2	2	SW	0	3	2	2	0	0	3 degrees

Date	VP	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
					3	2	SSW	0	3	2	2	0	0	2 degrees
27/02/2020	VP4	AM	06:50	09:50	1	2	W	0	6	1	2	1	1	-2 degrees; fresh snow
					2	3	WNW	0	5	2	2	1	1	-1 degree
					3	3	WNW	0	5	2	2	1	1	1 degree
27/02/2020	VP4	AM	10:20	13:20	1	3	WNW	0	5	2	2	1	1	1 degree
					2	3	WNW	0	5	2	2	1	1	2 degrees
					3	3	WNW	0	5	2	2	1	1	3 degrees
07/02/2020	VP2	AM	07:00	10:00	1	1	SSW	0	2	2	2	1	2	-2 degrees; remnant patches of snow
					2	1	S	0	2	2	2	1	2	-1 degree
					3	3	SE	0	2	2	2	1	2	2 degrees
07/02/2020	VP2	AM	10:30	13:30	1	3	SSE	0	3	2	2	1	2	3 degrees
					2	3	SSE	0	4	2	2	1	2	4 degrees
					3	4	SSE	0	4	2	2	1	2	
26/02/2020	VP1	AM	11:50	14:50	1	4	W	0	5	2	2	0	1	3 degrees; remnant snow
					2	4	W	0	5	2	2	0	1	3 degrees; remnant snow
					3	4	WNW	0	4	2	2	0	1	3 degrees; remnant snow
26/02/2020	VP1	AM	15:20	18:20	1	4	WNW	0	4	2	2	0	1	3 degrees
					2	3	WSW	0	4	2	2	0	1	1 degree
					3	3	WSW	2	6	2	2	0	1	1 degree

Key:

- Observer: AM =Angus Murray; FMacF = Frazer MacFarlane; TD = Tim Drew
- Wind speed: according to Beaufort Scale
- Wind direction: according to 16-point compass

Date	VP	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes

- Rain: 0 = None; 1 = Drizzle/Mist; 2 = Light showers; 3 = Heavy showers; 4 = Light rain; 5 = Heavy rain
- Cloud cover: in eighths of sky (oktas)
- Cloud height: 0 = <150 m; 1 = 150-500 m; 2 = >500 m
- Visibility: 0 = Poor (<1 km); 1 = Moderate (1-2 km); 2 = Good (>2 km)
- Frost: 0 = None; 1 = Ground frost; 2 = All day frost
- Snow: 0 = None; 1 = On site; 2 = On high ground

Table A3.2: Survey times and hourly weather conditions during the 2019-20 Foraging Goose Surveys

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
28/09/2019	FMacF	09:40	12:40	1	3	SW	0	2	2	2	0	0
				2	2	SW	0	3	2	2	0	0
				3	2	SW	0	3	2	2	0	0
29/09/2019	FMacF	09:40	12:40	1	2	S	1	8	2	2	0	0
				2	2	S	0	6	2	2	0	0
				3	1	S	0	5	2	2	0	0
25/10/2019	FMacF	16:00	19:00	1	2	W	0	8	2	2	0	0
				2	3	W	0	8	2	2	0	0
				3	2	W	0	8	2	1	0	0
27/10/2019	FMacF	15:50	18:50	1	2	SW	1	8	2	2	0	0
				2	2	SW	1	8	2	2	0	0
				3	2	SW	1	8	2	1	0	0
25/11/2019	FMacF	13:40	14:40	1	3	SW	0	7	2	2	0	0
				2	3	SW	0	6	2	2	0	0

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
16/12/2019	FMacF	11:00	13:30	1	3	NW	1	8	2	2	0	0
				2	3	NW	1	8	2	2	0	0
				3	3	NW	1	8	2	2	0	0
18/12/2019	FMacF	08:50	09:50	1	2	W	0	1	2	2	0	0
				2	2	W	0	2	2	2	0	0
20/12/2019	FMacF	08:00	09:50	1	3	SW	1	8	2	2	0	0
				2	3	SW	1	8	2	2	0	0
30/01/2019	FMacF	14:10	17:10	1	3	W	1	8	2	2	0	0
				2	3	W	2	8	2	2	0	0
				3	4	W	1	8	2	1	0	0
06/02/2020	AM	08:15	10:45	1	2	SSW	0	6	2	2	0	0
				2	3	SSW	0	4	2	2	0	0
				3	3	SSW	0	4	2	2	0	0
27/02/2020	AM	13:45	16:15	1	3	WNW	0	5	2	2	1	1
				2	3	WNW	0	4	2	2	1	1
				3	3	WNW	0	5	2	2	1	1

Key:

- Observer: AM = Angus Murray; FMacF = Frazer MacFarlane
- Wind speed: according to Beaufort Scale
- Wind direction: according to 16-point compass
- Rain: 0 = None; 1 = Drizzle/Mist; 2 = Light showers; 3 = Heavy showers; 4 = Light rain; 5 = Heavy rain
- Cloud cover: in eighths of sky (oktas)
- Cloud height: 0 = <150 m; 1 = 150-500 m; 2 = >500 m
- Visibility: 0 = Poor (<1 km); 1 = Moderate (1-2 km); 2 = Good (>2 km)
- Frost: 0 = None; 1 = Ground frost; 2 = All day frost

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
• Snow: 0 = None; 1 = On site; 2 = On high ground												

Table A3.3: Survey times and hourly weather conditions during the 2019 Black Grouse Survey

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
11/04/2019	FMacF	18:00	21:00	1	2	NE	0	8	2	2	0	0	
				2	2	NE	1	8	2	2	0	0	
				3	2	NE	0	8	2	1	0	0	
15/04/2019	FMacF	05:00	08:00	1	2	NW	0	8	2	1	0	0	
				2	2	NW	0	8	2	2	0	0	
				3	1	NW	0	8	2	2	0	0	
16/04/2019	TD	18:20	21:20	1		E	1	8	2	2	0	0	Drizzle
				2		E	1	8	2	1	0	0	Drizzle
				3		E	1	8	2	0	0	0	Drizzle
17/04/2019	TD	05:00	08:00	1	2	SSE	0	8	2	0	0	0	
				2	2	SSE	0	8	2	1	0	0	
				3	2	SSE	0	8	2	2	0	0	
10/05/2019	FMacF	18:10	21:10	1	2	NE	1	8	2	2	0	0	
				2	1	NE	0	7	2	2	0	0	
				3	1	NE	0	6	2	2	0	0	
11/05/2019	FMacF	04:10	07:10	1	2	NE	0	4	2	2	0	0	
				2	1	NE	0	4	2	2	0	0	
				3	1	NE	0	3	2	2	0	0	

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
13/05/2019	FMacF	04:05	07:05	1	3	SW	1	8	2	2	0	0	
				2	2	SW	0	7	2	2	0	0	
				3	2	SW	0	6	2	2	0	0	
17/05/2019	FMacF	04:00	07:00	1	3	W	0	6	2	2	0	0	
				2	3	W	0	5	2	2	0	0	
				3	2	W	0	4	2	2	0	0	

Key:

- Observer: FMacF = Frazer MacFarlane; TD = Tim Drew
- Wind speed: according to Beaufort Scale
- Wind direction: according to 16-point compass
- Rain: 0 = None; 1 = Drizzle/Mist; 2 = Light showers; 3 = Heavy showers; 4 = Light rain; 5 = Heavy rain
- Cloud cover: in eighths of sky (oktas)
- Cloud height: 0 = <150 m; 1 = 150-500 m; 2 = >500 m
- Visibility: 0 = Poor (<1 km); 1 = Moderate (1-2 km); 2 = Good (>2 km)
- Frost: 0 = None; 1 = Ground frost; 2 = All day frost
- Snow: 0 = None; 1 = On site; 2 = On high ground

Table A3.4: Survey times and hourly weather conditions during the 2019 Breeding Raptor Survey

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
24/03/2019	FMacF	11:30	17:00	1	4	W	3	8	2	2	0	0	
				2	4	W	3	8	2	2	0	0	
				3	4	W	3	7	2	2	0	0	
				4	4	W	0	6	2	2	0	0	
				5	4	W	0	4	2	2	0	0	

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
				6	4	W	0	4	2	2	0	0	
24/03/2019	TD	12:00	17:00	1	4	W	3	8	2	2	0	0	
				2	4	W	3	8	2	2	0	0	
				3	4	W	4	7	2	2	0	0	
				4	4	W	0	3	2	2	0	0	
				5	4	W	0	4	2	2	0	0	
				6	4	W	0	4	2	2	0	0	
25/03/2019	FMacF	10:30	17:00	1	2	NW	0	3	2	2	0	0	
				2	2	NW	0	3	2	2	0	0	
				3	2	NW	0	3	2	2	0	0	
				4	1	NW	0	2	2	2	0	0	
				5	2	NW	0	3	2	2	0	0	
				6	2	NW	0	3	2	2	0	0	
26/03/2019	TD	07:00	12:55	1	4	SW	0	6	2	2	0	0	
				2	4	SW	0	7	2	2	0	0	
				3	4	SW	0	8	2	2	0	0	
				4	4	SW	0	5	2	2	0	0	
				5	4	SW	0	5	2	2	0	0	
				6	4	SW	0	5	2	2	0	0	
11/04/2019	FMacF	14:30	17:30	1	3	NE	0	6	2	2	0	0	
				2	4	NE	0	5	2	2	0	0	
				3	3	NE	0	6	2	2	0	0	
14/04/2019	FMacF	09:15	16:45	1	2	NW	1	8	2	2	0	0	
				2	3	NW	0	8	2	2	0	0	

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
				3	3	NW	1	8	2	2	0	0	
				4	3	NW	0	8	2	2	0	0	
				5	4	NW	0	8	2	2	0	0	
				6	4	NW	1	8	2	2	0	0	
				7	4	NW	1	8	2	2	0	0	
15/04/2019	FMacF	08:30	12:30	1	1	NW	0	8	2	2	0	0	
				2	2	NW	0	7	2	2	0	0	
				3	1	NW	0	6	2	2	0	0	
16/04/2019	TD	13:00	17:00	1	2	E	0	8	2	2	0	0	
				2	2	E	1	8	1	1	0	0	Light shower
				3	2	E	0	8	2	2	0	0	
				4	2	E	1	8	1	1	0	0	Light shower
17/04/2019	TD	09:30	13:30	1	2	E	0	2	2	2	0	0	
				2	2	E	0	3	2	2	0	0	
				3	2	E	0	3	2	2	0	0	
18/04/2019	TD	10:00	16:00	1	1	SE	1	8	0	0	0	0	Fog/mist; 6 degrees
				2	1	SE	1	6	0	0	0	0	Fog clearing
				3	1	SE	0	1	2	2	0	0	
				4	1	SE	0	1	2	2	0	0	15 degrees
				5	1	SE	0	1	2	2	0	0	17 degrees
				6	1	SE	0	1	2	2	0	0	17 degrees
10/05/2019	FMacF	14:15	17:15	1	2	NE	0	8	2	2	0	0	
				2	3	NE	0	8	2	2	0	0	
				3	2	NE	0	8	2	2	0	0	

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
11/05/2019	FMacF	08:05	11:05	1	2	NE	0	3	2	2	0	0	
				2	2	NE	0	4	2	2	0	0	
				3	2	NE	0	5	2	2	0	0	
13/05/2019	FMacF	07:30	10:30	1	2	SW	0	5	2	2	0	0	
				2	2	SW	0	4	2	2	0	0	
				3	2	SW	0	3	2	2	0	0	
17/05/2019	FMacF	07:30	10:30	1	2	W	0	4	2	2	0	0	
				2	2	W	0	3	2	2	0	0	
				3	2	W	0	3	2	2	0	0	
25/05/2019	FMacF	12:30	15:30	1	3	W	0	7	2	2	0	0	
				2	2	W	0	7	2	2	0	0	
				3	2	W	0	7	2	2	0	0	
29/05/2019	FMacF	07:45	10:45	1	2	SW	0	6	2	2	0	0	
				2	2	SW	0	7	2	2	0	0	
				3	3	SW	0	8	2	2	0	0	
30/05/2019	FMacF	11:05	17:40	1	2	SW	0	4	2	2	0	0	
				2	3	SW	0	4	2	2	0	0	
				3	4	SW	0	4	2	2	0	0	
				4	3	SW	0	3	2	2	0	0	
				5	3	SW	0	2	2	2	0	0	
				6	3	SW	0	3	2	2	0	0	
25/06/2019	FMacF	12:55	18:15	1	3	W	0	3	2	2	0	0	
				2	2	W	0	4	2	2	0	0	
				3	3	W	0	4	2	2	0	0	

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
				4	2	W	0	5	2	2	0	0	
				5	2	W	0	4	2	2	0	0	
				6	2	W	0	3	2	2	0	0	
26/06/2019	FMacF	09:55	18:00	1	3	SW	1	8	2	2	0	0	
				2	3	SW	1	8	2	2	0	0	
				3	3	SW	1	8	2	2	0	0	
				4	2	SW	0	6	2	2	0	0	
				5	2	SW	0	6	2	2	0	0	
				6	2	SW	0	6	2	2	0	0	
				7	2	SW	0	6	2	2	0	0	
				8	2	SW	0	6	2	2	0	0	
				9	3	SW	1	6	2	2	0	0	
28/06/2019	FMacF	14:45	17:45	1	3	SW	1	8	2	2	0	0	
				2	3	SW	0	7	2	2	0	0	
				3	2	SW	0	4	2	2	0	0	
25/07/2019	FMacF	14:25	17:25	1	3	NW	0	6	2	2	0	0	
				2	2	NW	0	6	2	2	0	0	
				3	2	NW	0	5	2	2	0	0	
26/07/2019	FMacF	14:20	17:20	1	2	SW	1	8	2	2	0	0	
				2	2	SW	1	8	2	2	0	0	
				3	2	SW	1	8	2	2	0	0	
29/07/2019	FMacF	09:20	16:20	1	2	SW	0	8	2	2	0	0	
				2	3	SW	1	8	2	2	0	0	
				3	3	SW	0	8	2	2	0	0	

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow	Notes
				4	2	SW	1	8	2	2	0	0	
				5	2	SW	0	8	2	2	0	0	
				6	3	SW	0	8	2	2	0	0	
30/07/2019	FMacF	09:10	16:00	1	2	SE	0	2	2	2	0	0	
				2	3	SE	0	3	2	2	0	0	
				3	2	SE	0	3	2	2	0	0	
				4	2	SE	0	4	2	2	0	0	
				5	2	SE	0	5	2	2	0	0	
				6	2	SE	0	6	2	2	0	0	

Key:

- Observer: FMacF = Frazer MacFarlane; TD = Tim Drew
- Wind speed: according to Beaufort Scale
- Wind direction: according to 16-point compass
- Rain: 0 = None; 1 = Drizzle/Mist; 2 = Light showers; 3 = Heavy showers; 4 = Light rain; 5 = Heavy rain
- Cloud cover: in eighths of sky (oktas)
- Cloud height: 0 = <150 m; 1 = 150-500 m; 2 = >500 m
- Visibility: 0 = Poor (<1 km); 1 = Moderate (1-2 km); 2 = Good (>2 km)
- Frost: 0 = None; 1 = Ground frost; 2 = All day frost
- Snow: 0 = None; 1 = On site; 2 = On high ground

Table A3.5: Survey times and hourly weather conditions during the 2019 MBBS

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
12/04/2019	FMacF	06:30	15:00	1	2	NW	1	8	2	2	0	0
				2	2	NW	0	7	2	2	0	0
				3	3	NW	0	6	2	2	0	0
				4	3	NW	0	6	2	2	0	0
				5	3	NW	0	6	2	2	0	0
				6	3	NW	0	6	2	2	0	0
				7	3	NW	0	8	2	2	0	0
				8	2	NW	0	5	2	2	0	0
21/05/2019	FMacF	11:05	17:25	1	2	W	0	6	2	2	0	0
				2	3	W	0	5	2	2	0	0
				3	2	W	0	5	2	2	0	0
				4	5	W	0	5	2	2	0	0
				5	2	W	0	5	2	2	0	0
				6	2	W	0	5	2	2	0	0
23/06/2019	FMacF	08:05	15:50	1	2	SW	0	7	2	2	0	0
				2	3	SW	0	6	2	2	0	0
				3	3	SW	0	4	2	2	0	0
				4	3	SW	0	3	2	2	0	0
				5	3	SW	0	4	2	2	0	0
				6	2	SW	0	4	2	2	0	0
				7	2	SW	0	4	2	2	0	0
12/07/2019	FMacF	09:10	16:10	1	2	W	0	4	2	2	0	0
				2	2	W	0	5	2	2	0	0

Date	Observer	Survey start time	Survey end time	Hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
				3	2	W	0	4	2	2	0	0
				4	1	W	0	3	2	2	0	0
				5	1	W	0	3	2	2	0	0
				6	2	W	0	4	2	2	0	0
				7	2	W	0	4	2	2	0	0

Key:

- Observer: FMacF = Frazer MacFarlane
- Wind speed: according to Beaufort Scale
- Wind direction: according to 16-point compass
- Rain: 0 = None; 1 = Drizzle/Mist; 2 = Light showers; 3 = Heavy showers; 4 = Light rain; 5 = Heavy rain
- Cloud cover: in eighths of sky (oktas)
- Cloud height: 0 = <150 m; 1 = 150-500 m; 2 = >500 m
- Visibility: 0 = Poor (<1 km); 1 = Moderate (1-2 km); 2 = Good (>2 km)
- Frost: 0 = None; 1 = Ground frost; 2 = All day frost
- Snow: 0 = None; 1 = On site; 2 = On high ground

APPENDIX 4 - DETAILS OF TARGET SPECIES FLIGHTS

Details of each target species flight recorded during the 2019-20 FAS and Raptor Surveys are presented below in Table A4.1.

Table A4.1: Details of each target species flight recorded during the 2019-20 Flight Activity Surveys and Raptor Surveys, listed by species

Species*	VP	Observer**	Date	Flight start time	Flight duration (s)	Minimum no. of birds	Key no.***	Notes
Greylag Goose	VP 2	AM	07/02/20	08:28	16	1	106	
Pink-footed Goose	VP 2	AM	07/02/20	09:16	70	30	107	
Mallard	VP 2	TD	25/03/19	11:17	77	2	2	Appeared inland
	VP 1	FMacF	24/05/19	10:47	31	2	21	Pair of birds
	VP 1	FMacF	13/07/19	10:28	14	1	41	Rose from Courhope Burn
	VP 3	FMacF	30/09/19	17:45	49	2	71	Pair passing Peat Hill
	VP 2	FMacF	28/10/19	12:25	14	2	85	From Millhope Burn
	VP 1	FMacF	27/11/19	12:11	18	2	95	
	VP 2	FMacF	30/11/19	10:43	19	2	97	From Millhope Burn
Grey Heron	VP 2	FMacF	29/05/2019	11:51	21	1	22	Flying towards Harehope
	VP 2	FMacF	25/05/2019	09:58	39	1	25	Brief call
	VP 2	FMacF	28/06/2019	11:47	47	1	38	Towards Millhope
	VP 3	FMacF	13/07/2019	14:37	12	1	44	Landed in burn
	VP 2	FMacF	25/07/2019	11:17	33	1	47	To Mill Hope
	VP 1	FMacF	26/07/2019	12:43	46	1	49	Along Courhope Burn
	VP 2	FMacF	28/07/2019	10:46	28	1	51	Flying south
	VP 1	FMacF	21/08/2019	11:15	23	1	57	Along Courhope Burn

Species*	VP	Observer**	Date	Flight start time	Flight duration (s)	Minimum no. of birds	Key no.***	Notes
	VP 2	FMacF	21/08/2019	14:41	19	1	59	Flight to Millhope Burn
	VP 3	FMacF	22/08/2019	N/A	29	1	60	Along Flemington Burn
	VP 1	FMacF	27/09/2019	14:12	14	1	64	Along Courhope Burn
	VP 3	FMacF	28/09/2019	08:09	63	1	68	Along Flemington Burn
	VP 3	FMacF	25/10/2019	13:49	33	1	77	Landed at Flemington Burn
	VP 4	FMacF	26/10/2019	12:16	48	2	78	Towards Peat Hill
	VP 3	FMacF	27/10/2019	09:27	18	1	80	Along Flemington Burn
	VP 1	FMacF	27/10/2019	11:12	14	1	81	Along Courhope Burn
	VP 2	FMacF	28/10/2019	09:57	16	1	84	Over Harehope Forest
	VP 3	FMacF	30/10/2019	10:53	41	2	86	Along Courhope Burn
	VP 4	FMacF	25/11/2019	15:17	16	2	92	Past Cloich Farm
	VP 2	FMacF	27/11/2019	09:21	17	1	94	Towards Millhope Burn
	VP 3	FMacF	29/11/2019	11:13	18	1	96	To Flemington Burn
	VP 1	FMacF	18/12/2019	10:27	13	1	101	Along Courhope Burn
	VP 2	FMacF	23/12/2019	11:27	32	1	103	Over Harehope Burn
	VP 3	FMacF	31/01/2019	13:39	28	1	105	To Flemington burn from Courhope Burn
Osprey	VP 4	FMacF	28/07/2019	14:28	77	1	52	Flew towards Grassfield
Curlew	VP 1	FMacF	28/03/2019	09:58	77	1	4	Over Peat Hill
	VP 4	FMacF	28/03/2019	13:21	43	1	5	
	VP 4	FMacF	28/03/2019	13:44	34	1	6	
	VP 4	FMacF	29/03/2019	09:26	31	1	7	
	VP 4	FMacF	29/03/2019	09:33	29	1	8	

Species*	VP	Observer**	Date	Flight start time	Flight duration (s)	Minimum no. of birds	Key no.***	Notes
	VP 4	TD	04/04/2019	09:59	47	1	9	
	VP 4	TD	04/04/2019	10:48	71	2	10	Pair
	VP 4	TD	05/04/2019	15:08	79	1	15	Lost to view, possibly landed
	VP 4	FMacF	24/05/2019	13:07	33	1	23	
	VP 4	FMacF	24/05/2019	13:43	13	1	24	
	VP 4	FMacF	28/05/2019	11:37	31	1	26	
	VP 1	FMacF	28/05/2019	15:17	26	2	27	On Wether Law
	VP 3	FMacF	31/05/2019	09:29	28	2	28	Over Peat Hill
	VP 4	FMacF	23/06/2019	16:34	28	1	30	
	VP 3	FMacF	24/06/2019	15:28	14	1	31	
	VP 3	FMacF	24/06/2019	15:43	27	1	32	Towards Peat Hill
	VP 1	FMacF	25/06/2019	09:57	24	1	33	Towards Wether Law
	VP 4	FMacF	27/06/2019	08:22	30	1	35	Likely nest at Early Burn
	VP 1	FMacF	27/06/2019	12:02	31	1	36	
	VP 3	FMacF	13/07/2019	13:58	39	2	42	Calling
	VP 4	FMacF	25/07/2019	07:58	43	2	45	Calling
	VP 1	FMacF	26/07/2019	12:05	78	1	48	Calling
Woodcock	VP 2	FMacF	28/06/2019	12:18	10	1	39	Flushed from ground
	VP 1	FMacF	13/07/2019	10:28	14	1	40	Flushed by walkers
	VP 4	FMacF	25/07/2019	08:25	14	1	46	Along Middle Burn
	VP 4	FMacF	28/07/2019	13:43	10	1	54	Along Middle Burn
	VP 3	FMacF	20/08/2019	14:12	10	1	56	Over Courhope Burn

Species*	VP	Observer**	Date	Flight start time	Flight duration (s)	Minimum no. of birds	Key no.***	Notes
	VP 4	FMacF	22/08/2019	14:21	17	1	61	Along Middle Burn
	VP 1	FMacF	23/08/2019	14:29	19	1	62	Along Courhope Burn
	VP 2	FMacF	27/09/2019	18:48	13	2	65	Over Harehope Forest
	VP 1	FMacF	29/09/2019	17:18	16	1	70	Along Courhope Burn
	VP 4	FMacF	30/09/2019	07:21	14	1	72	Along Middle Burn
	VP 4	FMacF	26/10/2019	18:03	15	1	79	Along Middle Burn
	VP 4	FMacF	31/10/2019	08:48	14	2	87	Along Middle Burn
	VP 4	FMacF	25/11/2019	17:11	14	1	93	Along Middle Burn
	VP 4	FMacF	16/12/2019	16:03	9	2	100	To Middle Burn
Snipe	VP 3	FMacF	23/03/2019	10:09	17	1	1	By stream
	VP 3	FMacF	31/05/2019	12:58	23	1	29	
	VP 1	FMacF	13/07/2019	14:25	14	1	43	Flushed
	VP 1	FMacF	28/07/2019	09:27	14	1	50	Flushed from Harehope Burn
	VP 3	FMacF	20/08/2019	12:27	14	2	55	Flew from Flemington Burn
	VP 2	FMacF	21/08/2019	11:59	14	1	58	Flushed
	VP 3	FMacF	30/09/2019	11:17	13	1	73	Flushed from Middle Burn
	VP 1	FMacF	25/11/2019	08:58	10	1	88	Flushed

*Species names and order follow the British List maintained by the BOU[2]

**Observer: TD =Tim Drew; AM = Angus Murray, FMacF = Fraser MacFarlane

***Key numbers allow identification of individual flights, and correspond with the numbers shown on Figures 8.1.3-6, Appendix 1

CLOICH FOREST WIND FARM

VOLUME 3: TECHNICAL APPENDICES

TECHNICAL APPENDIX A8.3: COLLISION RISK MODELLING

JUNE 2021

Prepared By:

Arcus Consultancy Services

7th Floor
144 West George Street
Glasgow
G2 2HG

T +44 (0)141 221 9997 l **E** info@arcusconsulting.co.uk
w www.arcusconsulting.co.uk

Registered in England & Wales No. 5644976

TABLE OF CONTENTS

1 INTRODUCTION

This Technical Appendix has been produced as a supporting document to the Ornithology Chapter of the Environmental Impact Assessment (EIA) Report. It includes details of the avian Collision Risk Modelling (CRM) calculations used to predict annual number of collisions that may be caused by the proposed Cloich Forest Wind Farm (the Development) for two species, based on data recorded during the 2019/20 Flight Activity Surveys (FAS).

As recommended in NatureScot (NS) guidance[1], the CRM methods were based on Band *et al*. (2007)[2].

2 COLLISION RISK CALCULATIONS

CRM was completed separately for particular seasons (breeding and non-breeding), with the estimate based on the observed occupancy rate (i.e., the proportion of total survey time that flights of a given target species was observed) and the number of potentially active minutes during that period (i.e., the total number of minutes during the relevant season that the bird could be active). Breeding seasons were defined in accordance with NS guidance on species-specific breeding seasons[1,3].

Height bands 1 and 2 (<20 m and 20-150 m), as recorded during the FAS, fall within the Rotor Swept Height (RSH) of the candidate turbine model (approximately 14–150 m). Therefore, a 'worst-case scenario' approach was adopted and all target species flights within these height bands were considered to be at Potential Collision Height (PCH). Flights that passed within the Collision Risk Zone (CRZ) at PCH were included in the CRM (where sufficient flight activity was recorded, defined as ≥ 3 flights or ≥ 10 individuals within the CRZ at PCH).

The CRZ was defined as the visible area within the Vantage Point (VP) viewsheds during FAS which are shown on Figure 8.1.2, Appendix A8.1.

Species that met these criteria were: goshawk (breeding and non-breeding seasons) and curlew (breeding season[4]). Details of target species flights included in the CRM are presented in Table A4.1 in Appendix A8.1, and Table A2.1 in Appendix A8.2.

For each species, the risk of collision for an individual was calculated by estimating the likelihood of collision based on the characteristics of the birds and of the turbines, using the Band *et al*. (2007) model[2]. The model runs as a two-stage process:

- **Stage 1**: calculate the number of birds flying through the rotors; and
- **Stage 2**: estimate the probability of a bird flying through the rotors being hit.

The estimated numbers of bird movements through the CRZ at PCH (stage 1) is then multiplied by the probability of collision (stage 2) to estimate the theoretical number of birds at risk of collision.

This produces a theoretical collision mortality rate that assumes birds take no action to avoid collision when, in practice, most birds do take avoiding action, which dramatically lowers predicted mortality. Therefore, the predicted collision mortality is combined with a parameter representing avoidance behaviour likely to be displayed by birds flying towards

[1] NS (2017). *Recommended bird survey methods to inform impact assessment of onshore wind farms*, Version 2.

[2] Band, W., Madders, M. & Whitfield, D.P. (2007) Develo*ping field and analytical methods to assess avian collision risk at wind farms*. In de Lucas, M., Janss, G. & Ferrer, M. (eds.) *Birds and Wind Power*. Quercus, Madrid.

[3] NS (2009) Breeding season dates for key breeding species in Scotland [Online] Available at: https://www.nature.scot/bird-breeding-season-dates-scotland (Accessed 08/03/21)

[4]Curlew flights recorded on 28th and 29th March 2019 have been included within the breeding season for the purposes of CRM, despite falling outwith the specified April to July breeding season[3]. There were no other flights recorded within the non-breeding season, and all flights were or one or two individuals. Therefore, it is considered these flights are representative of breeding season behaviour.

turbine blades. This involves the use of species-specific avoidance rates recommended by NS[5].

2.1 Stage 1: Calculating Numbers of Birds Flying Through the Rotors

2.1.1 Available Hours for Flight Activity

The total amount of time that a species was potentially active was determined by calculating the minutes of available daylight for each species during the months of interest. For curlew, which could be active nocturnally, an additional 25% of nocturnal hours were added to the daylight hours to give a more accurate representation of the available hours for these species. The total available hours for flight activity for each species modelled are included in Table 1 below.

2.1.2 Input Variables for the CRM

Based on the flight behaviour of goshawk and curlew, and the unpredictability of their movements within the Site, the random CRM model was used for both species. The viewshed area used for all random models was 1030.74 hectares (ha).

Input variables for Stage 1 are presented in Table 1.

Table 1: Input Variables for Random CRM Models

Species	Season	Total observation time (seconds)	Available hours for flight activity	Time at RSH (seconds)
Goshawk	Non-breeding (mid-August to mid-March)	734400	2102.25	134.5
	Breeding (mid-March to mid-August)	518400	2393.25	181.25
Curlew	Breeding (April to July)	345600	2214.75*	1063
* Includes additional 25% of night hours.				

[5] NS (2018) Avoidance Rates for the onshore NS Wind Farm Collision Risk Model [Online] Available at: https://www.nature.scot/wind-farm-impacts-birds-use-avoidance-rates-naturescot-wind-farm-collision-risk-model (Accessed 30/06/20)

2.2 Stage 2: Estimating the Probability of Collision

2.2.1 Bird Biometrics and Avoidance Rates

The relevant biometrics and species-specific avoidance rates for each species used in Stage 2 of the CRM are presented in Table 2. All target species were considered to use flapping (rather than gliding) flight.

Table 2: Target Species Biometrics and Avoidance Rates Used in the CRM

Species	Body length*,** (m)	Wingspan*,** (m)	Assumed flight speed (m/s)**	Avoidance rate*** (%)
Goshawk****	0.565	1.050	10.00	98.00
Curlew	0.550	0.900	16.30	98.00

*Values taken from Robinson, R.A. (2005) *BirdFacts: profiles of birds occurring in Britain & Ireland. BTO, Thetford* www.bto.org/about-birds/birdfacts (accessed 07/06/2020)

**Values taken from a range of literature which includes:

- Mullarney, K, Svensson, L, Zetterström, D, and Grant, P J. 2000. Collins Bird Guide. HarperCollins, London; and
- Bruderer, B. & Bolt, A. 2001. Flight characteristics of birds: I. Radar measurements of speeds. *Ibis*, 143, 178-204.

***NS (2018) *Avoidance Rates for the onshore NatureScot Wind Farm Collision Risk Model*.

****Average values have been used to account for sexual dimorphism between males and females.

2.2.2 Turbine Parameters

The candidate turbines models for the proposed Development are the Nordex N133 and Vestas V136. For the purposes of modelling, a precautionary approach using values from the Vestas V136 (the larger rotor diameter) was used. Technical specifications of these models and the values used in the CRM are presented in Table 3.

Table 3: Candidate Turbine Parameters

Parameter	Nordex N133	Vestas V136 (used for CRM)
Hub height	83 m	82 m
Rotor diameter	133.2 m	136.0 m
Rotor radius	66.6 m	68.0 m
No. of turbines	12	12
No. of rotor blades	3	3
Risk window area	N/A	N/A
Risk volume	N/A	N/A
Maximum chord width	3.94	4.1
Rotation period	Not provided	3.4 seconds
Average pitch	Not provided	5
Estimated maximum operation*	85%	85%

* Taken from British Wind Energy Association (BWEA). 2007. *Factsheet: Can We Rely on Wind?* BWEA, London

2.3 Calculation of Collision Probability

Collision risk for birds passing through the rotors was calculated using the NS example spreadsheet for calculating the probability of collision[6]. The results are presented in Table 4.

Table 4: Probability of Collision for Birds Passing through Rotors

Species (and flight type)	p(collision)* Upwind	p(collision)* Downwind	Mean
Goshawk (flapping)	9.3%	6.3%	7.8%
Curlew (flapping)	6.7%	4.8%	5.8%
*Where p = probability; the probability is calculated for both upwind and downwind flights, with a higher collision risk in upwind conditions; the mean was then used to estimate collision risk			

The final collision rates calculated for each species are listed in Table 5 below.

Table 5: Estimated Seasonal Collision Risk and Number of Years Per Collision for Species for Which CRM Was Completed

Species	Period	Annual collision risk (no. of birds killed)		No. of years per collision	
		Assuming no avoidance	Using species-specific avoidance rates*	Assuming no avoidance	Using species-specific avoidance rates*
Goshawk	2019/20 non-breeding season	0.116	0.002	8.562	428.076
	2019 breeding season	0.254	0.005	3.939	196.967
	2019/20 whole year	**0.370**	**0.007**	**2.698**	**134.898**
Curlew	2019 breeding season	**2.486**	**0.050**	**0.402**	**20.116**

3 CONCLUSION

CRM was completed for two target species: goshawk and curlew. Using species specific avoidance rates, 0.002 goshawk collisions were predicted each year, or one collision every 134.898 years. For curlew, 0.050 collisions were predicted each year (all within the breeding season), or one collision every 20.116 years.

[6] Available at: https://www.nature.scot/professional-advice/planning-and-development/advice-planners-and-developers/renewable-energy-development/onshore-wind-energy/wind-farm-impacts-birds (last accessed 08/03/2021).

CLOICH FOREST WIND FARM

VOLUME 3: TECHNICAL APPENDICES

TECHNICAL APPENDIX A8.4: ORNITHOLOGY CONSULTATION REPORT 2019

JUNE 2021

Prepared By:

Arcus Consultancy Services

7th Floor
144 West George Street
Glasgow
G2 2HG

T +44 (0)141 221 9997 l **E** info@arcusconsulting.co.uk
w www.arcusconsulting.co.uk

Registered in England & Wales No. 5644976

TABLE OF CONTENTS

1 INTRODUCTION

1.1 Background

Arcus Consultancy Services Limited (Arcus) has been commissioned by EDF Renewables (the client) to carry out ornithology surveys at the site of the consented Cloich Forest Wind Farm ('the Development') in the Scottish Borders.

A S36 application for the Development (reference 12/01283/S36) was submitted to the Scottish Government in October 2012 and was consented on 8th July 2016. The consent is for an 18-turbine wind farm.

The client is now considering altering the layout of the Development. Because an amended layout would require a new planning application or an amendment to the existing consent, EIA is likely to be necessary. EDF Renewables therefore intends to initiate bird surveys that will inform the design process and establish a suitable baseline for a future EIA. In this report, the 'Site' refers to all land within the site boundary of the Development, as shown in Figure 1, Appendix 1.

A year of baseline ornithology surveys were undertaken for the Development between April 2011 and March 2012. These surveys covered all areas within the Site where turbines were planned to be positioned. The baseline survey dataset was used to inform the Environmental Impact Assessment (EIA)[1] for the Development. It is anticipated that a revised layout would adhere to the same site area and a similar footprint as the consented wind farm, albeit with a reduced number of turbines. It is likely that it would also relate to a development with a generating capacity of more than 50MW.

As the layout of the Development is likely to change, and since most of the recorded data are more than five years old, additional ornithology surveys will be completed between March 2019 and February 2020 (inclusive). If an application to alter the Development is submitted, the results of these surveys will be used to inform an Ecological Impact Assessment (EcIA) of the potential impacts of the Development on important ornithological features.

This document includes a summary of the completed (2011-12) baseline ornithology survey methods and results, and details of the proposed 2019-20 ornithology surveys.

We would appreciate feedback from Scottish Natural Heritage (SNH) regarding the proposed survey programme and methods detailed in this Ornithology Consultation Report, particularly with respect to the Vantage Point (VP) locations and level of survey effort for geese.

1.2 Site Description

The following description was taken from the Cloich Forest Wind Farm Environmental Statement[1] (ES), written in 2012, it is anticipated that the Site has not significantly changed since then. The majority of the Site consists of plantation forest. The plantation is largely comprised of commercially stocked Sitka spruce (*Picea sitchensis*) with lesser amounts of Douglas fir (*Pseudotsuga menziesii*), Norway spruce (*Picea abies*), larch (*Larix* sp.), lodgepole pine (*Pinus contorta*) and Scots pine (*Pinus sylvestris*). Due to the managed nature of rotation forestry, the age structure of species varies across the Site. Active forestry operations (including felling) are ongoing in parts of the Site. Open areas are present throughout the Site in the form of forest rides, open areas (including areas where trees have failed), recently clear felled areas and recently planted areas.

[1] Partnerships for Renewables. (2012). *Cloich Forest Wind Farm Environmental Statement*. Planning application reference 12/01283/S36. Available on the Scottish Borders Council planning application search page: https://eplanning.scotborders.gov.uk/online-applications/

Vegetation within these areas often comprises of marshy grassland and wet modified bog.

There are numerous watercourses and ditches across the Site, in addition to two small ponds. The majority of the Site is surrounded by rough pasture and improved grassland fields used for sheep and cattle grazing. Boundaries are limited to dry stone walls and post-and-wire fences.

The 1:25,000 Ordnance Survey map identifies local high points in the north of the Site at White Rig (325 m above sea level (asl)), in the central area of the Site at Peat Hill (464 m asl), Whaup Law (457 m asl) and Ewe Hill (462 m asl), and Crailzie Hill (476 m asl) on the southern boundary. A further peak is located immediately to the west at Wether Law (479 m asl). Collectively these are referred to as the Cloich Hills. Elevations fall in all directions towards the Eddleston Water in the north and east and Lyne Water in the west and south; the Cloich Hills form a watershed between the two watercourses.

1.3 Statutory Sites of International Importance for Ornithological Interests

Although a desk-based study has not been completed, two statutory sites of European importance designated for their ornithological interests have been identified within 20 km of the Site:

1. Gladhouse Reservoir Special Protection Area (SPA) and Ramsar site; and
2. Westwater SPA and Ramsar site.

Details of these statutory sites are presented in Table 1.

Table 1: Details of Statutory Sites of International Importance Designated for Ornithological Interests within 20 km of the Site

Site name	Designations	Designated features	Description	Approximate distance to/ direction from the Site
Gladhouse Reservoir	SPA and Ramsar site	Pink-footed goose (*Anser brachyrhynchus*), non-breeding	Located 270 m asl in the Pentland Hills, Gladhouse Reservoir regularly provides a winter roost for many wildfowl, including large numbers of pink-footed geese.	6.7 km to north-east
Westwater	SPA and Ramsar site	Pink-footed goose, non-breeding; and Waterfowl assemblage, non-breeding	Located 320 m asl in the Pentland Hills, Westwater is an artificial reservoir and supports large numbers of wintering pink-footed geese and over 20,000 wintering waterfowl[2].	8.4 km to north-west

2 SUMMARY OF 2011-12 BASELINE ORNITHOLOGY SURVEYS

An outline of the completed ornithology survey programme and key survey results are presented below however, if required, full details of the survey methods and results of the 2011-12 baseline surveys are presented in the Ornithology Chapter of the Environmental Statement (ES)[1] and associated appendices.

[2] SNH. (2018). Citation For Special Protection Area (SPA) Westwater (UK9004251). Available online at: https://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=8591

2.1 Breeding Season Survey Methods

2.1.1 Flight Activity Surveys (FAS) (2011)

A minimum of 36 hours of survey effort was completed at each of six VP locations[3] during the breeding season (April to August 2011 inclusive) to record target species flight lines in the area planned for turbines within the Site. VP locations for these surveys can be seen in Figure 10.1 in the ES[1].

2.1.2 Black Grouse Surveys (2011)

Surveys for lekking black grouse (*Lyrurus tetrix*) were carried out between late March and May 2011, following SNH survey guidance[4] and the methods set out in Gilbert *et al*. (1998)[5]. This involved two visits to all areas of potentially suitable lekking habitat within the Site and a surrounding 500 m buffer.

2.1.3 Breeding Bird Territory Mapping Surveys (2011)

Breeding bird surveys were undertaken in the single area of open habitat within the Site to document the presence of breeding moorland birds. Two survey visits were completed on 17th May and 7th July 2011. Survey methods followed Brown and Shepherd (1993)[6]. This area was also visited during the black grouse surveys on 15th April and 11th May 2011 and the two methods were undertaken concurrently on these dates.

2.1.4 Breeding Season Point Count Surveys (2011)

Point count surveys were undertaken to assess the breeding bird community within the plantation woodland. Twenty points were used, located in representative sections of woodland habitats within the Site. Point count surveys were undertaken over three visits, one in each of April, May and June 2011.

2.1.5 Breeding Raptor Surveys (2011)

Walkover surveys for evidence of breeding raptors was undertaken within plantation forestry, mainly for goshawk (*Accipiter gentilis*), but clearfell/re-stocked sections were also surveyed for merlin (*Falco columbarius*), hen harrier (*Circus cyaneus*) and short-eared owl (*Asio flammeus*). Although the guidance at the time stated that all suitable habitats within 1 km of the wind farm should be surveyed for goshawk, access was unavailable to adjacent forestry during the breeding season. Much of the adjacent plantations were, however, visible during vantage point surveys and it was considered that should birds have been nesting in the buffer they would have been detected during FAS (for example during display flights)[7]. Surveys followed the methodology in Hardey *et al*. (2006)[8], which recommends four visits to confirm occupancy and breeding. Surveys were undertaken between April and July inclusive.

[3] Note that these VP locations differ from the proposed VP locations in section 3.1.1.

[4] SNH (2010). Survey Methods for Use in Assessing the Impacts of Onshore Wind Farms on Bird Communities. SNH Guidance Note December 2010.

[5] Gilbert, G., Gibbons, D.W. & Evans, J. (1998). *Bird Monitoring Methods*. RSPB, Sandy.

[6] Brown, A., F. & Shepherd, K., B. (1993). A method for censuring upland breeding waders. *Bird Study* 40, 189-195.

[7] Note that buffers weren't specified for any other raptor species in the ES.

[8] Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B., Thompson, D. 2006. Raptors: A field guide for surveys and monitoring. The Stationery Office.

2.2 Non-breeding Season Survey Methods

2.2.1 FAS (2011-12)

A minimum of 45 hours of survey effort was completed at each of six VP locations (in the same positions that were used in the breeding season (2011) FAS) during the non-breeding season (September 2011 to March 2012 inclusive) to record target species flight lines in the area planned for turbines within the Site.

2.2.2 Non-breeding Season Point Count Surveys (2011-12)

Surveys for non-breeding woodland birds were conducted from 20 representative points (in the same positions as in the breeding season point count surveys (2011)) during the 2011/12 non-breeding season. Point count surveys were undertaken over six visits, completed monthly between October 2011 and March 2012 (inclusive).

2.2.3 Car Transect Surveys for Foraging Geese

A large area of agricultural land surrounding the Site to the north-east, north, north-west and west (see Figure 10.4 in ES[1] for precise area) was checked regularly for feeding/loafing geese throughout the autumn/winter season. Weekly 'car transect' surveys were conducted during the autumn period (late September to early November) which then reverted to twice-monthly visits between December and March inclusive. These surveys generally followed a dawn VP survey over-looking the Westwater Reservoir roost site (see below), to determine where geese from the roost were dispersing to.

2.2.4 Westwater Reservoir SPA Goose Roost Surveys

Dawn VP surveys were undertaken from a single VP overlooking Westwater Reservoir SPA, each of approximately two hours in duration. Surveys were conducted on a weekly basis during the autumn period (late September to early November) and then reverted to fortnightly surveys between December and March inclusive. The aim of the surveys was to map the flight lines of goose flocks commuting from the roost site to surrounding feeding areas.

2.3 Summary of 2011 Breeding Season Baseline Survey Results

2.3.1 FAS (2011)

A total of four target species were recorded during the FAS between April and August 2011. Goshawk was the species recorded most frequently (nine flights), followed by merlin (five flights), osprey (*Pandion haliaetus;* three flights) and peregrine (*Falco peregrinus;* one flight).

2.3.2 Black Grouse Surveys (2011)

No black grouse were recorded during the targeted surveys for this species completed in 2011, nor during any of the other surveys.

2.3.3 Breeding Bird Territory Mapping Surveys (2011)

A total of 10 species were recorded as breeding at the open area of habitat at Courhope or adjacent woodland, of which one is included on the UK Birds of Conservation Concern

(BoCC)[9] Red list: mistle thrush (*Turdus viscivorus*). Additionally, crossbill (*Loxia curvirostra*), a Schedule 1[10] species, was identified as breeding during the survey.

2.3.4 Breeding Season Point Count Surveys (2011)

A total of 16 species were recorded as breeding within the woodland habitats during the point count surveys, of which two are Red-listed BoCC: mistle thrush and tree pipit (*Anthus trivialis*).

2.3.5 Breeding Raptor Surveys (2011)

Two target raptor species were recorded during the breeding raptor surveys: goshawk and peregrine.

- **Goshawk**: an active goshawk territory was confirmed to be present within the Site, from which three chicks were successfully reared and fledged.
- **Osprey**: the only observation was of a single bird circling over the southeast of the Site carrying a fish. No indication of breeding was recorded on any other occasion.

2.4 Summary of 2011/12 Non-breeding Season Baseline Survey Results

2.4.1 FAS (2011-12)

A total of seven target species were recorded during the FAS between September 2011 and March 2011. Goshawk and golden plover (*Pluvialis apricaria*) were the species recorded most frequently (nine flights each), followed by merlin and pink-footed goose (eight flights each), hen harrier (three flights), goosander (*Mergus merganser*; one flight) and greylag goose (*Anser anser*; one flight).

2.4.2 Non-breeding Season Point Count Surveys (2011-12)

A total of 16 species were recorded as breeding within the woodland habitats during the non-breeding season point count surveys, of which two are Red-listed BoCC: starling (*Sturnus vulgaris*) and fieldfare (*Turdus pilaris*).

2.4.3 Car Transect Surveys for Foraging Geese

The car-transect surveys confirmed that small numbers of pink-footed geese roosting at the Westwater SPA feed in fields to the north and west of the Site (on average over 3 km from the Site boundary) and that the Site does not appear to lie on a regular flight path; indeed, just one flight was recorded over the northern top of the Site during the targeted goose surveys. Figure 10.16 in the ES[1] shows the locations of the feeding geese flocks and associated flight lines.

2.4.4 Westwater Reservoir SPA Goose Roost Surveys

Significant numbers of pink-footed geese were recorded using off-Site habitats during the targeted VP surveys at Westwater Reservoir SPA. A maximum flock size of 5,300 individuals was observed feeding on improved grassland approximately 15 km west of the Site and 9 km south of Westwater Reservoir.

[9] Eaton MA, Aebischer NJ, Brown AF, Hearn RD, Lock L, Musgrove AJ, Noble DG, Stroud DA and Gregory RD (2015) Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. British Birds 108, 708–746. Available online at britishbirds. co.uk/wp-content/uploads/2014/07/BoCC4.pdf

[10] Species listed on Schedule 1 of the Wildlife & Countryside Act 1981 (as amended) and/or Annex I of the EU Birds Directive.

2.5 Collision Risk Modelling

Based on the results of the 2011-12 baseline FAS, collision risk modelling (CRM) was carried out for five species, with the following estimated collision mortality estimates presented in the Ornithology Chapter of the ES:

- Pink-footed goose: undetectable, likely to be no collisions.
- Golden plover: 1.7 birds per year.
- Merlin: 0.01 birds per year.
- Osprey: 0.02 birds per year.
- Goshawk: 0.08 birds per year.

Other target species recorded during FAS were either recorded at such low frequencies (peregrine) that their risk of collision with turbines was considered to be negligible or, in the case of greylag goose, goosander and hen harrier, flights were not at collision risk height.

2.6 EcIA

No significant effects (including cumulative effects) were predicted for any bird species associated with the Site. However, slight (non-significant) impacts on goshawk were predicted and it was proposed that best practice measures would be followed during construction to protect breeding goshawk.

3 PROPOSED 2018-19 ORNITHOLOGY SURVEYS

3.1 Proposed Breeding Season Survey Methods

Based on the results of the 2011 baseline breeding season ornithology surveys, current SNH guidance[11] (which has changed since the baseline surveys were completed) and professional experience, it is proposed that the 2019 breeding season ornithology surveys will comprise a combination of FAS and targeted surveys for black grouse and raptors/owls, as described below.

3.1.1 FAS (2019)

Surveys will be undertaken from suitable VPs to record the flight activity of target species, which will include the following:

- All wild swan and goose species;
- All raptor and owl species listed on Schedule 1 and/or Annex I;
- All wader species; and
- Black grouse.

Four VP locations have been identified for the FAS; these are shown in Figure 2, Appendix 1. These VP locations will be ground truthed and confirmed in early March 2019 and may be subject to adjustments.

Survey methods will follow current SNH guidance[11]. Flight lines of all target species will be recorded on large scale maps, with the flight height of target species recorded at 15 second intervals. The following three height bands will be used[12]:

- Height band 1: 0 to <20 m
- Height band 2: 20 m to < 150 m (collision risk height)
- Height band 3: >150 m

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

[12] Note that these height bands are different to those used during the baseline surveys.

In addition, the activity of secondary species will be summarised, as per SNH guidance. Secondary species will include all non-target raptor and owl species and raven (*Corvus corax*).

A minimum of 36 hours of survey effort will be undertaken at each of the four VP locations during the breeding season FAS from March to August 2019 (inclusive).

3.1.2 Black Grouse Surveys

Black grouse surveys will be undertaken to identify lek sites within 1.5 km (subject to land access) of the Site. The surveys would be based on standard methods[5]. Two visits to areas of suitable habitat (identified during previous survey visits and aerial imagery) will be undertaken between late March and mid-May 2019 around the hours of dawn and/or dusk.

3.1.3 Breeding Raptor and Owl Surveys

Breeding raptor and owl surveys will be undertaken to identify breeding territories of protected raptor and owl species in areas of suitable habitat within the Site and a buffer from the Site boundary (1 km for goshawk and barn owl (*Tyto alba*); 2 km for all other species) subject to land access. The survey methods will involve a combination of watches from suitable VPs, and walkovers, and will be based on the most recent guidance for surveying raptors[13]. A minimum of four visits will be undertaken between mid-March and July in order to cover different breeding cycles of key target species (goshawk, hen harrier, short-eared owl and merlin).

During the 2011 baseline surveys at the Site, goshawk was considered to be a key sensitivity due to high levels of flight activity. Therefore, a large proportion of the breeding raptor surveys will be targeted towards detecting goshawk territories and activity within suitable habitat in the survey area. The remaining raptor surveys will focus on the open areas within and surrounding the Site.

3.1.4 Excluded Breeding Season Surveys

Repeat breeding bird territory mapping surveys and breeding season point count surveys have not been proposed because the Site is predominantly conifer plantation and current SNH guidance[11], which has changed since the baseline surveys were carried out in 2011/12, is that survey of woodland passerines, especially in commercial conifer forest, is generally not required. The Site is likely to be of limited suitability for breeding waders and none were recorded breeding within the Site during the 2011 breeding bird territory mapping surveys.

3.2 Proposed Non-breeding Season Survey Methods

Based on the results of the 2011/12 baseline non-breeding season ornithology surveys, current SNH and raptor survey guidance[11],[13] (both of which have changed since the baseline surveys were completed) and professional experience, it is proposed that the 2019/20 non-breeding season ornithology surveys comprise of FAS, as described below.

3.2.1 FAS (2019/20)

Surveys will be undertaken from suitable VPs to record the flight activity of target species. These will follow the same breeding season FAS survey methods described in section 3.1.1.

[13] Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B. & Thompson, D. (2013). *Raptors: a field guide to survey and monitoring (3rd Edition)*. The Stationery Office, Edinburgh.

A minimum of 36 hours of survey effort will be undertaken at each of the four VP locations during the non-breeding season FAS from September 2019 to February 2020 inclusive.

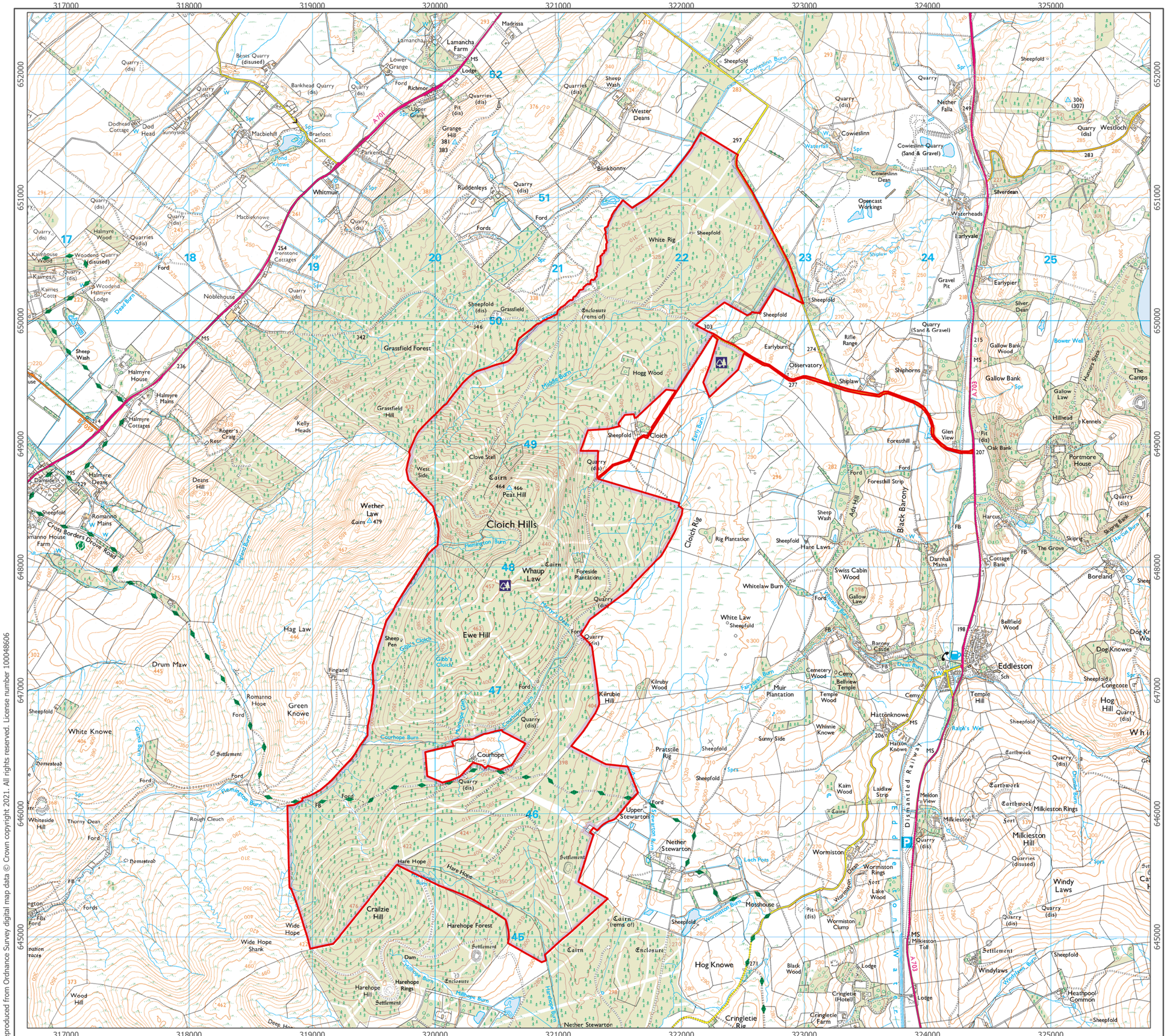
3.2.2 Excluded Non-breeding Season Surveys

Repeat goose surveys have not been proposed as the results of the 2011/12 surveys found that there were few goose flights over the Site, and birds from the nearby Gladhouse Reservoir and Westwater SPAs were not found to be commuting over the Site or feeding/roosting within 1 km of the proposed turbines or other infrastructure. It is considered that goose activity over winter 2011/12 is likely to be representative of activity over most winters on account of the relatively typical weather conditions. The survey results of the specific goose surveys, combined with the FAS results, indicate that the Site is unsuitable for use by this species and the airspace above is not on a regular flight path.

Additionally, repeat non-breeding season point count surveys have also not been proposed because (as with the breeding season point count surveys) the Site is predominantly conifer plantation and current SNH guidance[11] is that survey of woodland passerines, especially in commercial conifer forest, is generally not required.

APPENDIX 1 – FIGURES

Figure 1: The Development Site Boundary



P:\Projects\Ornithology\Projects\3122 Cloich Wind Farm\3122 Cloich Wind Farm.aprx\3122-REP-004 Fig01 Development Site Boundary

eDF renewables

ARCUS

Site Boundary

1:30,000 Scale @ A3

0 0.5 1 km

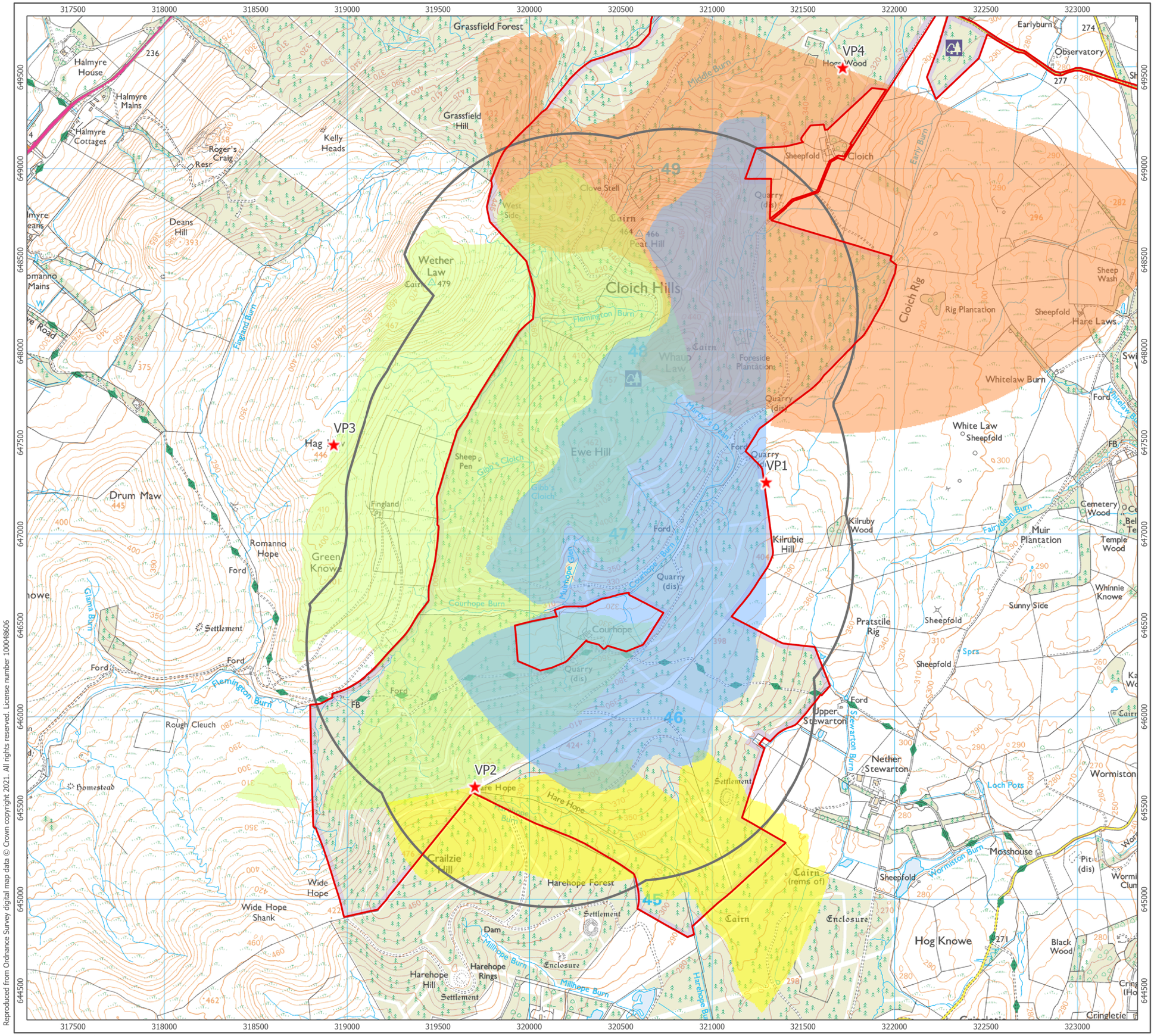
NORTH

Produced By: LS	Ref: 3122-REP-004
Checked By: JA	Date: 11/06/2021

Development Site Boundary
Figure 1

Cloich Forest Wind Farm
Appendix A8.5: Ornithology
Consultation Report 2019

Figure 2: Vantage Point Locations and Viewsheds (2019/20)



P:\Projects\Ornithology\Projects\3122 Cloich Wind Farm\3122 Cloich Wind Farm.aprx\3122-REP-005 Fig02 Vantage Points and Viewsheds

CLOICH FOREST WIND FARM

VOLUME 3: TECHNICAL APPENDICES

TECHNICAL APPENDIX A8.5: ORNITHOLOGY CONSULTATION REPORT 2020

JUNE 2021

Prepared By:

Arcus Consultancy Services

7th Floor
144 West George Street
Glasgow
G2 2HG

T +44 (0)141 221 9997 l **E** info@arcusconsulting.co.uk
w www.arcusconsulting.co.uk

Registered in England & Wales No. 5644976

TABLE OF CONTENTS

1 INTRODUCTION & SUMMARY

Arcus Consultancy Services Limited (Arcus) has been commissioned by EDF Renewables (the client) to carry out ornithology surveys at the site of the consented Cloich Forest Wind Farm ('the Consented Development') in the Scottish Borders.

A S36 application for the Consented Development (reference 12/01283/S36) was submitted to the Scottish Government in October 2012 and was consented on 8th July 2016. The consent is for an 18-turbine wind farm.

The client intends to amend the layout of the Consented Development. Because an amended layout would require a new S36 application an updated Environmental Impact Assessment (EIA) will be necessary. EDF Renewables has therefore commissioned a programme of bird surveys that will inform the design process and establish a suitable baseline for an EIA for this amended layout ('the Revised Development'). In this report, the 'Site' refers to all land within the boundary of the Revised Development, as shown in Figure 1, Appendix 1. Note that the Site for the Revised Development is the same as that used for the Consented Development.

A year of baseline ornithology surveys were undertaken for the Consented Development between April 2011 and March 2012 (inclusive). The baseline survey dataset was used to inform the Environmental Impact Assessment (EIA)[1] for the Consented Development. It is anticipated that a revised layout would adhere to the same Site as the consented wind farm, albeit with a reduced number of turbines. It is likely that it would also relate to a development with a generating capacity of more than 50MW.

Given that the layout of the Consented Development will change, and since the 2011-12 data are more than five years old, an additional year of ornithology surveys have been completed between March 2019 and February 2020 (inclusive). If an application for a new layout is submitted, the results of these surveys will be used to inform an Ecological Impact Assessment (EcIA) of the potential impacts of the Revised Development on important ornithological features.

This document follows on from, and should be read in conjunction with, the following two reports:

- Cloich Forest Wind Farm Scoping Request Report[2]. This report was submitted in October 2019 by Arcus, on behalf of the client, and formally requested a scoping opinion for the Revised Development. This was provided to Scottish Natural Heritage (SNH) for comment. This report included details of the ornithology survey programme and a summary of the surveys that had been completed to date.
- Cloich Forest Wind Farm Ornithology Consultation Report[3]. This report was submitted in March 2019 by Arcus, on behalf of the client, to SNH. The purpose of this report was to seek feedback on the suitability of the ornithology survey programme to appropriately inform an EcIA. Recommendations were received and incorporated into the survey programme as detailed in the Scoping Request Report.

A Site description and summary of nearby statutory sites of international importance is provided in both of the previous reports[2,3]. Full summaries of the completed (2011-12) baseline ornithology survey methods and results are also provided in the previous reports. Additionally, the Scoping Request Report[2] also provides a full summary of the 2019-20 ornithology survey methods. For brevity, this information is not repeated here.

[1] Partnerships for Renewables. (2012). *Cloich Forest Wind Farm Environmental Statement*. Planning application reference 12/01283/S36. Available on the Scottish Borders Council planning application search page: https://eplanning.scotborders.gov.uk/online-applications/

[2] EDF Renewables. (2019). *Cloich Forest Wind Farm Scoping Request*. Planning application reference 19/01489/SCO. Available on the Scottish Borders Council planning application search page: https://eplanning.scotborders.gov.uk/online-applications/

[3] Arcus. (2019). *Cloich Wind Farm Ornithology Consultation Report*.

This document provides an updated summary of the 2019-20 ornithology survey results to date.

A response to the Scoping Request Report[2] was received from SNH on 21st November 2019 (Reference: A3116858) which stated the following:

"*With regards to ornithology, the 2017 guidance requires that a minimum two years of surveys should be undertaken. We note there were surveys undertaken in 2012 and while they can provide some context they are, as set out in the guidance, now too old to inform the impact assessment. We therefore advise surveys should continue until an additional year is gathered. We are happy with the program of surveys that was used in 2019 and for this to be used again in 2020.*"

Based on the results to date, Arcus consider that the dataset obtained from the 2019/20 ornithology surveys is sufficient to inform a robust assessment of potential impacts of the Revised Development on ornithological features. As detailed in the section 2 below, flight activity of target species at the Site was found to be extremely low, as was also found in the 2011-12 baseline surveys for the Consented Development. These results are supported by information provided in Section 3. Potential ornithological sensitivities of the Site are discussed further in Section 4.

In light of the information detailed in this report, we are requesting that SNH reconsider the advice in the Scoping Report response recommending an additional year of ornithology surveys.

We would appreciate feedback from SNH regarding this.

2 SUMMARY OF 2019-20 BASELINE ORNITHOLOGY SURVEY RESULTS

A summary of the 2019-20 baseline ornithology survey results during each season (breeding season and non-breeding season) is presented below.

For reference, the vantage point locations and viewsheds, and ornithology survey areas are provided in Figure 2 and Figure 3 in Appendix 1 respectively.

2.1 Summary of 2019 Breeding Season Survey Results

2.1.1 Flight Activity Surveys (FAS; 2019)

A total of five target species were recorded during the FAS between March and August 2019. Curlew (*Numenius arquata*) was the species recorded most frequently (22 flights), followed by goshawk (*Accipiter gentilis);* nine flights), snipe (*Gallinago gallinago*; eight flights), woodcock (*Scolopax rusticola*; seven flights) and osprey (*Pandion haliaetus;* one flight). These target species flights are shown in Figure 4 (Confidential), Appendix 1.

2.1.2 Black Grouse Surveys (2019)

No black grouse (*Lyrurus tetrix*) were recorded during the targeted surveys for this species completed in 2019, nor during any of the other 2019 surveys.

2.1.3 Moorland Breeding Bird Surveys (2019)

A total of three target species were recorded as breeding in the open areas of habitat surrounding Cloich Forest: curlew (one confirmed territory), lapwing (*Vanellus vanellus*; one confirmed territory) and snipe (one probable territory). Although, not a target species of moorland breeding bird surveys, woodcock was recorded on several occasions and there are likely to be several territories within Cloich Forest.

2.1.4 Breeding Raptor Surveys (2019)

Two target raptor species were recorded during the breeding raptor surveys: goshawk and osprey.

- **Goshawk**: adult birds were observed displaying in February; however, no active breeding territories were confirmed during the breeding season.
- **Osprey**: two sightings of osprey were recorded in April and May; both flew over the Site. No indication of breeding was recorded.

2.2 Summary of 2019/20 Non-breeding Season Survey Results

2.2.1 FAS (2019/20)

A total of five target species were recorded during the FAS between September 2019 and February 2020. Woodcock was the species recorded most frequently (ten flights each), followed by snipe (two flights) and goshawk (two flights). There were also single flights of pink-footed goose (*Anser brachyrynchus*) and greylag goose (*Anser anser*). These target species flights are shown in Figure 5 (Confidential), Appendix 1. Note that the pink-footed goose flight, the greylag goose flight and one goshawk flight are not included in the Figure as they were recorded in February 2020 and had not been digitised at time of writing.

2.2.2 Car Transect Surveys for Foraging Geese

The car-transect surveys found very few geese feeding in fields surrounding the Site and that the Site does not appear to lie on a regular flight path. Furthermore, no foraging pink-footed geese were recorded during these dedicated surveys. The only geese recorded foraging consisted of small flocks of greylag geese (up to 46 individuals) that

were thought to be associated with Portmore Loch, just over 3 km to the east of the Site. Just one flight of pink-footed geese (70 individuals) was recorded in February 2020, outside of the Site boundary.

3 SUPPORTING INFORMATION FROM PREVIOUS STUDIES

Incidentally, two further wind farm applications were submitted in the areas immediately adjacent to the east and west of the Site: Hag Law Wind Farm and Kilrubie Wind Farm. Planning for both of these was refused on landscape, visual and noise grounds; however, the respective environmental statements[4,5] provide additional ornithology data that is valuable to contextualise the results of the Revised Development ornithology surveys. Ornithology surveys for Hag Law Wind Farm were completed between May 2011 and June 2013 while ornithology surveys for Kilrubie Wind Farm were completed between April 2014 and March 2015.

As with the ornithology survey results for both the Consented and Revised Developments, the ornithology survey results for these two applications (for which the survey areas overlap with the Site) show a similarly low level of bird activity, particularly with respect to pink-footed goose. However, it should be noted that the habitat within the Site consists mainly of large conifer plantation blocks rather than the open hill pasture habitats surveyed for the Hag Law and Kilrubie wind farms, and therefore differences in the suite of species recorded is reflected. A summary of the results of the different studies is provided below.

3.1 FAS

The range of bird species recorded and low level of flight activity was relatively similar to that found in previous studies within and adjacent to the Site. Table 1 below shows a comparison of the four studies however it should be noted that the survey areas, associated habitats and survey effort vary from study to study. One notable observation from the data is that the levels of pink-footed goose flight activity were consistently low across all four studies.

Table1: Year-round FAS Results Summary for Cloich Forest & Previous Studies

	Cloich Forest (Mar 2019 – Feb 2020)	**Cloich Forest (Apr 2011-Mar 2012)**	**Hag Law (May 2011-Apr 2012)**	**Kilrubie (Apr 2014 – Mar 2015)**
	Survey effort: 306 hours (4 VP locations)	**Survey effort: 536.6 hours (6 VP locations)**	**Survey effort: 216 hours (3 VP locations)**	**Survey effort: 157 hours (2 VP locations)**
Target Species	**Number of flights (and number of birds observed) recorded during FAS**			
Greylag goose	1 (1)	1 (9)	0	1 (2)
Pink-footed goose	1 (30)	8 (323)	1 (35)	3 (111)
Mute swan (*Cygnus olor*)	0	0	0	1 (1)
Goosander (*Mergus merganser*)	0	1 (5)	0	0
Osprey	1 (1)	3 (3)	0	0

[4] West Coast Energy. (2014). Hag Law Wind Farm Environmental Impact Assessment. Planning application reference: 14/00738/FUL. Available on the Scottish Borders Council planning application search page: https://eplanning.scotborders.gov.uk/online-applications/

[5] Kilrubie Wind Farm Ltd. (2015) Kilrubie Wind Farm Environmental Statement: Volume 1: Written Statement. Planning application reference: 15/00818/FUL. Available on the Scottish Borders Council planning application search page: https://eplanning.scotborders.gov.uk/online-applications/

Goshawk	10 (18)	22 (24)	0	0
Hen harrier (*Circus cyaneus*)	0	3 (4)	0	1 (1)
Lapwing	0	1 (2)	1 (1)	25 (171)
Golden plover (*Pluvialis apricaria*)	0	12 (426)	0	2 (33)
Curlew	22 (38)	5 (7)	20 (42)	13 (14)
Woodcock	17 (17)	0	0	0
Snipe	10 (10)	1 (1)	0	5 (7)
Greenshank (*Tringa nebularia*)	0	1 (1)	0	0
Merlin	0	8 (8)	2 (2)	2 (2)
Peregrine (*Falco peregrinus*)	0	1 (2)	3 (3)	0

3.2 Black Grouse Surveys

In a similar manner to the 2019 surveys for the Revised Development, no black grouse were recorded during any of the previous surveys at Cloich Forest, Hag Law or Kilrubie.

3.3 Moorland Breeding Bird Surveys

None of the target species territories recorded during the 2019 surveys were located within the Site boundary. This was likely due to the habitat within the Site (predominately conifer plantation) being unsuitable for the target species. The curlew and lapwing territories identified were both located in open hill pasture to the east of the Site boundary in the area of land that was previously surveyed for Kilrubie Windfarm in 2014. During the breeding bird surveys for Kilrubie Windfarm, a similar array of species was found with several curlew, lapwing and snipe territories recorded across the hill pasture habitat.

No target species territories were confirmed in the open hill pasture to the west of the Site, with just one probable snipe territory recorded. This area was previously surveyed for Hag Law in 2011 and 2013 which found several curlew and lapwing territories across their study area which covered a much larger area of open hill pasture than the Revised Development's Moorland Breeding Bird Surveys.

The Breeding Bird Surveys completed in 2011 for the Consented Development were less extensive than those undertaken in 2019 for the Revised Development and were limited to the open area at Courhope in the centre of the Site. As with the Moorland Breeding Bird Surveys in 2019, no target species territories were identified in the open area at Courhope in 2011.

3.4 Breeding Raptor Surveys

Raptor activity was generally very low at the Site during the breeding season with just two target species identified. One osprey sighting, in combination with the two recorded during FAS suggest that this species was not breeding within, or in close proximity to, the Site and registrations were likely transient individuals. Regular sightings of kestrel (*Falco tinniculus*), buzzard (*Buteo buteo*) and sparrowhawk (*Accipiter nisus*) indicate that these non-target raptor species bred within the Site in 2019.

As the 2011 breeding raptor surveys for the Consented Development identified a single active goshawk territory (resulting in three chicks fledged) within the Site, this species was a key target species during the 2019 breeding raptor surveys. Surveys from February

to April 2019 indicated that there was an active territory in a similar location to that in 2011. However, activity dropped off during further surveys and it is likely that the breeding attempt failed at an early stage. There were no further sightings of goshawk from May 2019 onwards (during either breeding raptors surveys or FAS). In January 2020 a short flight was recorded, with a further display flight recorded during FAS in early February 2020.

Breeding raptor surveys undertaken for the Hag Law and Kilrubie developments found no evidence of breeding target raptor species.

4 KEY ORNITHOLOGICAL SENSITIVITIES

Pink-footed goose was considered a key target species for the survey programme due to the proximity of Gladhouse Reservoir and Westwater SPAs to the Site (6.9 km and 8.5 km respectively). However, both the 2019/20 and 2011/12 surveys recorded very few pink-footed goose flights over the Site, and no birds from the nearby SPAs were found to be commuting over the Site nor feeding/roosting within 1 km of the proposed turbines or other infrastructure during either survey year. These results support the findings of a report published by the Wildfowl and Wetlands Trust (WWT) in 2012[6] which mapped the distribution of feeding pink-footed geese in Scotland. Two of the sites it focused on were Gladhouse Reservoir and Westwater SPAs. The WWT studies at each of these sites suggested that the area around the Site is not important for feeding geese. Furthermore, recent counts (up to 2017/18) at Gladhouse Reservoir SPA show that numbers of pink-footed geese using the reservoir as a roost have declined over the past twenty years[7]. Due to the very low activity associated with the Site, it is considered unlikely that further surveys would add any further significant information to inform impacts of the Revised Development on pink-footed goose.

The other key ornithological sensitivity initially identified for the Site was goshawk. The EIA for the Consented Development predicted slight (non-significant) impacts on goshawk due to the confirmed presence of an active breeding territory within the Site. It was proposed that best practice measures would be followed during construction to protect breeding goshawk. The 2019/20 surveys again confirmed the presence of goshawk within the Site, although no breeding territories were confirmed. Despite goshawk being present, recorded flight activity was very low during both the 2019/20 and 2011/12 surveys. Therefore, it is considered unlikely that further surveys would add any further significant information to inform impacts of the Revised Development on goshawk. If the Revised Development were to proceed, surveys for breeding goshawk would be undertaken during the breeding season prior to construction commencing and again during the following breeding season if works were on-going, in order to identify the location of any nest sites. No construction works would be undertaken within 500 m of any identified nest site during the period in which a nest is active (likely to be March to August inclusive).

Flight activity of other target species during the 2019/20 surveys was also very low. Curlew was the species recorded most frequently, likely due to the presence of an active curlew breeding territory in open hill pasture within the Site buffer. As the majority of the Site is conifer plantation, these flights are unlikely to represent curlew flight activity over the area where turbines will be located and it is considered likely that any impacts on curlew from the Revised Development will be negligible. Due to this, further surveys are unlikely to add any further significant information to inform impacts on curlew.

[6] Mitchell, C. 2012. *Mapping the distribution of feeding Pink-footed and Iceland Greylag Geese in Scotland*. Wildfowl & Wetland Trust / Scottish Natural Heritage Report, Slimbridge. 108pp.

[7] Frost, T.M., Austin, G.E., Calbrade, N.A., Mellan, H.J., Hearn, R.D., Robinson, A.E., Stroud, D.A., Wotton, S.R. and Balmer, D.E. 2019. *Waterbirds in the UK 2017/18: The Wetland Bird Survey*. BTO/RSPB/JNCC. Thetford.

As a result of this review it can be demonstrated that there is a robust data set which has not changed significantly over time, supported by information gathered for Kilrubie Windfarm during the intervening period. Whilst the data collected for the Consented Development is now several years old, a similar suite of target species and associated low levels of flight activity has been recorded to date during the two survey periods, and as such, it is considered unlikely that completing further surveys would add significant new information to the existing baseline dataset.

APPENDIX 1 – FIGURES

Figure 1: Development Site Boundary

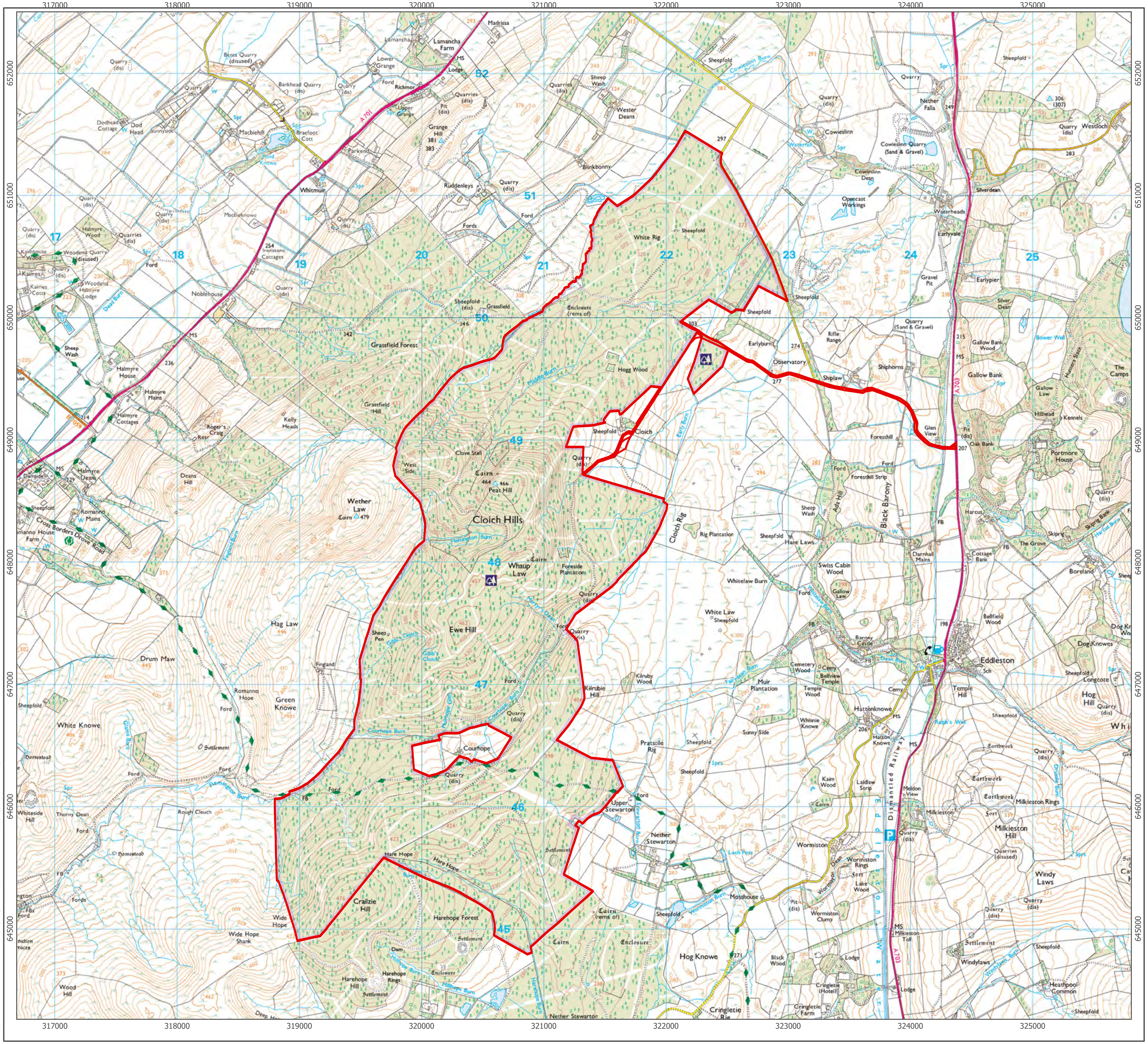
Figure 2: Vantage Points and Viewsheds

Figure 3: Ornithology Survey Areas

Figure 4: Target Species Flights (Mar 2019 – Aug 2019) (Confidential)

Figure 5: Target Species Flights (Sep 2019 – Jan 2020) (Confidential)

Figure 1: The Development Site Boundary



EDF renewables

ARCUS

Site Boundary

1:30,000 Scale @ A3

0 0.5 1 km

NORTH

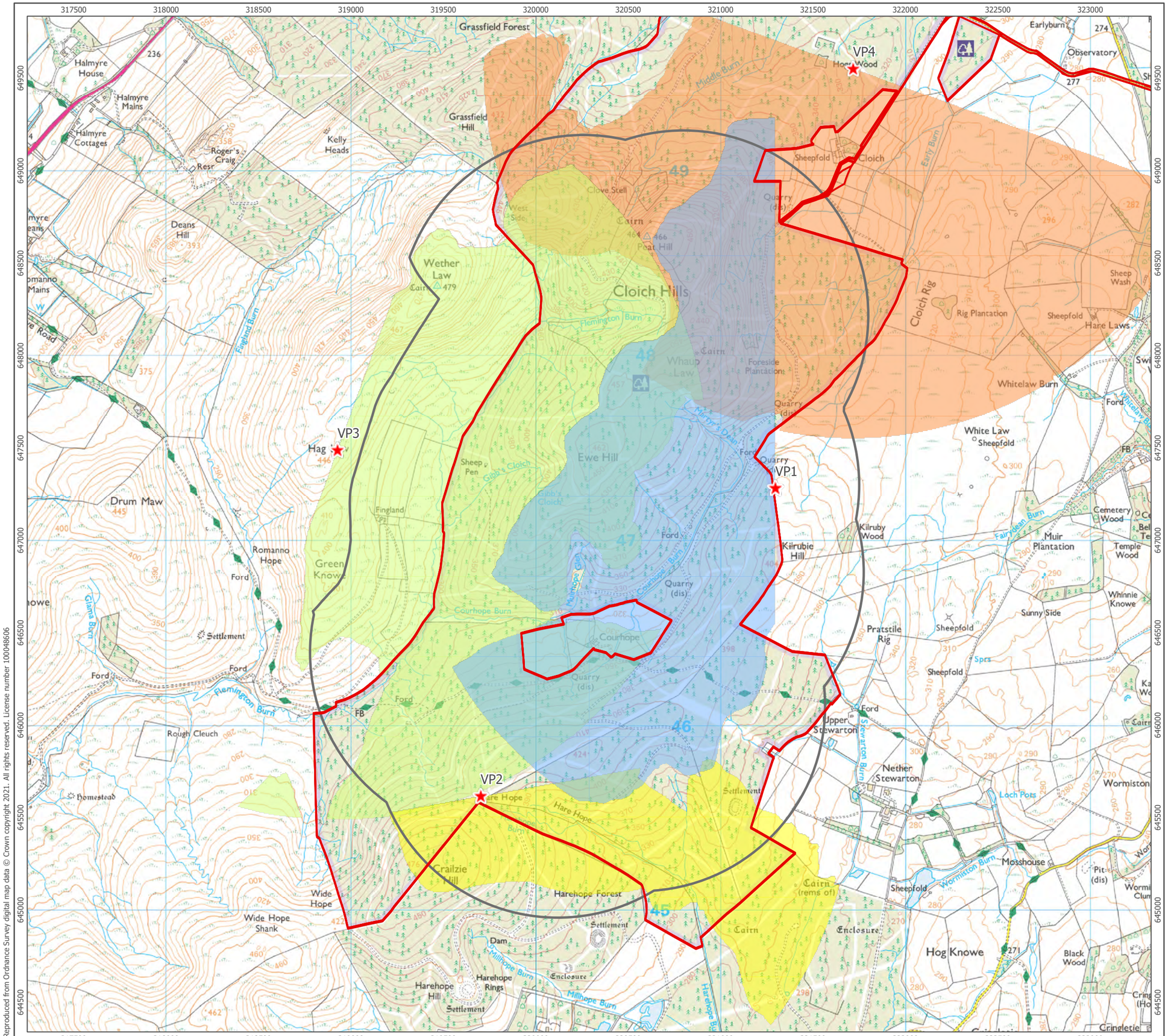
Produced By: LS	Ref: 3122-REP-004
Checked By: JA	Date: 17/03/2021

Development Site Boundary
Figure 1

Cloich Forest Wind Farm
Appendix A8.5: Ornithology Consultation Report 2020

\\10.0.0.190\share\Projects\Ornithology\Projects\3122 Cloich Wind Farm\3122 Cloich Wind Farm.aprx\3122-REP-004 Fig01 Development Site Boundary

Figure 2: Vantage Point Locations and Viewsheds (2019/20)



\\10.0.0.190\share\Projects\Ornithology\Projects\3122 Cloich Wind Farm\3122 Cloich Wind Farm.aprx\3122-REP-005 Fig02 Vantage Points and Viewsheds

eDF renewables

ARCUS

- Vantage Points
- Site Boundary
- Core Study Area
- VP 1 Viewshed
- VP 2 Viewshed
- VP 3 Viewshed
- VP 4 Viewshed

1:20,000 Scale @ A3

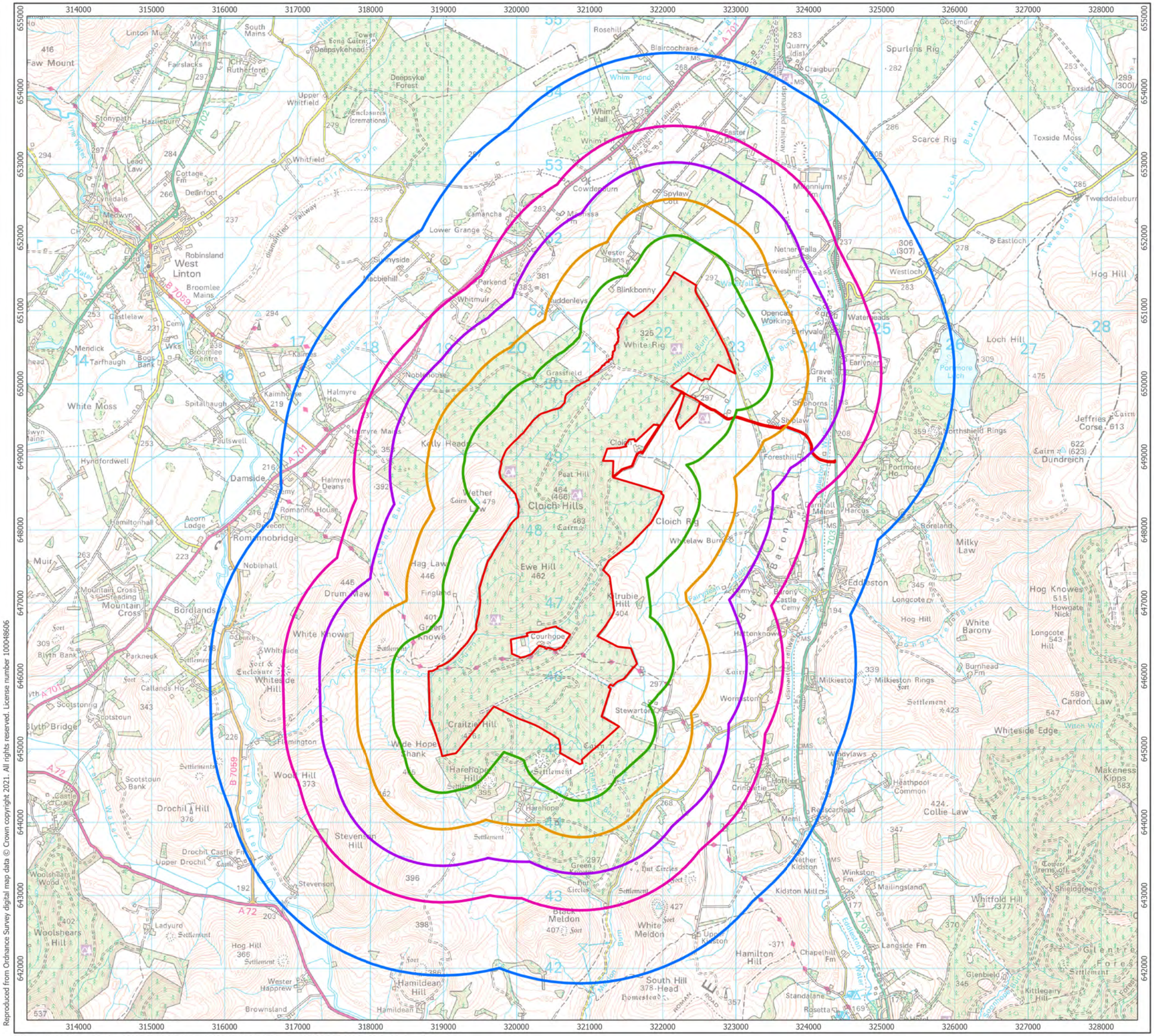
0 0.5 1 km NORTH

Produced By: LS	Ref: 3122-REP-005
Checked By: JA	Date: 17/03/2021

Vantage Points and Viewsheds
Figure 2

Cloich Forest Wind Farm
Appendix A8.5: Ornithology
Consultation Report 2020

Figure 3: Ornithology Survey Areas



P:\Projects\Ornithology\Projects\3122 Cloich Wind Farm\3122 Cloich Wind Farm.aprx\3122-REP-013 Fig03 Ornithology Survey Area

EDF renewables

ARCUS

- Site Boundary
- Moorland Breeding Bird Survey Area (0.5 km Buffer of Site Boundary)
- Goshawk Survey Area (1 km Buffer of Site Boundary)
- Black Grouse Survey Area (1.5 km Buffer of Site Boundary)
- Raptor and Owl Survey Area (2 km Buffer of Site Boundary)
- Goose Survey Area (3 km Buffer of Site Boundary)

1:50,000 Scale @ A3

0 0.5 1 km

NORTH

Produced By: LS	Ref: 3122-REP-013
Checked By: JA	Date: 11/06/2021

Ornithology Survey Areas
Figure 3

Cloich Forest Wind Farm
Appendix A8.5: Ornithology Consultation Report 2020

ARCUS

CLOICH FOREST WIND FARM

VOLUME 3: TECHNICAL APPENDICES

TECHNICAL APPENDIX A9.1:
PEAT SLIDE RISK ASSESSMENT

JUNE 2021

Prepared By:

Arcus Consultancy Services

7th Floor
144 West George Street
Glasgow
G2 2HG

T +44 (0)141 847 0340 l E info@arcusconsulting.co.uk
w www.arcusconsulting.co.uk

Registered in England & Wales No. 5644976

TABLE OF CONTENTS

1 INTRODUCTION

1.1 Background

Arcus Consultancy Services Ltd (Arcus) was commissioned by Cloich Windfarm Partnership LLP, wholly owned by EDF Energy Renewables Limited, ('the Applicant') to carry out a Peat Slide Risk Assessment (PSRA) to support an Environmental Impact Assessment Report (EIA Report) for the proposed Cloich Forest Wind Farm ('the Development') located within the Cloich Forest, approximately 5.5 kilometres (km) north-west of Peebles ('the Site'). The Site Layout is illustrated in Figure 9.1.1.

The Development will consist of the following key infrastructure:

- Up to 12 wind turbines with a maximum tip height of 149.9m;
- Associated foundations, blade laydown areas, crane hardstandings and external transformers at each wind turbine location;
- Access tracks linking the turbine locations comprising of a combination of new and upgraded tracks;
- Temporary construction compound;
- Up to two borrow pits for aggregate extraction;
- Network of underground cabling;
- Substation building, containing control elements;
- A Battery Energy Storage System (BESS) facility; and
- Site access.

The PSRA supports Chapter 9: Geology, Ground Conditions and Peat of the EIA Report.

The PSRA is accompanied by the following appendices:

- Appendix A: Figures;
- Appendix B: Site Photographs; and
- Appendix C: Hazard Rank Calculations.

1.2 Scope and Purpose

The scope of this PSRA is to:

- Review available desk-based information on the Site;
- Undertake a site walkover survey and peat probe surveys to characterise the prevailing ground conditions and identify existing or potential peat instability;
- Report on the findings of the survey and assess the potential instability risk and estimate the hazard from any potential peat slide; and
- Recommend mitigation measures and specific construction methodologies that should be considered during the construction period, if required.

This PSRA provides factual information on the peat survey results relating to the proposed turbine locations. Desk-based information and site surveys have been utilised to assess the potential risk of any peat landslide. The methodology adopted and details on the assessment are outlined in Sections 3, 4 and 5. The assessment has been undertaken in accordance with Scottish Government Guidance in assessing the likelihood and consequence of such an event.

The PSRA has been prepared by engineers, ecologists, and hydrologists at Arcus. The individuals have between 10- and 20-years' experience in both the onshore renewable wind sector and civil engineering projects throughout the UK and Ireland.

2 SITE INFORMATION AND DESK STUDY

2.1 Site Description and Topography

The Site Location is shown on Figure 1.1 of the EIA Report. The Site is situated within the Cloich Forest, covering an area of approximately 1,080 hectares (ha), centred on National Grid Reference (NGR) 320648, 647881 (Figure 1.2 of the EIA Report). The Site and the Development is wholly located within the administrative boundary of Scottish Borders Council ('the Council').

The topography of the Site, and immediate vicinity, is complex, with elevation ranging from approximately 280 metres (m) Above Ordnance Datum (AOD) in the north-east part of the Site to approximately 476 m AOD at the peak of Crailzie Hill in the south. The Site encompasses the rolling Cloich Hills, including Peat Hill (466 m AOD), Ewe Hill (462 m AOD), White Rig (325 m AOD), and Crailzie Hill (476 m AOD). The hills are dissected by a number of watercourses, including Middle Burn, Flemington Burn, Martyr's Dean, Corehope Burn and Harehope Burn. All watercourses eventually feed into the River Tweed. There are no waterbodies within the Site.

Coniferous plantation, at various stages of the planting, growing and felling cycle, is the primary land use within the Site; however, the area around Courhope in the south of the Site consists of improved upland pasture, utilised for sheep grazing, and improved grassland which remains clear of forestry.

In addition to the operational commercial forest of Cloich Forest, the Site and immediate vicinity consists of further areas of forestry and rural farmland, primarily used for grazing and other farmland activities.

The Site contains two public roads which form the Site access from the A703; these public roads are as follows:

- D17 Whim – Shiplaw; and
- D18 Cloich.

There are no residential properties within the Site; however, Cloich Farm is located adjacent to the Site, at approximate NGR 321655, 649105, approximately 1.2 km north-west from the closest turbine (T10).

2.2 Site Walkover

The purpose of the desk study and site visit was to gain a thorough understanding of site conditions including topography, geology, existing peat instability and hydrology. The outcome of this stage of the study was to determine which areas required detailed intrusive survey (by peat probing) and ultimately provide data for the assessment of PSRA.

Several site visits were undertaken as part of the overall EIA process between March 2020 and March 2021. The Site was examined for evidence of peatlands, presence of landslip and localised hagging. Geological mapping and areas of interest were pre-loaded to a handheld device for reference during the site walkover. Following a review of these in parallel with the initial site walkover, the desk study aimed to identify and or verify the following:

- The general condition of peat deposits;
- Evidence of any previous peat instability;
- The presence of low lying wet/peat lands; and
- Watercourses and potential other receptors.

2.2.1 Site Conditions

Forestry plantations are present across a majority of the site at varying stages of development. Some southern and northern areas of the site have been subject to felling and currently comprise open hummocky ground.

An established network of forestry tracks allows for movement around the Site with relative ease, with exception to the north eastern area of the Site which does not facilitate vehicular access and consists of dense forestry which restricts access by foot.

Topographically the Site is generally of high gradient, with extreme gradients falling in all directions from various hills in the south, east, west and central Site area.

Quarries are present in the eastern and western areas of the Site where rock has been extracted in specific areas. The presence of these quarries is known and they are not considered to pose any adverse impact to the Development.

Site photographs taken during the site walkover are included in Appendix B.

2.3 Published Geology

2.3.1 Superficial Soils

Published geological mapping of superficial soils indicates a majority of the Site to be underlain by deposits of Diamicton Till of Devensian Age. No superficial deposits are recorded across the remainder of the Site other than small localised pockets of Peat and Alluvium in the central eastern areas and at the northern extent of the Site.

Figure 9.1.2 illustrating the Superficial Soils is included in Appendix A.

2.3.2 Bedrock Geology

Published bedrock geology mapping indicates the majority of the Site to be underlain by sandstone and siltstone of the Kirkcolm Formation, with wacke and siltstone of the Portpatrick Formation present in the south-western Site area. A thin lens of the Moffat Shale Group comprising mudstone is also present in the south-western Site area.

Figure 9.1.3 illustrating the Solid Geology is included in Appendix A.

2.3.3 Carbon and Peatland Mapping 2016

The Carbon and Peatland 2016[1] Mapping indicates that at the macro level the Site is underlain by pockets of Class 4 soils in north, central and southern areas; these soils are unlikely to be associated with peatland habitats or to include carbon-rich soils. Numerous small pockets of Class 5 soils are also present at the Site, primarily in northern and central areas; these soils are not recorded as peatland habitat but there is potential for carbon-rich soils and deep peat. The remainder of the Site is recorded as Class 0 (Mineral Soils) where peatland habitats are not typically found, other than a small area of Class 3 soil which is recorded at the southern boundary of the site; these are soils where occasional peatland habitats can be found and most soils are carbon-rich with some areas of deep peat.

2.4 Geomorphology

No evidence of historic peat hagging was noted during the Site walkover and topsoil, where undisturbed generally appeared to be in good condition. Extensive forestry plantation and quarrying activities have historically been undertaken at the Site; it is considered that properties of the peat deposits may have been altered due to these historical activities.

[1] https://www.nature.scot/professional-advice/planning-and-development/planning-and-development-advice/soils/carbon-and-peatland-2016-map (Accessed 21/06/21)

Nonetheless, the possibility of instability within peat soils cannot be discounted, especially where there are significant topographic variances and the presence of watercourses, although there are only very localised areas of peat depth great enough to be considered at risk of instability.

2.5 Hydrology and Hydrogeology

The Site varies significantly in elevation and encompasses a network of watercourses which flow southwest and northeast from the central topographic high ridge.

The Site lies within the catchments of the Eddleston Water, which is classified by SEPA as having an overall status of "Poor", and Flemington Burn and Harehope Burn, which are both classified by SEPA as having an overall status of "Good"[2].

The Cowieslinn Burn, a tributary of Eddleston Water, rises at the northwest boundary of the Site and flows northeast to join Eddleston Water approximately 1.3 km east of the Site. The Middle Burn rises in the centre of the Site, to the west of Peat Hill at approximately 430 m AOD and flows north to join the Cowieslinn Burn and Eddleston Water. The Eddleston Water discharges to the River Tweed in Peebles, approximately 6 km southeast of the Site.

The Early Burn rise to the east of the Site, flows northeast to form the Shiplaw Burn and eventually flows into the Eddleston Water and the River Tweed. There are a number of small tributaries associated with the Early Burn within the Site boundary.

The Courhope Burn rises in the centre of the Site to the northeast of Ewe Hill at approximately 450 m AOD and flows southwest to form the Flemington Burn at the western boundary of the Site. The Flemington Burn flows west and discharges to the Lyne Water and eventually the River Tweed approximately 5 km to the south of the Site.

There are a number of smaller tributaries of the Courhope Burn and Flemington Burn within the Site boundary, including Corbie Linn which is a tributary of Flemington Burn.

The Harehope Burn rises in the south of the Site, 100 m north of the southern boundary, and flows east to join the Eddleston Water and then joins the River Tweed at the confluence in Peebles.

A tributary of the Stewarton Burn is located to the southeast of the Site and drains to the east into Stewarton Burn and Wormiston Burn before discharging to the Eddleston Water approximately 2.5 km east of the Site.

The groundwater unit underlying the Development is the Peebles, Galashiels and Hawick groundwater unit which is classified by SEPA as having an overall status of "Good".

Figure 9.1.4 illustrating the Geomorphology of the site is included in Appendix A

2.6 Sources of Information

The following sources of information were used as part of the desk study investigations:

- British Geological Survey - Online GeoIndex[3];
- Ordnance Survey (OS) topographical information;
- Aerial and Satellite photography via Ordnance Survey and Google Earth.
- Soil Survey of Scotland - 'MacAulay Institute for Soil Research' 1984;
- Soil Survey of Scotland - 'Scottish Peat Surveys' 1964;
- Scottish Government (SG) - 'Peat Landslide Hazard and Risk Assessments' December
- 2017;
- Scottish Government, Scottish Natural Heritage, SEPA (2017) Peatland Survey,

[2] https://www.sepa.org.uk/data-visualisation/water-environment-hub/ (Accessed 21/06/21)
[3] https://mapapps2.bgs.ac.uk/geoindex/home.html (Accessed 21/06/21)

Guidance on Developments on Peatland[4];
- The Scottish Government - Scotland's Third National Planning Framework, 2014[5];
- The Scottish Government - Scottish Planning Policy, 2014[6];
- Assessments by other EIA specialists (specifically hydrology and ecology for data on sensitive receptors); and
- Scotland's Environment Interactive Map[7]

[4] https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2018/12/peatland-survey-guidance/documents/peatland-survey-guidance-2017/peatland-survey-guidance-2017/govscot%3Adocument/Guidance%2Bon%2Bdevelopments%2Bon%2Bpeatland%2B-%2Bpeatland%2Bsurvey%2B-%2B2017.pdf (Accessed 21/06/21)

[5] https://www.gov.scot/publications/national-planning-framework-3/ (Accessed 21/06/21)

[6] https://www.gov.scot/publications/scottish-planning-policy/ (Accessed 21/06/21)

[7] https://map.environment.gov.scot/sewebmap/ (Accessed 21/06/21)

3 GUIDANCE AND METHODOLOGY

3.1 Overview of Guidance and Peat Failure Mechanisms

3.1.1 Peat Depth and Slope

The Scottish Government guidance divides peat instability into two categories: 'peat slides' and 'bog bursts'. The guidance states that peat slides have a greater risk of occurrence in areas where:

- Peat is encountered at or near to ground surface level;
- The thicknesses are recorded in the region of 2.0 m (above which, in general terms, peat instability would increase with peat thickness); and
- The slope gradients are steep (between 5° and 15°).

Bog bursts are considered to have a greater risk of occurrence in areas where:

- Peat depth is greater than 1.5 m; and
- Slope gradients are shallow (between 2° and 10°).

It should be noted however that peat instability events, although uncommon, can occur out with these limits. Reports of bog bursts are generally restricted to the Republic and Northern Ireland.

Further to the general guidance above, in relation to peat depth, it is considered that the extent and depth of peat is controlled to a degree by rainfall and elevation, giving rise to three common types of peat (Boylan et al. 2008[8]):

- Upland Blanket Bog: Blanket bogs are typically about 3 m thick however, they can be up to 5 m thick. Generally thinning at greater elevations;
- Raised Bog: Raised bogs generally tend to be 3-12 m thick, averaging 7 m with their growth occurring above the water table; and
- Lowland Blanket Bog: Much the same as the upland version; however, they form around sea level in areas of very high rainfall.

Generally, the potential for peat instability increases with peat depth, however other instability indicators need considered, namely slope and substrate.

3.1.2 Substrate

Peat slide failures tend to occur at the interface of the peat and underlying substrate therefore, understanding the nature of the underlying substrate can provide a key factor when considering the risk stability.

Using the peat probe refusal, an estimation of the underlying materials can be determined based on:

- Gradual refusal – Clay;
- Crunching/Gritty – Weathered Rock/Sand and Gravel; or
- Abrupt Refusal/Hard – Rock.

Where sand and/or gravel is recorded, the interface is considered to be the best-case scenario with the highest friction value.

Where clay is recorded, the upper horizons of the clay are typically softened through poor drainage in this soil group with low shear strengths expected. While rock substrate provides a high strength, the surface being smooth can lead to a weak interface, with similar risk to that of a clay substrate.

[8] Boylan et al (2008) Peat Slope Failure in Ireland (Accessed 21/06/21)

The presence of slip material, or evidence of peat instability would represent the worst-case scenario for the assessment of substrate.

The substrate parameters are included in the Hazard and Exposure Assessment in Section 5 of this PSRA.

3.1.3 Other Considerations

Preparatory factors which effect the stability of peat slopes in the short to medium-term include:

- Loss of surface vegetation (deforestation);
- Changes in sub-surface hydrology;
- Increase in the mass of peat through accumulation, increase in water content and growth of tree planting; or
- Reduction in shear strength of peat or substrate due to chemical or physical weathering, progressive creep and tension cracking.

Triggering factors which can have immediate effect on peat stability and act on susceptible slopes include:

- Intensive rainfall or snow melt causing pressures along existing or potential peat/substrate interfaces;
- Snow melt;
- Alterations to drainage patterns, both surface and sub-surface;
- Peat extraction at the toe of the slope reducing the support of the upslope material;
- Peat loading (commonly due to stockpiling) causing an increase in shear stress; and
- Earthquakes or rapid ground accelerations such as due to blasting or mechanical movement.

Consideration of peat stability should form an integral part of the design of a wind farm development. While peat does not wholly provide a development constraint, areas of deep peat or peat deposits on steep slope should be either avoided through design and micro-siting; or mitigation measures should be designed to avoid instability and movement.

3.2 Methodology

Despite being an application under the Town and Country Planning (Scotland) Act 1997[9], the PSRA has been carried out in accordance with the Energy Consents Unit (ECU), Scottish Government guidance of 2017 titled Peat Landslide Hazard and Risk Assessments - Best Practice Guide for Proposed Electricity Generation Developments[10].

In June 2014, Scottish Planning Policy[11] (SPP) and National Planning Framework (NPF3)[12] were published. In relation to peat and the assessment of effects on resource, NPF3 references SNH Scotland's National Peatland Plan[13]. These policy, framework and guidance documents are considered in this PSRA. The PSRA undertaken is based on:

- Desk based assessment;
- Site Walkover;
- An initial Phase 1 peat probing scheme;

[9] Scottish Government (1997) Town and Country Planning (Scotland) Act 1997 [Online] Available at: http://www.legislation.gov.uk/ukpga/1997/8/contents (Accessed 21/06/21)

[10] Scottish Government (2017) Peat Landslide Hazard and Risk Assessment: Best Practice Guide for Proposed Electricity Generation Development [Online] Available at: https://www.gov.scot/Publications/2017/04/8868 (Accessed 21/06/21)

[11] Scottish Government (2014) Scottish Planning Policy [Online] Available at: http://www.scotland.gov.uk/Topics/Built-Environment/planning/Policy (Accessed 21/06/21)

[12] Scottish Government (2014) National Planning Framework 3 [Online] Available at: http://scotland.gov.uk/Resource/0045/00453683.pdf (Accessed 21/06/21)

[13] SNH (2015) Scotland's National Peatland Plan [Online] Available at: https://www.nature.scot/climate-change/taking-action/carbon-management/restoring-scotlands-peatlands/scotlands-national-peatland-plan (Accessed 21/06/21)

- Phase 2 probing comprising infrastructure specific probing; and
- A hazard and risk ranking assessment.

The area of the Site subject to assessment was determined by the emerging development layout which considered both anticipated peat deposits as well as other physical and environmental constraints.

3.2.1 Development of Hazard Rank

The early stages of the PSRA including the desk study, site visit and peat probing were carried out in parallel with the assessment of wider constraints to inform the layout of the Development. Following identification of peat depths within the Site, the assessment has determined the potential effects on the peat resource from construction activities which would include:

- Construction of tracks;
- Excavation of turbine bases;
- Foundation construction;
- Construction of hardstanding; and
- Temporary storage of peat and soils.

An assessment of the peat probing data and a review against desk study information was undertaken and a hazard rank was calculated for different zones across the site reflecting risk of peat instability/constraint to construction.

Where practical, the Development design would be progressed to avoid areas of a risk score above 'low'. Where this has would not be achievable, areas affected would be discussed in both the EIA as having significant effect, with relative mitigation measures proposed to reduce this, and recorded on a risk register which sets out specific mitigation measures which are considered necessary to reduce the risk of inducing instability.

Details of the hazard and risk ranking assessment is included in Sections 5 and 6 of this PSRA.

4 SITE SURVEYS AND RESULTS

4.1 Investigations

The existing peat depths across the Site have been determined through a peat probe survey undertaken during the EIA as recommended in the Nature Scot (formerly Scottish Natural Heritage (SNH)), Scottish Government and James Hutton Institute guidance for investigating peat. The survey was initiated to inform the EIA and site design work while supporting the peat slide risk assessment and comprised of the following:

- Phase 1 Probing – 100 m grid across the developable area; and
- Phase 2 (a and b) Probing – Infrastructure focussed probing comprising 50 m centres along tracks with perpendicular probes between 10 m and 25 m either side of track, and 10 m cross-hair of turbine locations.

Initial peat depth surveys were undertaken in March 2020 comprising a 100 m grid in the developable area and where dense forestry plantation would allow access. The rationale of probing is in accordance with the phase 1 approach as detailed in the Scottish Government guidance for investigating peat.

Phase 2 peat depth surveys were undertaken across a series of visits in November 2020 through to April 2021. The probe positions for these visits were determined by the design freeze layout and provided increased resolution along the access track alignments and in the vicinity of turbine hardstandings. Peat depths were measured at cross sections centred along the proposed access tracks at 50 m centres with offsets of 25 m on either side of the centre line. Across turbine locations, where possible, probing was carried out at 10 m centres for assessment allowing for micro siting of turbines and hardstandings relative to prevailing conditions.

It should be acknowledged that natural variations in peat depth/thickness could occur between probe positions, although areas of infrastructure had undergone intensely spaced probing and this would be less likely.

4.2 Summary of Peat Depths

Throughout the peat surveys to date, a total of 1,081 probes were progressed. 92.5% of these probes recorded no peat or peat up to 0.5 m in depth. Thick peat (where the depth was greater than >1.0 m) was recorded at less than 3% of locations.

The maximum peat depth recorded was 4.6 m in the eastern sector of the Site, this was the only peat of this extent found in the entire Site.

Generally, peat over the Site was recorded as being less than 0.5 m with the average peat depth across the Site being 0.26 m.

Table 1 summarises the recorded peat depths.

Table 1: Peat Depth Summary

Peat Depth Range (m)	No of peat probes	Percentage of Total (%)
0.00 - 0.50 m	1,000	92.5
0.51m - 1.00 m	50	4.6
1.01m - 1.50 m	12	1.1
1.51m - 2.00 m	8	<1.0
2.01m - 2.50 m	3	<1.0
2.51m - 3.00 m	0	0
3.01m – 3.50 m	4	<1.0

3.51m – 4.00 m	0	0
4.01m – 4.50 m	3	<1.0
4.51m – 5.00m	1	<1.0

The peat probe locations and depths are shown on Figure 9.1.5 appended with this PSRA, and details of probe records are included in Appendix C. The Interpolated Peat Depths are illustrated on Figure 9.1.6 and the peat depths encountered at turbine locations and summarised in Table 2 below.

Table 2: Peat Depths at Turbines

Proposed Turbine No.	Average Peat Depths (m)
T1	0.16
T2	0.18
T3	0.28
T4	0.13
T5	0.21
T6	0.16
T7	0.06
T8	0.48
T9	0.12
T10	0.13
T11	0.10
T12	0.11

5 HAZARD AND EXPOSURE ASSESSMENT

5.1 Background

A 'Hazard Ranking' system has been applied across the Site based on the analysis of risk of peat slide as outlined in the Scottish Government guidance. This is applied on the principle:

Hazard Ranking = Hazard x Exposure

Where 'Hazard' represents the likelihood of any peat slide event occurring and 'Exposure' being the impact or consequences that a peat slide may have on sensitive receptors that exist on and around the Site.

5.2 Methodology

The determination of Hazard and Exposure values is based on a number of variables which impact the likelihood of a peat slide (the Hazard), and the relative importance of these variables specific to the Site.

Similarly, the consequences or Exposure to receptors is dependent on variables including the particular scale of a peat slide, the distance it will travel and the sensitivity of the receptor.

In the absence of a predefined system, the approach to determining and categorising Hazard and Exposure is determined on a Site-by-Site basis. The particular system adopted for the Development PSRA assessment is outlined in the following sub sections.

5.3 Hazard Assessment

The potential for a peat slide to occur during the construction of a windfarm depends on several factors, the importance of which can vary from Site to Site. The factors requiring considerations would typically include:

- Peat depth;
- Slope gradient;
- Substrate material;
- Evidence of instability or potential instability;
- Vegetation cover; and
- Hydrology.

Of these, peat depth and slope gradient are considered to be principal factors. Without a sufficient peat depth and a prevailing slope, peat slide hazard would be negligible. The Slope Gradient is illustrated on Figure 9.1.7 For the Development, the substrate material is also considered a key relevant factor in relation to the mechanics of slide, whilst the other aspects provide key considerations.

It should be noted that historical peat probing at the Site did not include an estimate of the underlying substrate material, therefore a value of 2 (unknown) was assigned to these probing points which is equivalent to clay as seen in Table 5. This is considered a conservative figure which could increase the hazard ranking and is another layer of safety embedded within this PSRA.

5.4 Hazard Rating

When several factors may impact on the Hazard potential, a relative ranking process is applied attributing different weighting to each factor as shown below.

Table 3: Coefficients for Slope Gradients

Slope Angle (degrees)	Slope Angle Coefficients
Slope < 2°	1
2° < Slope < 4°	2
4° < Slope < 8°	4
8° < Slope < 15°	6
Slope >15°	8

Table 4: Coefficients for Peat Thickness and ground conditions

Peat Thickness	Ground Conditions Coefficients
Peaty or organic soil (<0.5m)	1
Thin Peat (0.5 – 1.0m)	2
Deep Peat (>1.0m)	3*
Deep Peat (>3.0)	8

* - Note that thicker peat generally occurs in areas of shallow gradient and records and research indicate that thick peat does not generally occur on the steeper gradients.

Table 5: Coefficients for Substrate

Substrate Material	Substrate Coefficients
Sand/gravel	1
Rock	1.5
Clay	2
Not proven	2
Slip material (Existing materials)	5

The Hazard Rating Coefficient for a particular location is calculated using the following equation:

Hazard Rating Coefficient = Slope Gradient x Peat Thickness x Substrate

From the Hazard Rating Coefficient, the risk to stability can be ranked as set out in Table 6.

Table 6: Hazard Rating

Hazard Rating Co-efficient	Potential Stability Risk (Pre-Mitigation)
<5	Negligible
5 to 15	Low
16 to 30	Medium
31 to 50	High
> 50	Very High

5.5 Peat Stability Assessment

The likelihood of a particular slope or hillside failing can be expressed as a Factor of Safety. For any potential failure surface, there is a balance between the weight of the potential landslide (driving force or shear force) and the inherent strength of the soil or rock within the hillside (shear resistance).

The guidance states that the 'Infinite Slope' method of analysis, after Skempton and DeLory (1957), is the most well established and commonly applied method for the assessment of peat slope stability. The stability of a slope can be assessed by calculating the factor of safety F, which is the ratio of the sum of resisting forces (shear strength) and the sum of the destabilising forces (shear stress):

$$F = \frac{c' + (\gamma - m\gamma_w) z \cos^2 \beta \tan \phi'}{\gamma z \sin \beta \cos \beta}$$

Where *c'* is the effective cohesion, *γ* is the bulk unit weight of saturated peat, *γw* is the unit weight of water, *m* is the height of the water table as a fraction of the peat depth, *z* is the peat depth in the direction of normal stress, *β* is the angle of the slope to the horizontal and ϕ' is the effective angle of internal friction. Values of F < 1 indicate a slope would have undergone failure under the conditions modelled; values of F > 1 suggest conditions of stability.

Assumed geotechnical parameters have been utilised in the formula to inform the stability assessment, based on literature values to inform the stability analysis, as included in Table 7.

Table 7: Literature for Geotechnical Parameters of Peat

Reference	Effective **Cohesion C'** (kPa)	Effective Angle of Friction **ϕ** (°)	**Unit Weight Y'** (kN/m2)	Comments
Hanrahan et al (1967)[14]	5.5 – 6.1	36.6 - 43.5	-	Remoulded H4 Sphagnum peat
Hollingshead and Raymond (1972)[15]	4.0	34	-	-
Hollingshead and Raymond (1972)	2.4 – 4.7	27.1 – 35.4	-	Sphagnum peat (H3, mainly fibrous)
Carling (1986)[16]	6.52	0	10	-
Kirk (2001)[17]	2.7 – 8.2	26.1 – 30.4		Ombrotrophic blanket peat
Warburton et al (2003)[18]	5.0	23	9.68	Basal Peat
Warburton et al (2003)	8.74	21.6	9.68	Fibrous Peat
Dykes and Kirk (2006)	3.2	30.4	9.61	Acrotelm
Dykes and Kirk (2006)	4.0	28.8	9.71	Catotelm

[14] Hanrahan et al (1967) - Hanrahan, E.T., Dunne, J.M., and Sodha, V.G. 1967. Shear strength of peat. Proceedings Geotechnical Conference, Oslo, Vol. 1, pp. 193–198.

[15] Hollingshead and Raymond (1972) - Hollingshead, G.W., and Raymond, G.P. 1972. Field loading tests on Muskeg, Canadian Geotechnical Journal, 9(3): 278–289.

[16] Carling (1986) - Peat slides in Teesdale and Weardale, northern Pennines, July 1983: Description and failure mechanisms

[17] Kirk (2001) - Initiation of a multiple peat slide on Cuilcagh Mountain, Northern Ireland

[18] Warburton et al (2003) - Anatomy of a Pennine peat slide, Northern England

C′ – effective cohesion (kPa), typically ranging from 2.5 to 8.5 therefore 5.0 has been adopted for the purposes of the assessment.

ϕ – effective angle of friction (°), typically ranging from 21.6 to 43.5 therefore 29.6 has been adopted for the purposes of the assessment.

Y' – unit weight (kN/m2), typically ranging from 9.61 to 10, therefore 10 has been adopted for the purposes of the assessment.

In accordance with the best practice method, F values of <1.0 indicate slopes that would experience failure under the modelled conditions and as such are considered areas of high risk. However, Boylan et al (2008) indicate that a relatively high value of F=1.4 should be used to identify slopes with the potential for instability. Adopting this approach, high risk areas area indicated where F is <1.0, medium risk areas are indicated as 1.01 to 1.50 and >1.5 are low risk.

Using digital terrain modelling and GPS co-ordinates of each peat probe, a factor of Safety, F has been calculated for each probe locations which has been interpolated through ArcGIS Spatial Analyst tools. The Factor of Safety Assessment provides a sense check of the ranking based system, providing an absolute approach to the 'Factor of Safety Plan' is shown on Figure 9.1.8. The results of the Factor of Safety calculations indicated all points on the Site as low risk. This was primarily due to the l limited peat recorded on site.

5.6 Exposure Assessment

The main Exposure receptors identified within the Site and surrounding area which could potentially be affected in the event of a peat slide were existing wind farm infrastructure.

The impact of a peat slide on receptors can be assessed on a relative scale based on the potential for loss of habitat, a historical feature or disruption/danger to the public. To effectively assess the impact, the assessment of Exposure effect must also consider the distance between the hazard and the receptor, and the relative elevation between the two.

5.7 Exposure Rating

Similar to the Hazard Rating, the Exposure Ratings were determined using relative ranking process by attributing the different weighting systems to each factor as shown below:

Table 8: Coefficients for Receptor Type

Receptor	Receptor Coefficients
Tracks or Paths	2
Road	3
Minor water feature	6
Site infrastructure	6
Dwelling	8
Major water feature	8
Sensitive Habitats (Blanket bog)	8

Table 9: Coefficients for Distance from Receptor

Distance from Receptor	Distance Coefficients
> 1 km	1
100 m to 1 km	2
10 m to 100 m	3
<10 m	4

Table 10: Coefficients for Receptor Elevation

Receptor Elevation	Elevation Coefficients
< 10 m	1
10 m to 50 m	2
50 m to 100 m	3
> 100 m	4

The Exposure Rating Coefficient for a particular location is calculated using the following equation:

Exposure Rating Coefficient = Receptor x Distance x Elevation

From the Exposure Rating Coefficient, the risk to stability can be ranked as set out in Table 11.

Table 11: Exposure Rating

Exposure Rating Co-efficient	Potential Stability Risk (Pre-Mitigation)
<6	Very Low
6 to12	Low
13 to 24	High
24 to 30	Very High
>30	Extremely High

5.8 Rating Normalisation

In order to achieve an overall Hazard Ranking in accordance with the Scottish Government Guidance, the Hazard and Exposure Rating Coefficient derived from the coefficient tables are normalised as shown in Table 12.

Table 12: Rating Normalisation

Hazard Rating		Exposure Rating	
Current Scale	Normalised Scale	Current Scale	Normalised Scale
< 5 Negligible	1	<6 Very Low	1
5 to 15 Low	2	6 to 12 Low	2
15 to 30 Medium	3	13 to 24 High	3
30 to 50 High	4	25 to 30 Very High	4
>50 Very high	5	>30 Extremely High	5

The record of the Hazard Rank Assessment is included in Appendix C of this PSRA.

6 HAZARD RANKING

Having identified the rating coefficients in Section 5 of this PSRA, it is possible to categorise areas of the Site with a Hazard Ranking by multiplying the Hazard and Exposure Rating. Hazard Ranking and associated suggested actions matrix are shown in Tables 13 and 14 below:

Table 13: Hazard Ranking and Suggested Actions

Hazard Ranking		Action Suggested in the Scottish Executive Guidance
17-25	High	Avoid project development at these locations.
11-16	Medium	Project should not proceed unless hazard can be avoided or mitigated at these locations, without significant environmental impact, in order to reduce hazard ranking to low or less
5-10	Low	Project may proceed pending further investigation to refine assessment. Mitigation of hazards maybe required through micro-siting or re-design at these locations.
1-4	Negligible	Project should proceed with monitoring and mitigation of peat landslide hazards at these locations as appropriate.

Table 14: Hazard Ranking Matrix

Hazard Rating						
	5	Low	Low	Medium	High	High
	4	Negligible	Low	Medium	Medium	High
	3	Negligible	Low	Low	Medium	Medium
	2	Negligible	Negligible	Low	Low	Low
	1	Negligible	Negligible	Negligible	Negligible	Low
		1	2	3	4	5
		Exposure Rating				

Receptor exposure was assessed for each of the hazard zones using the approach in Section 5. A summary of the Hazard Ranking result for each identified area is summarised in Table 15 and is presented in Figure 9.1.9 - Hazard Ranking Zonation Plan. The zonation is based on a combination of considerations including calculated hazard result, peat depth, topography and receptors and land uses.

7 SLIDE RISK AND MITIGATION

7.1 General

The PSRA has shown the Site to be generally of 'negligible' or 'low' hazard ranking.

The majority of peat across the site area was less than 0.5 m, with some also extending to depths between 0.5 m and 1.0 m. Localised pockets of peat greater than 1.0 m were recorded and these areas were largely avoided through the site layout design process.

There was a singular peat probe in the vicinity of T8 which generated a moderate hazard rating, however this was an isolated point with all nearby locations being designated with low or negligible hazard rankings. The moderate probe recorded a peat depth of 1.9 m on a gradient of 8.57°. Other probes in the vicinity record peat depths ranging from 0.0 m to 0.9 m, making the moderate probe a significant outlier. The recorded substrate at the moderate probe is clay whereas gravel was recorded elsewhere in the area, therefore it is possible that a layer of soft clay overlying stiffer clay was recorded as peat which would explain why the recorded peat depth was more than double that of any other probes in the near vicinity. This very isolated area has therefore been included within the wider zone (H7) with a low hazard ranking.

Where the hazard ranking has been lowered through mitigation measures, the original ranking will remain in the overall hazard zoning plan. It should be acknowledged that the hazard zonation plan is based on the pre-mitigation status.

While specific recommended mitigation in 'low' ranked areas are proposed, other mitigation is embedded in the design at EIA stage. It is also necessary for detailed design and construction of the Development to be undertaken in a competent and controlled manner.

The embedded mitigation and good practice measures are set out in Section 7.2 of this PSRA. It should be noted that the mitigation measures defined are not exclusive and other forms of mitigation may well be required and should be implemented during construction of the Development.

Table 15: Hazard Ranking

Hazard Area and Infrastructure		Unmitigated Hazard		Mitigated Hazard	
Hazard Area	Infrastructure Affected	Ranking	Key Aspects and Direct Effects	Specific Actions	Ranking
H1	Existing tracks, Substation and BESS, and Construction Compound	Negligible	• Location and topography: Northern portion of site, sloping northerly • Hydrology: Middle burn situated in the central area flowing north. • Peat Depth: 0.0 m – 0.50 m. • Slope Gradient: 0° to 8° • Exposure: Proposed infrastructure	Best practice measures in relation to drainage prior to and during construction will be implemented as outlined in Technical Appendix 10.1 Water Construction Environmental Management Plan and management of peat and peaty soils as outlined in Technical Appendix 9.2 Outline Peat Management Plan. Mitigation measures as set out in section 7.3.	Negligible
H2	Proposed track, T12 and Borrow Pit	Low	• Location and topography: sloping slightly to the north and more steeply to the south with the plateau West Side Hill in in the central area. • Hydrology: Tributaries from surrounding hills, flowing north. • Peat Depth: 0.0 m – 0.50 m. • Slope Gradient: 0° to 18° • Exposure: Site infrastructure	Best practice measures in relation to drainage prior to and during construction will be implemented as outlined in Technical Appendix 10.1 Water Construction Environmental Management Plan and management of peat and peaty soils as outlined in Technical Appendix 9.2 Outline Peat Management Plan. During construction visual inspections and monitoring in areas with the potential for peat slide risk should take place. Mitigation measures as set out in section 7.3.	Negligible

Hazard Area and Infrastructure		Unmitigated Hazard		Mitigated Hazard	
H3	T10	Low	• Location and topography: South side of Peat • Hydrology: Middle Burn and tributary to Early Burn • Peat Depth: 0.0 m – 2.50 m. • Generally < 0.50m • Slope Gradient: 0° to <20° • Exposure: Site infrastructure, Hydrology	Best practice measures in relation to drainage prior to and during construction will be implemented as outlined in Technical Appendix 10.1 Water Construction Environmental Management Plan and management of peat and peaty soils as outlined in Technical Appendix 9.2 Outline Peat Management Plan. Mitigation measures as set out in section 7.3.	Negligible
H4	n/a	Negligible	• Location and topography: Slightly sloping topography in the valley between West Side and Peat Hill. • Hydrology: None noted • Peat Depth: 0.0 m – 1.50 m. Generally, < 0.50 m • Slope Gradient: 0° to 14° • Exposure: None	Best practice measures in relation to drainage prior to and during construction will be implemented as outlined in Technical Appendix 10.1 Water Construction Environmental Management Plan and management of peat and peaty soils as outlined in Technical Appendix 9.2 Outline Peat Management Plan. Mitigation measures as set out in section 7.3.	Negligible
H5	T10 and Proposed Tracks	Negligible	• Location and topography: Sloping topography on south-eastern face of Peat Hill. • Hydrology: None noted • Peat depth: 0.0 m – 0.50 m. • Slope Gradient: 4° to 16° • Exposure: Proposed Site Infrastructure	Best practice measures in relation to drainage prior to and during construction will be implemented as outlined in Technical Appendix 10.1 Water Construction Environmental Management Plan and management of peat and peaty soils as outlined in Technical Appendix 9.2 Outline Peat Management Plan. Mitigation measures as set out in section 7.3.	Negligible

Hazard Area and Infrastructure		Unmitigated Hazard		Mitigated Hazard	
H6	Proposed track, existing track	Negligible	• Location and topography: Generally flatter topography, within the north eastern area of main body of site. • Hydrology: Tributaries to the Early Burn • Peat Depth: 0.0 m - 4.50 m. Varying depths of peat with isolated are of deep peat located in the shallowest topographic area. • Slope Gradient: 0° to 30° • Generally 0 - 8° • Exposure: Site infrastructure	Best practice measures in relation to drainage prior to and during construction will be implemented as outlined in Technical Appendix 10.1 Water Construction Environmental Management Plan and management of peat and peaty soils as outlined in Technical Appendix 9.2 Outline Peat Management Plan. Mitigation measures as set out in section 7.3.	Negligible
H7	n/a	Low	• Location and topography: Generally flatter topography, within the north eastern area of main body of site. • Hydrology: Tributaries to the Early Burn • Peat Depth: 0.0 m - 3.50 m. Varying depths of peat with isolated are of deep peat located in the shallowest topographic area. • Slope Gradient: 0° to 8° • Exposure: None	Best practice measures in relation to drainage prior to and during construction will be implemented as outlined in Technical Appendix 10.1 Water Construction Environmental Management Plan and management of peat and peaty soils as outlined in Technical Appendix 9.2 Outline Peat Management Plan. Mitigation measures as set out in section 7.3.	Negligible

Hazard Area and Infrastructure		Unmitigated Hazard		Mitigated Hazard	
• H8	Proposed track, existing track and T11	Low	• Location and topography: Steep valley in the western site area within Cloich Hills • Hydrology: Flemington Burn and tributaries • Peat Depth: 0.0 m - 1.50 m. Generally, <0.50 m • Slope Gradient: 0° to 16° • Exposure: Site infrastructure	Best practice measures in relation to drainage prior to and during construction will be implemented as outlined in Technical Appendix 10.1 Water Construction Environmental Management Plan and management of peat and peaty soils as outlined in Technical Appendix 9.2 Outline Peat Management Plan. Mitigation measures as set out in section 7.3.	Negligible
H9	T6	Low	• Location and topography: Sloping area in the west of site, on face of Ewe Hill. • Hydrology: Tributary to Flemington Burn • Peat Depth: 0.0 m – 0.50 m. • Slope Gradient: 2° to 18° • Exposure: Site infrastructure and Borrow pit area	Best practice measures in relation to drainage prior to and during construction will be implemented as outlined in Technical Appendix 10.1 Water Construction Environmental Management Plan and management of peat and peaty soils as outlined in Technical Appendix 9.2 Outline Peat Management Plan. During construction visual inspections and monitoring in areas with the potential for peat slide risk should take place. Mitigation measures as set out in section 7.3.	Low

Hazard Area and Infrastructure		Unmitigated Hazard		Mitigated Hazard	
H10	Proposed track, T1 and T8	Negligible	• Location and topography: Plateau along top of Ewe Hill and Whaup Law in the Central site area. • Hydrology: Gibbs Cloich • Peat Depth: 0.0 m – 2.00 m. Generally, <0.50 m • Slope Gradient: 0° to 20° • Exposure: Site infrastructure	Best practice measures in relation to drainage prior to and during construction will be implemented as outlined in Technical Appendix 10.1 Water Construction Environmental Management Plan and management of peat and peaty soils as outlined in Technical Appendix 9.2 Outline Peat Management Plan. Mitigation measures as set out in section 7.3.	Negligible
H11	Proposed track, T7 and T9	Negligible	• Location and topography: Steep southern face of Ewe Hill in the central site area. • Hydrology: Muirhope Glen, and tributary to the Courhope Burn • Peat Depth: 0.0 m - 0.50 m. • Slope Gradient: 4° to <22° • Exposure: Site infrastructure	Best practice measures in relation to drainage prior to and during construction will be implemented as outline in Technical Appendix 10.1 Water Construction Environmental Management Plan and management of peat and peaty soils as outlined in Technical Appendix 9.2 Outline Peat Management Plan. Mitigation measures as set out in section 7.3.	Negligible

Hazard Area and Infrastructure		Unmitigated Hazard		Mitigated Hazard	
H12	Proposed Tracks and Borrow Pit	Low	• Location and topography: Valley between Ewe Hill/Whaup Law and the southern face of Kilrubie Hill. • Hydrology: Martyr's Dean and Tributaries to the Courhope Burn • Peat Depth: 0.0 m – 1.50 m. Generally, <0.50 m • Slope Gradient: 0° to <18° • Exposure: Site infrastructure, Hydrology	Best practice measures in relation to drainage prior to and during construction will be implemented as outline in Technical Appendix 10.1 Water Construction Environmental Management Plan and management of peat and peaty soils as outlined in Technical Appendix 9.2 Outline Peat Management Plan. Mitigation measures as set out in section 7.3.	Negligible

Hazard Area and Infrastructure		Unmitigated Hazard		Mitigated Hazard	
H13	T5	Negligible	• Location and topography: Eastern Site Area, slightly sloping topography. • Hydrology: None • Peat Depth: 0.0 m – 0.50 m. • Slope Gradient: 0° to 16° • Exposure: Site infrastructure	Construction Environmental Management Plan and management of peat and peaty soils as outlined in Technical Appendix 9.2 Outline Peat Management Plan. No infrastructure or construction activity is proposed in this small area of blanket bog at the eastern extent of the Site. Nonetheless, visual inspections and monitoring in the area should take place during the construction phase. Mitigation measures as set out in section 7.3.	Negligible
H14	T4 and Proposed Tracks	Low	• Location and topography: Sloping topography on the eastern face of Kilrubie Hill, in the eastern site area. • Hydrology: None • Peat Depth: 0.0 m – 0.50 m. • Slope Gradient: 0° to 16° • Exposure: Site infrastructure, Hydrology	Construction Environmental Management Plan and management of peat and peaty soils as outlined in Technical Appendix 9.2 Outline Peat Management Plan. No infrastructure or construction activity is proposed in this small area of blanket bog at the eastern extent of the Site. Nonetheless, visual inspections and monitoring in the area should take place during the construction phase. Mitigation measures as set out in section 7.3.	Negligible

Hazard Area and Infrastructure		Unmitigated Hazard		Mitigated Hazard	
H15	Proposed Tracks	Low	• Location and topography: Sloping topography on the southern and western face of Ewe Hill. • Hydrology: Gibbs Cloich, Muirhope Glen and Courhope Burn • Peat Depth: 0.0 m – 0.50 m. • Slope Gradient: 0° to 18° • Exposure: Site infrastructure, Hydrology	Construction Environmental Management Plan and management of peat and peaty soils as outlined in Technical Appendix 9.2 Outline Peat Management Plan. No infrastructure or construction activity is proposed in this small area of blanket bog at the eastern extent of the Site. Nonetheless, visual inspections and monitoring in the area should take place during the construction phase. Mitigation measures as set out in section 7.3.	Negligible
H16	n/a	Negligible	• Location and topography: Gently sloping topography between Ewe Hill and Crailzie Hill. • Hydrology: Courhope Burn • Peat Depth: 0.0 m – 0.50 m. • Slope Gradient: 0° to 16° • Exposure: Hydrology	Construction Environmental Management Plan and management of peat and peaty soils as outlined in Technical Appendix 9.2 Outline Peat Management Plan. No infrastructure or construction activity is proposed in this small area of blanket bog at the eastern extent of the Site. Nonetheless, visual inspections and monitoring in the area should take place during the construction phase. Mitigation measures as set out in section 7.3.	Negligible

Hazard Area and Infrastructure		Unmitigated Hazard		Mitigated Hazard	
H17	Proposed Tracks, T2 and T3	Low	• Location and topography: Southern site area between Crailzie Hill and Ewe Hill. • Hydrology: Muirhope Glen • Peat Depth: 0.0 m – 1.00 m. Generally <0.5m • Slope Gradient: 0° to 14° • Exposure: Site infrastructure, Hydrology	Construction Environmental Management Plan and management of peat and peaty soils as outlined in Technical Appendix 9.2 Outline Peat Management Plan. No infrastructure or construction activity is proposed in this small area of blanket bog at the eastern extent of the Site. Nonetheless, visual inspections and monitoring in the area should take place during the construction phase. Mitigation measures as set out in section 7.3.	Negligible
H18	Proposed Tracks	Negligible	• Location and topography: Southern site area between Crailzie Hill and Ewe Hill. • Hydrology: Tributary to Courhope Burn • Peat Depth: 0.0 m – 0.5 m. • Slope Gradient: 2° to 14° • Exposure: Site infrastructure, Hydrology	Construction Environmental Management Plan and management of peat and peaty soils as outlined in Technical Appendix 9.2 Outline Peat Management Plan. No infrastructure or construction activity is proposed in this small area of blanket bog at the eastern extent of the Site. Nonetheless, visual inspections and monitoring in the area should take place during the construction phase. Mitigation measures as set out in section 7.3.	Negligible

Hazard Area and Infrastructure		Unmitigated Hazard		Mitigated Hazard	
H19	n/a	Negligible	• Location and topography: Eastern Site area between Kilrubie Hill and Cralzie Hill. • Hydrology: Tributary to Stewarton Burn • Peat Depth: 0.0 m – 0.5 m. • Slope Gradient: 0° to 14° • Exposure: Hydrology	Construction Environmental Management Plan and management of peat and peaty soils as outlined in Technical Appendix 9.2 Outline Peat Management Plan. No infrastructure or construction activity is proposed in this small area of blanket bog at the eastern extent of the Site. Nonetheless, visual inspections and monitoring in the area should take place during the construction phase. Mitigation measures as set out in section 7.3.	Negligible

7.2 Embedded Mitigation

Embedded mitigation includes measures taken during design of the Development to reduce the potential for peat slide risk, designing to avoid any localised deep pockets of peat as well as consideration of wider environmental constraints, including the hydrology on site. In summary the principal measures that have been taken in relation to avoiding peat slide are:

- Locating infrastructure on shallower slopes, where possible; and
- Locating infrastructure on areas of shallow peat (or no peat) where possible.

Section 7.3 will detail the types of mitigation that will be employed prior to and during construction reduce any potential risk.

7.3 Peat Slide Mitigation Recommendations

Mitigation measures and good practice procedures will be implemented during construction and could include but not be limited to:

- Ground investigations prior to detailed design;
- Identification of areas sensitive to changes in drainage regime prior to detailed design
- Implementation of a geotechnical risk register and if required, provision of a specialist geotechnical engineer for periodic monitoring programme through construction;
- Identification of areas of deep peat and tool box talks on limiting the works in these areas. No significant peat present beneath the footprint of the Development;
- Micro siting turbines and other infrastructure where required;
- Management of peat, soils and rock where necessary to predetermined temporary storage areas, and managed by the onsite Ecow when required;
- Avoid placing excavated material or other forms of loading on breaks of slope or other potentially unstable slopes;
- Excavation works should be during periods of continuous heavy rainfall. after heavy and prolonged rainfall events; and
- Post-Construction reinstatement and re-establishment of vegetation at earliest;
- Appropriate drainage design should be implemented trackside and at turbines and crane hardstands.

8 CONCLUSIONS

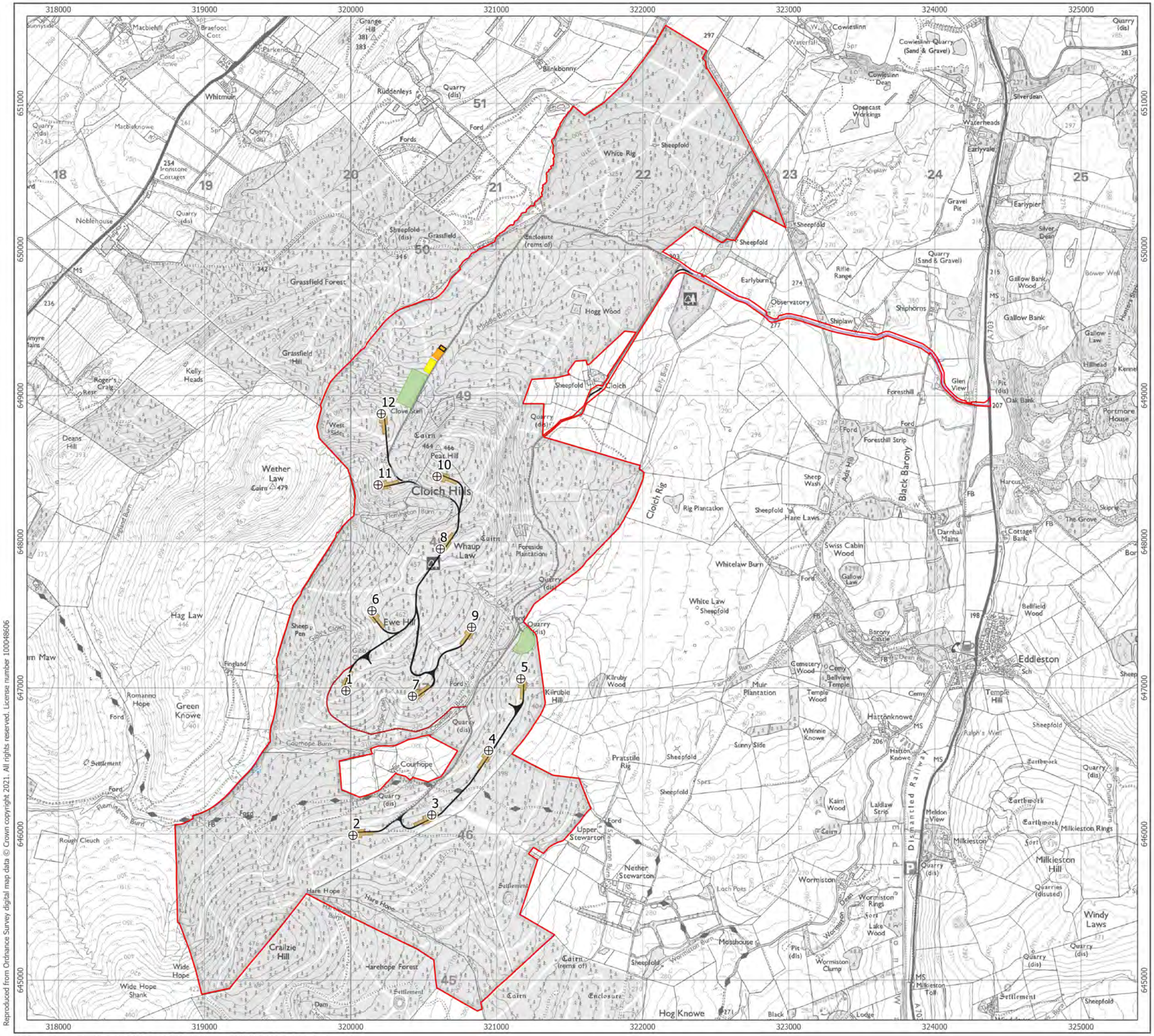
This PSRA has been undertaken for the Development in accordance with best practice, as detailed in Section 4.2 of the PSRA. The early stages of the assessment included a desk study, historic peat probing across the Site, followed by completion of Phase 1 peat probing and a further intensive probing exercise on the finalised Site layout design. The information gathered during this investigation was used to develop a Hazard Ranking across the Site.

The findings of the probing indicate that the majority of the Development is underlain by peat less than 0.5 m. While pockets of deep peat were recorded during the peat probing, these areas were out with the footprint of the Development.

Based on the scope of the study, the PSRA has indicated that the entire Site is 'negligible or low' hazard ranking with 50% of the hazard zones ranked as 'low' hazard ranking.

Notwithstanding the findings of the PSRA, the final design of infrastructure should be carefully sited and micro-siting adopted if required in order to maintain the design objective of avoiding any potential peat slide risk.

APPENDIX A - FIGURES



P:\Projects\Engineering\Projects\3439 Cloich\3439 Cloich.aprx\3439-REP-030 Fig9.1.1 Site Layout Plan

eDF renewables

ARCUS

- Site Boundary
- ⊕ Proposed Turbine Location

Proposed Site Infrastructure

- Borrow Pit
- Construction Compound
- Crane Hardstanding
- Substation Compound
- BESS Location
- New Access Track
- New Track Used by Construction Traffic Only
- Existing Track (Subject to Localised Upgrades)
- Public Road (Subject to Widening Works)

1:25,000 Scale @ A3

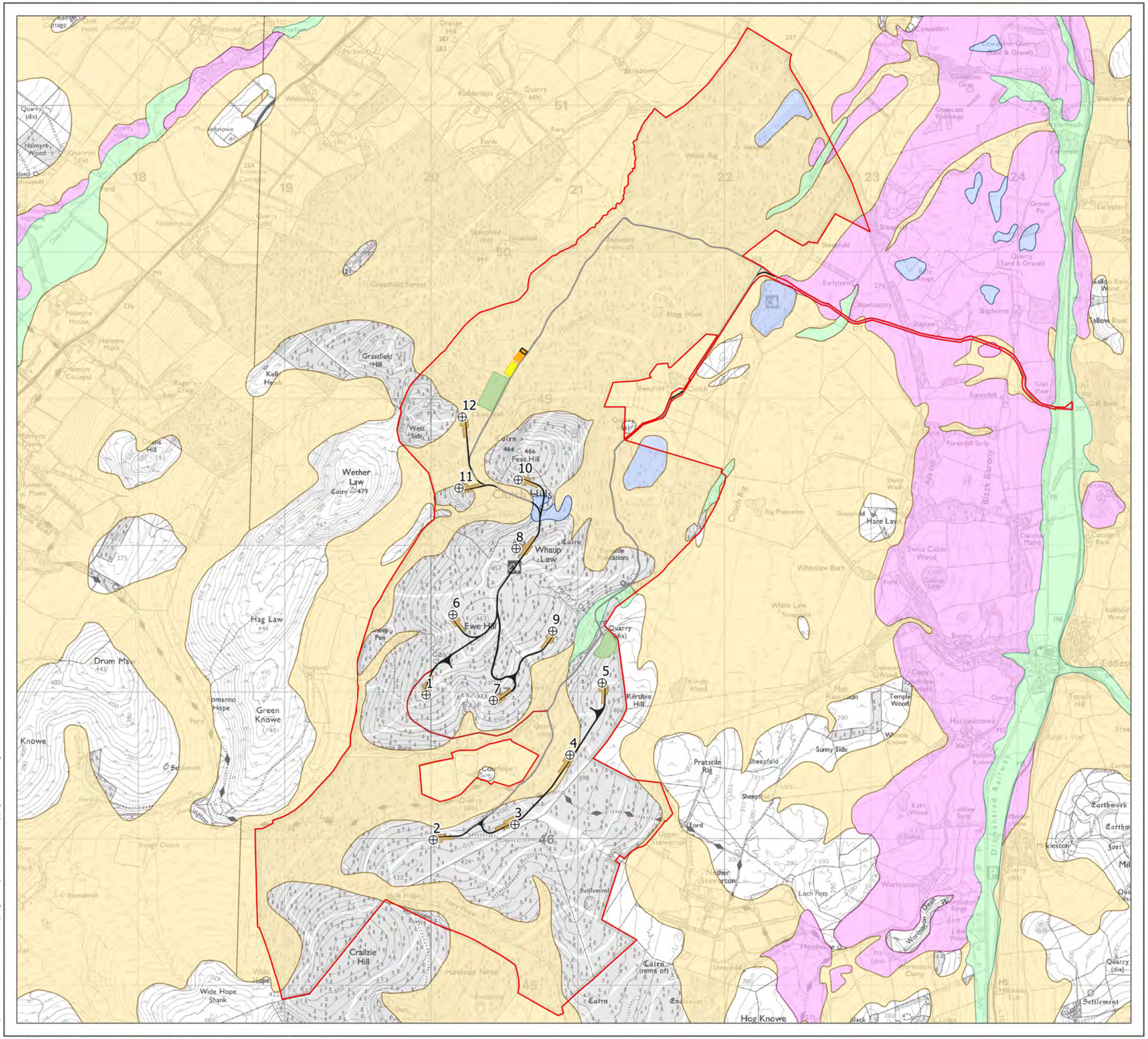
0 0.5 1 Km

NORTH

Produced By: BM	Ref: 3439-REP-030
Checked By: DB	Date: 10/06/2021

Site Layout Plan
Figure 9.1.1

Cloich Forest Wind Farm
Peat Slide Risk Assessment



Site Boundary
Proposed Turbine Location

Proposed Site Infrastructure

- Borrow Pit
- Construction Compound
- Crane Hardstanding
- Substation Compound
- BESS Location
- New Access Track
- New Track Used by Construction Traffic Only
- Existing Track (Subject to Localised Upgrades)
- Public Road (Subject to Widening Works)

Superficial Geology

- Alluvium
- Glaciofluvial Deposits
- Peat
- Till, Devensian
- Superficial Area Not Mapped

1:25,000 Scale @ A3

0 0.5 1 Km

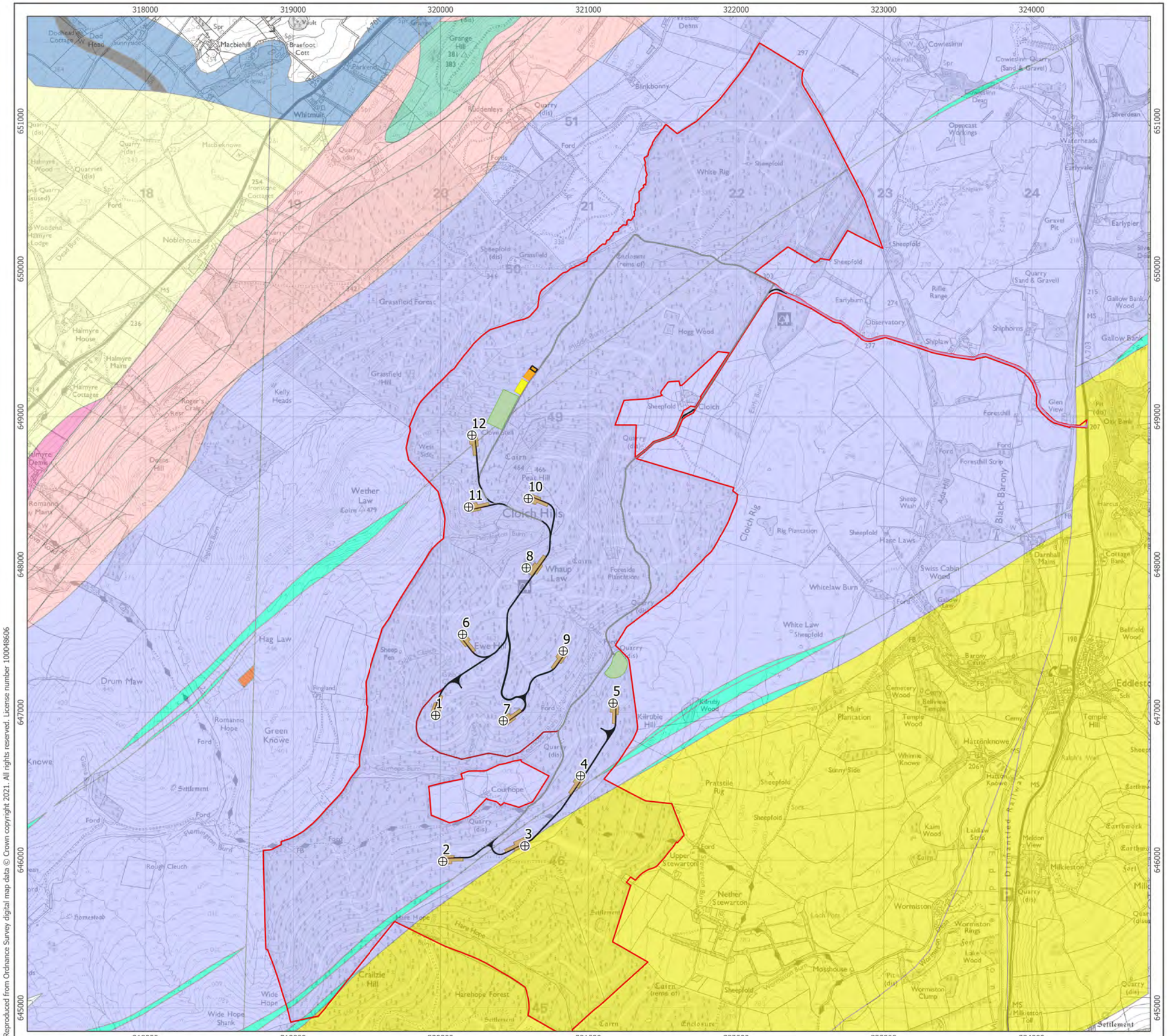
NORTH

Produced By: BM	Ref: 3439-REP-031
Checked By: DB	Date: 10/06/2021

Superficial Soils
Figure 9.1.2

Cloich Forest Wind Farm
Peat Slide Risk Assessment

P:\Projects\Engineering\Projects\3439 Cloich\3439 Cloich.aprx\3439-REP-031 Fig9.1.2 Superficial Geology



eDF renewables

ARCUS

- Site Boundary
- ⊕ Proposed Turbine Location

Proposed Site Infrastructure

- Borrow Pit
- Construction Compound
- Crane Hardstanding
- Substation Compound
- BESS Location
- New Access Track
- New Track Used by Construction Traffic Only
- Existing Track (Subject to Localised Upgrades)
- Public Road (Subject to Widening Works)

Bedrock Geology

- Kirkcolm Formation
- Moffat Shale Group
- Portpatrick Formation
- Auchtitench Sandstone Formation
- Biggar Volcanic Formation
- Clyde Plateau Volcanic Formation
- Lamancha Conglomerate Formation
- Leadhills Supergroup
- Marchburn Formation
- Strathclyde Group

1:25,000 Scale @ A3

0 0.5 1 Km

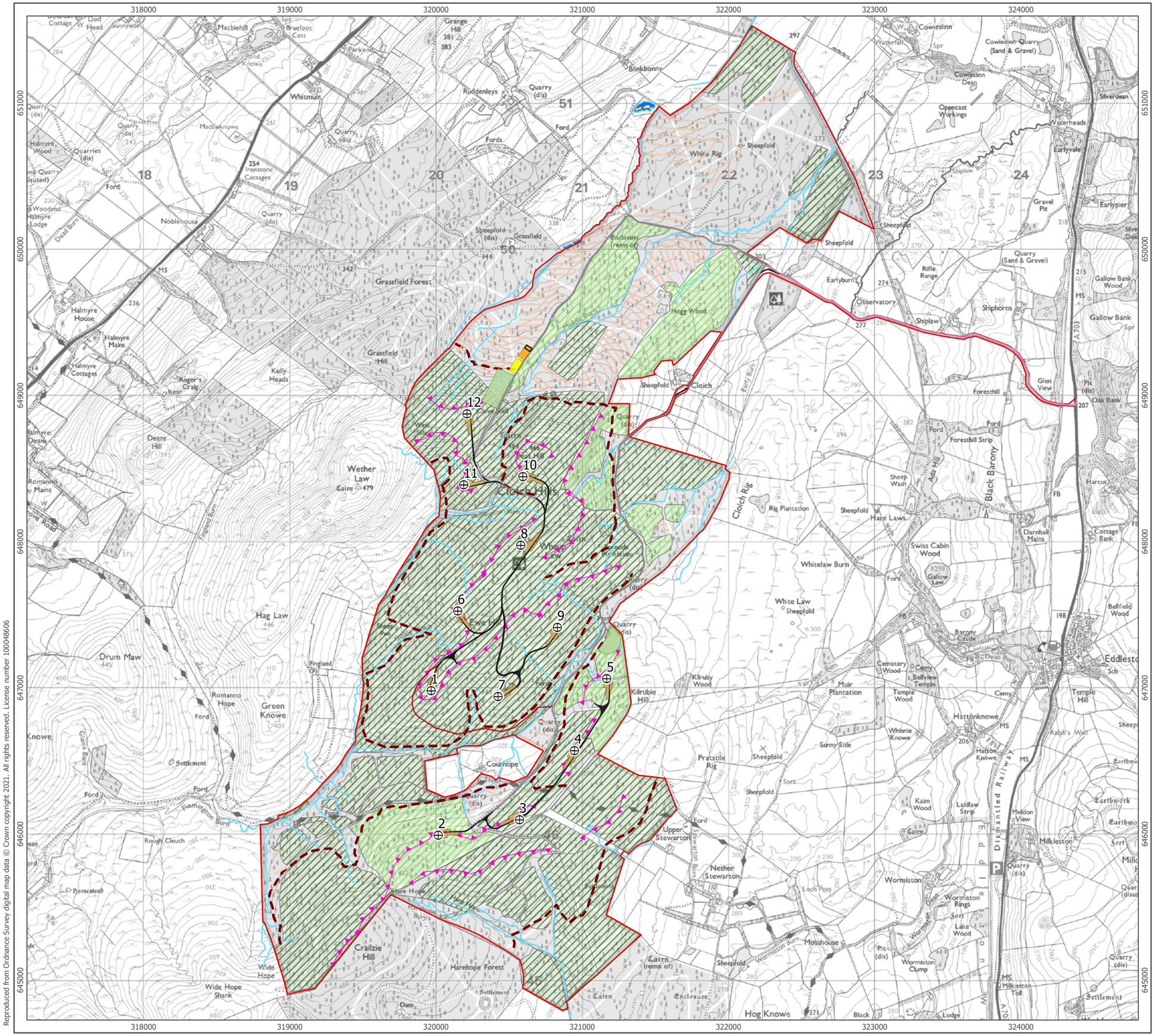
NORTH

Produced By: BM	Ref: 3439-REP-032
Checked By: DB	Date: 10/06/2021

Bedrock Geology
Figure 9.1.3

Cloich Forest Wind Farm
Peat Slide Risk Assessment

P:\Projects\Engineering\Projects\3439 Cloich\3439 Cloich.aprx\3439-REP-032 Fig9.1.3 Bedrock Geology



P:\Projects\Engineering\Projects\3439 Cloich\3439 Cloich.aprx\3439-REP-033 Fig9.1.4 Geomorphology Map

eDF renewables

ARCUS

- Site Boundary
- Proposed Turbine Location
- Artificial Drainage
- Bottom of Slope
- Top of Slope
- Watercourses
- Young Forestry
- Forestry
- Body of Water

Proposed Site Infrastructure

- Borrow Pit
- Construction Compound
- Crane Hardstanding
- Substation Compound
- BESS Location
- New Access Track
- New Track Used by Construction Traffic Only
- Existing Track (Subject to Localised Upgrades)
- Public Road (Subject to Widening Works)

1:25,000 Scale @ A3

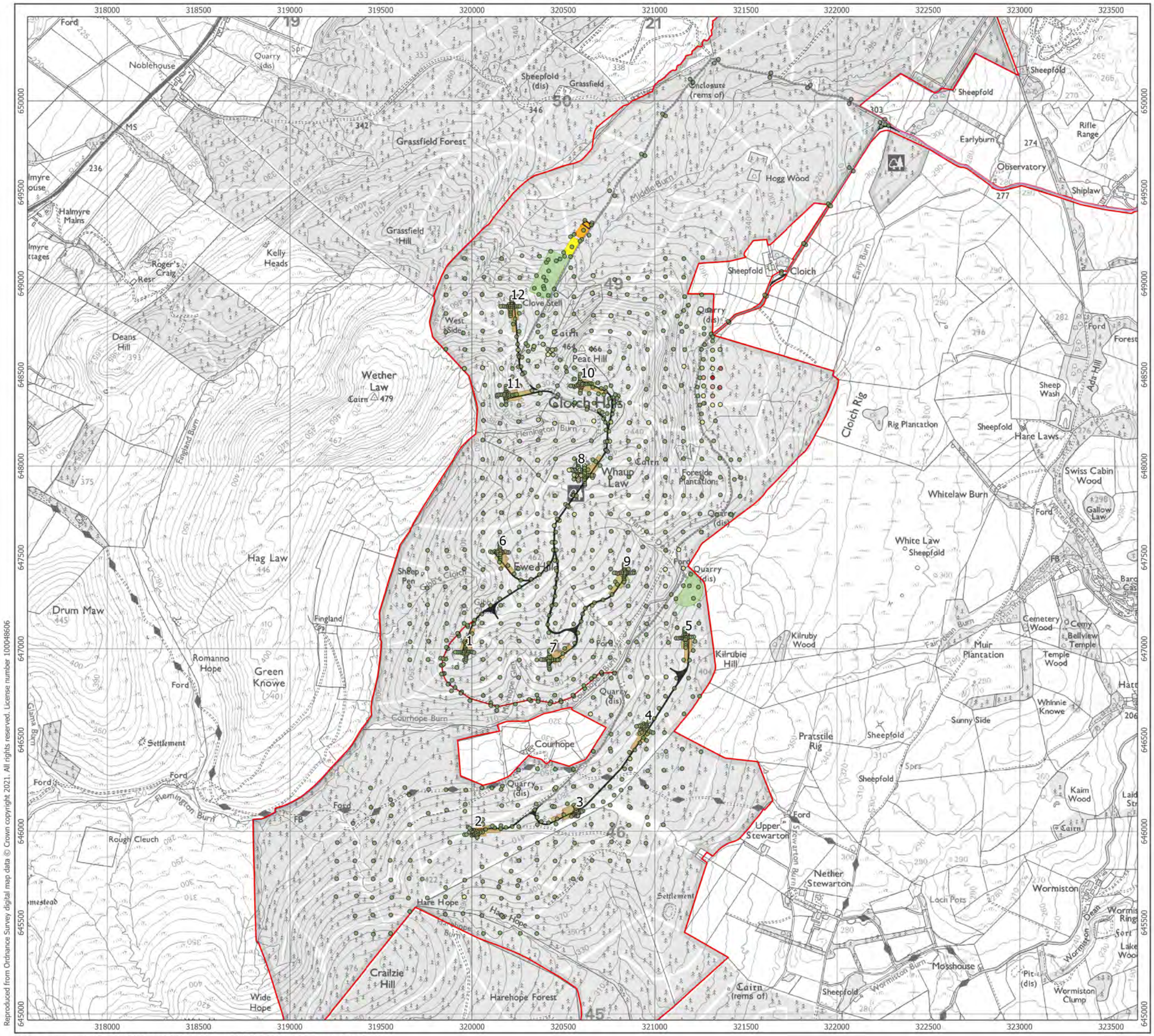
0 0.5 1 Km

NORTH

Produced By: BM	Ref: 3439-REP-033
Checked By: DB	Date: 06/05/2021

Geomorphology Map
Figure 9.1.4

Cloich Forest Wind Farm
Peat Slide Risk Assessment



P:\Projects\Engineering\Projects\3439 Cloich\3439 Cloich.aprx\3439-REP-034 Fig9.1.5 Recorded Peat Depths

eDF renewables

ARCUS

- Site Boundary
- Proposed Turbine Location

Proposed Site Infrastructure

- Borrow Pit
- Construction Compound
- Crane Hardstanding
- Substation Compound
- BESS Location
- New Access Track
- New Track Used by Construction Traffic Only
- Existing Track (Subject to Localised Upgrades)
- Public Road (Subject to Widening Works)

Recorded Peat Depths (m)

- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 1.50
- 1.51 - 2.00
- 2.01 - 2.50
- 2.51 - 3.00
- 3.01 - 3.50
- 3.51 - 4.00
- 4.01 - 4.50
- 4.51 - 5.00

1:20,000 Scale @ A3

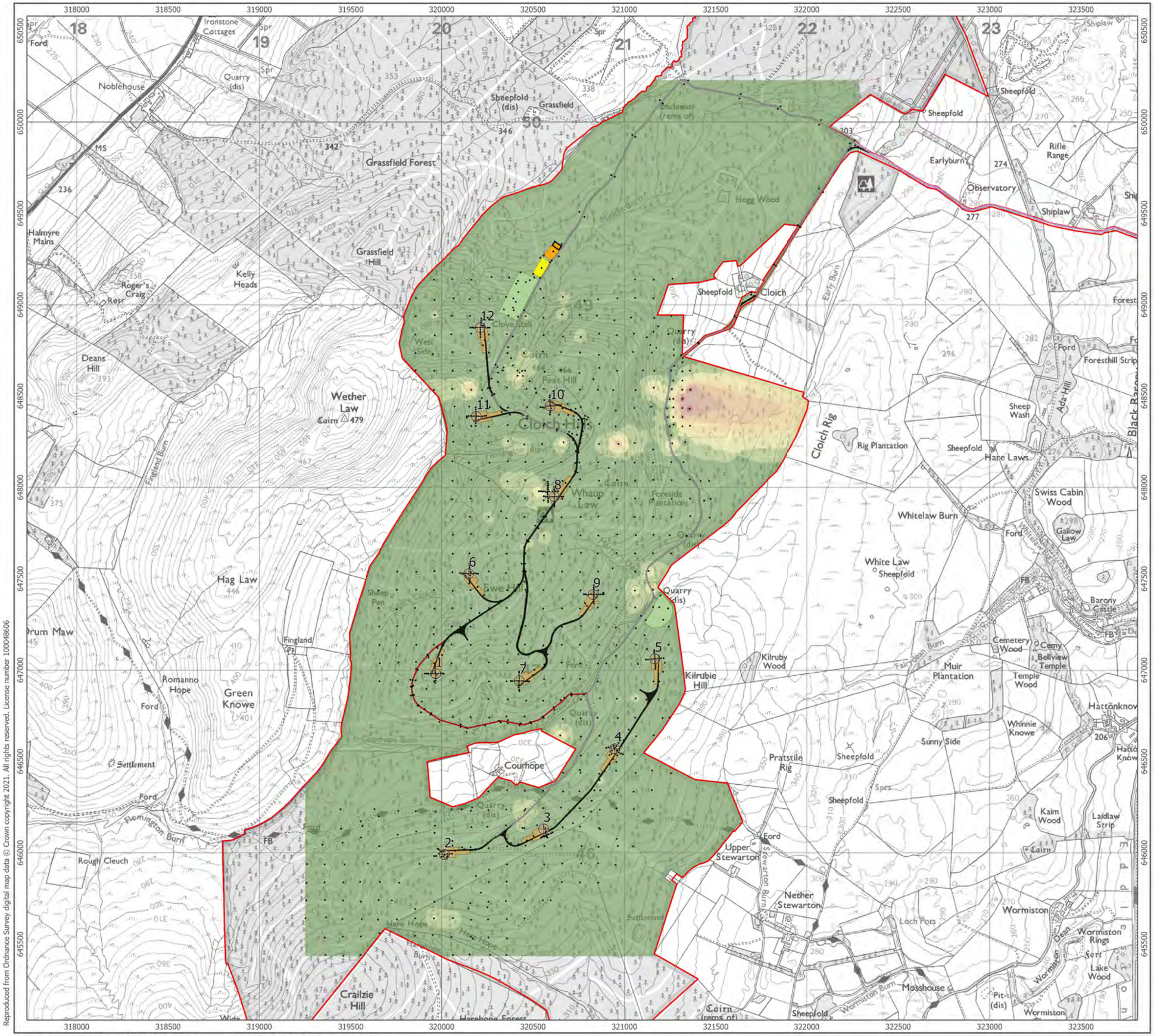
0 0.4 0.8 Km

NORTH

Produced By: BM	Ref: 3439-REP-034
Checked By: DB	Date: 10/06/2021

Recorded Peat Depths
Figure 9.1.5

Cloich Forest Wind Farm
Peat Slide Risk Assessment



P:\Projects\Engineering\Projects\3439 Cloich\3439 Cloich.aprx\3439-REP-035 Fig9.1.6 Interpolated Peat Depths

eDF renewables

ARCUS

- Site Boundary
- Proposed Turbine Location
- Peat Probe Location

Proposed Site Infrastructure

- Borrow Pit
- Construction Compound
- Crane Hardstanding
- Substation Compound
- BESS Location
- New Access Track
- New Track Used by Construction Traffic Only
- Existing Track (Subject to Localised Upgrades)
- Public Road (Subject to Widening Works)

Interpolated Peat Depths (m)

- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 1.50
- 1.51 - 2.00
- 2.01 - 2.50
- 2.51 - 3.00
- 3.01 - 3.50
- 3.51 - 4.00
- 4.01 - 4.50
- 4.51 - 5.00

1:20,000 Scale @ A3

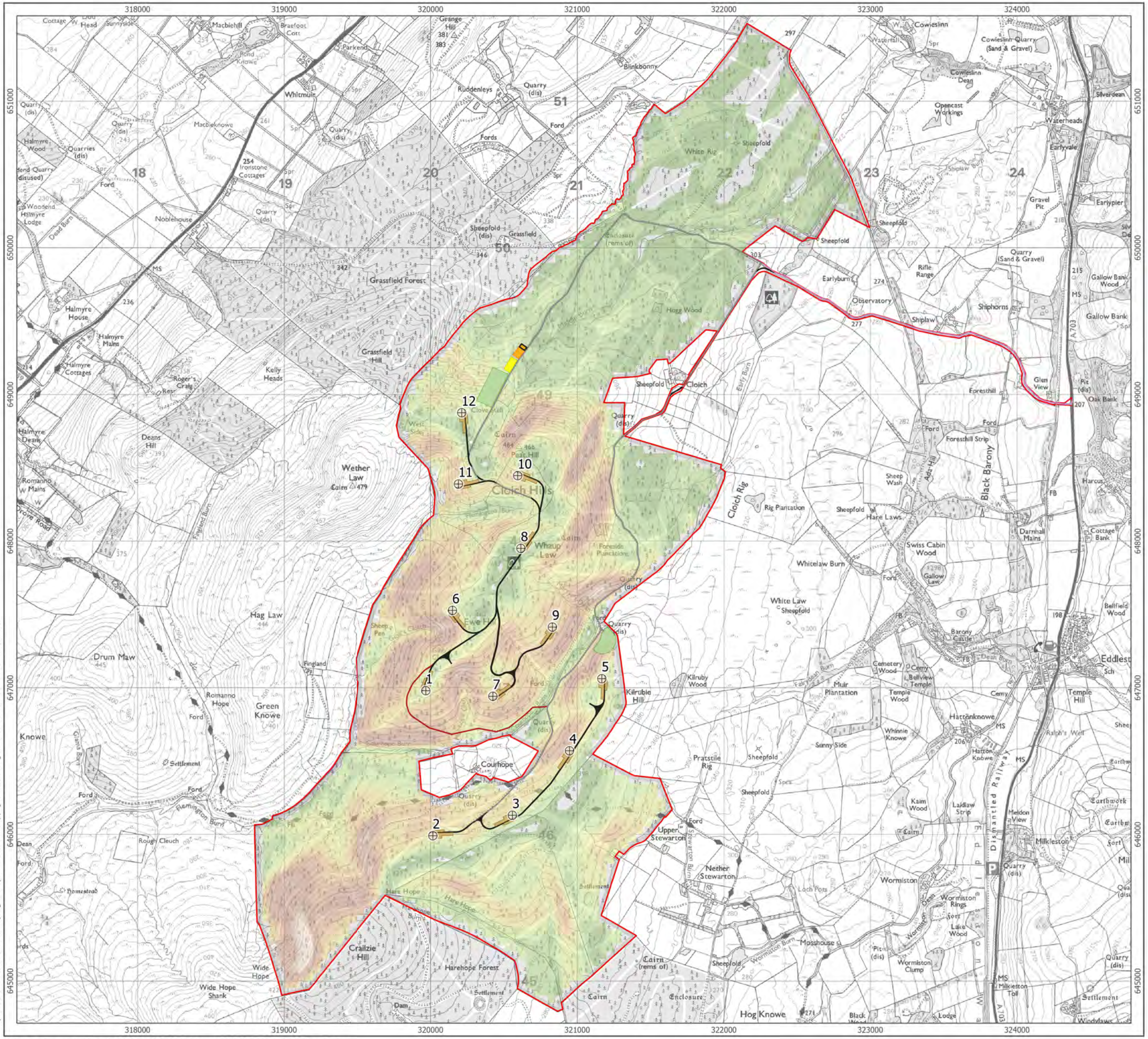
0 0.4 0.8 Km

NORTH

Produced By: BM	Ref: 3439-REP-035
Checked By: DB	Date: 10/06/2021

Interpolated Peat Depths
Figure 9.1.6

Cloich Forest Wind Farm
Peat Slide Risk Assessment



P:\Projects\Engineering\Projects\3439 Cloich\3439 Cloich.aprx\3439-REP-036 Fig9.1.7 Slope Gradient

edf renewables

ARCUS

- Site Boundary
- Proposed Turbine Location

Propcsed Site Infrastructure

- Borrow Pit
- Construction Compound
- Crane Hardstanding
- Substation Compound
- BESS Location
- New Access Track
- New Track Used by Construction Traffic Only
- Existing Track (Subject to Localised Upgrades)
- Public Road (Subject to Widening Works)

Slope Gradient (deg)

- 0.00 - 2.00
- 2.01 - 4.00
- 4.01 - 6.00
- 6.01 - 8.00
- 8.01 - 10.00
- 10.01 - 12.00
- 12.01 - 14.00
- 14.01 - 16.00
- 16.01 - 18.00
- 18.01 - 20.00
- 20.01 - 22.00
- 22.01 - 24.00
- 24.01 - 26.00
- 26.01 - 28.00
- 28.01 - 30.00

1:25,000 Scale @ A3

0 0.5 1 Km

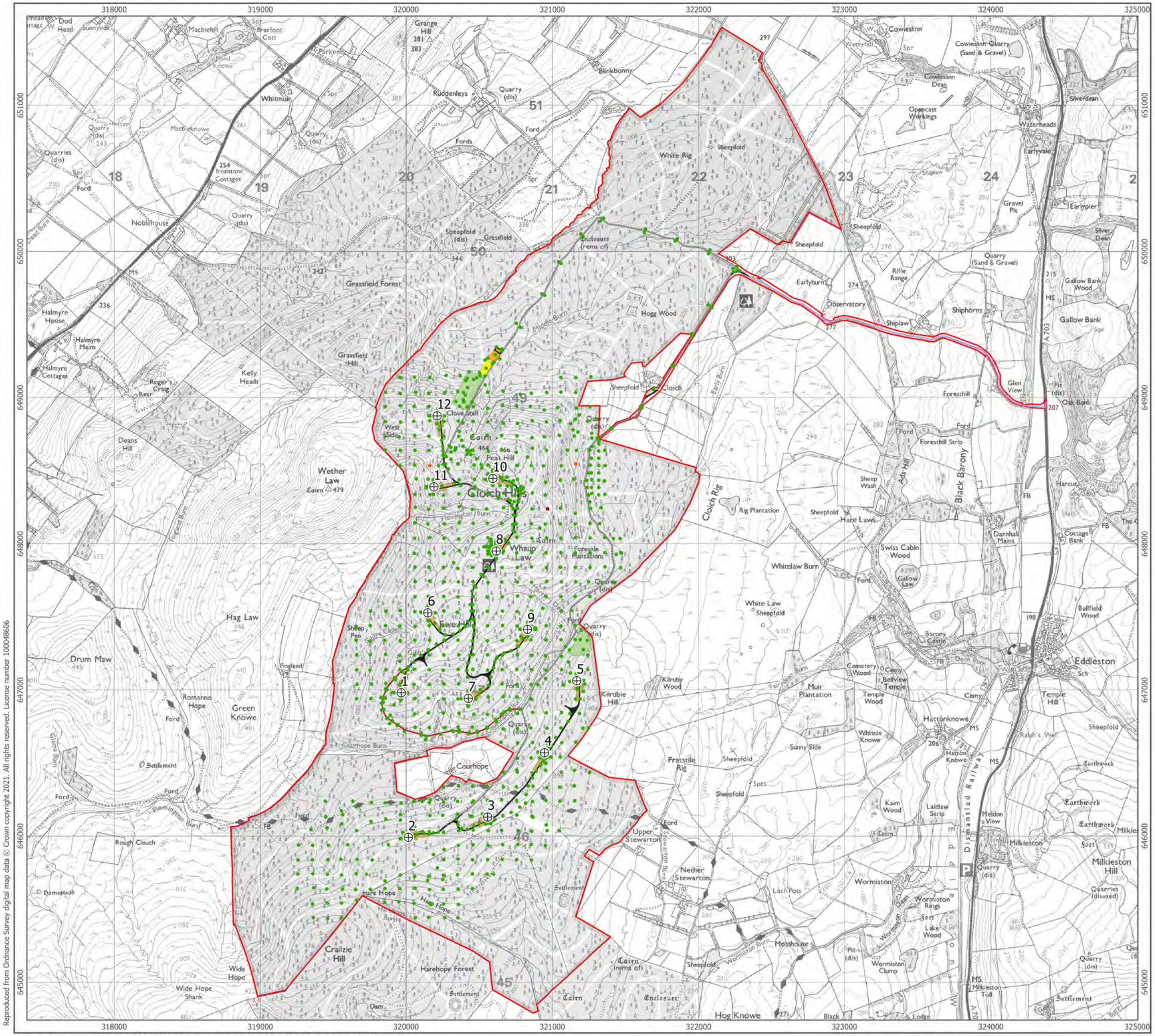
NORTH

Produced By: BM	Ref: 3439-REP-036
Checked By: DB	Date: 10/06/2021

Slope Gradient

Figure 9.1.7

Cloich Forest Wind Farm
Peat Slide Risk Assessment



P:\Projects\Engineering\Projects\3439 Cloich\3439 Cloich.aprx\3439-REP-037 Fig9.1.8 Factor of Safety Plan

eDF renewables

ARCUS

- Site Boundary
- ⊕ Proposed Turbine Location

Proposed Site Infrastructure

- Borrow Pit
- Construction Compound
- Crane Hardstanding
- Substation Compound
- BESS Location
- New Access Track
- New Track Used by Construction Traffic Only
- Existing Track (Subject to Localised Upgrades)
- Public Road (Subject to Widening Works)

Factor of Safety

- Low
- Medium
- High

1:25,000 Scale @ A3

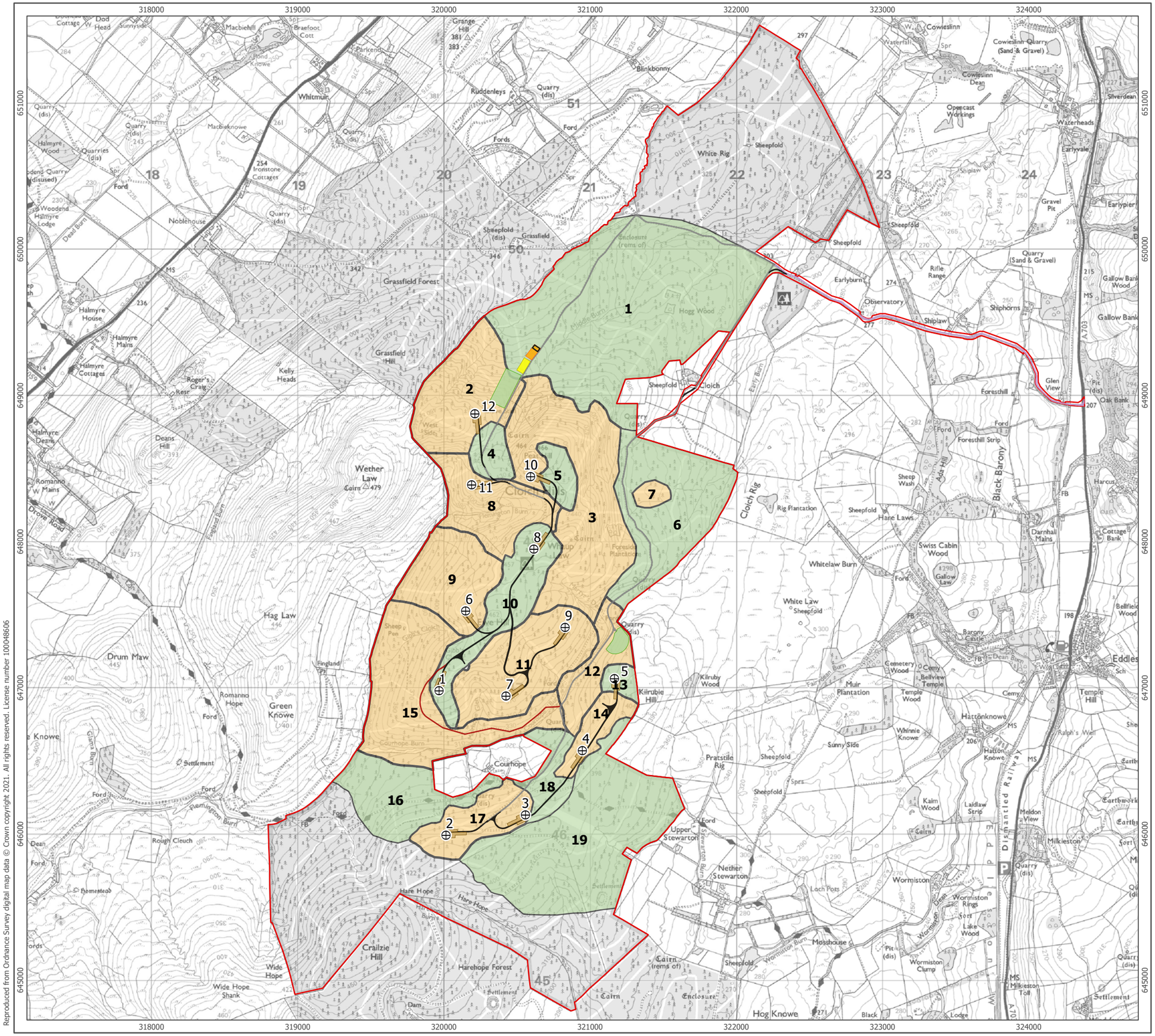
0 0.5 1 km

NORTH

Produced By: BM	Ref: 3439-REP-037
Checked By: DB	Date: 10/06/2021

Factor of Safety Plan
Figure 9.1.8

Cloich Forest Wind Farm
Peat Slide Risk Assessment



P:\Projects\Engineering\Projects\3439 Cloich\3439 Cloich.aprx\3439-REP-038 Fig9.1.9 Hazard Rank Zonation Plan

eDF renewables

ARCUS

- Site Boundary
- ⊕ Proposed Turbine Location

Proposed Site Infrastructure

- Borrow Pit
- Construction Compound
- Crane Hardstanding
- Substation Compound
- BESS Location
- New Access Track
- New Track Used by Construction Traffic Only
- Existing Track (Subject to Localised Upgrades)
- Public Road (Subject to Widening Works)

Hazard Ranking Zones

- Negligible
- Low

1:25,000 Scale @ A3

0 0.5 1 km

NORTH

Produced By: BM	Ref: 3439-REP-038
Checked By: DB	Date: 06/05/2021

Hazard Rank Zonation Plan
Figure 9.1.9

Cloich Forest Wind Farm
Peat Slide Risk Assessment

APPENDIX B - SITE PHOTOGRAPHS

Photograph 1

Photograph 2

Photograph 3

Photograph 4

Photograph 5

Photograph 6

Photograph 7

Photograph 8

APPENDIX C – HAZARD RANK ASSESSMENT RECORDS

3439 - Cloich Wind Farm - PSRA - Tabulated Peat Probe Data

ID	X	Y	Z	SLOPE	Slope Co-efficient	PEAT DEPTH	Peat Co-efficient	Gen Substrate	Substrate Co-eff.	Risk Rating Coefficient	Risk Rating Normalisation	Receptor	Receptor Co-eff.	Z Receptor	Distance	Receptor Dist Co-eff.	Z Difference (remove =/-)	Receptor elevation Co-eff	Impact Rating	Impact Rating Normalisation	Hazard Ranking
1	319345.914	646044.2618	306.603671	11.578422	6	0.3	1	R	1.5	9	2	Minor Water Feature	6	304.854465	22.186188	3	1.75	1	18	3	6
2	319455.318	646056.482	316.927225	13.160584	6	0.2	1	G	1	6	2	Tracks or Paths	2	313.133746	19.623064	3	3.79	1	6	1	2
3	319466.194	645936.0842	333.135503	10.532601	6	0.3	1	G	1	6	2	Minor Water Feature	6	323.137644	77.615187	3	10.00	1	18	3	6
4	319357.089	645936.6484	321.198596	9.866517	6	0.2	1	G	1	6	2	Minor Water Feature	6	319.788044	23.637856	3	1.41	1	18	3	6
5	319260.404	645938.2928	314.656103	16.036888	8	0.2	1	G	1	8	2	Minor Water Feature	6	308.14798	74.282051	3	6.51	1	18	3	6
6	319257.421	645836.2352	341.252085	17.640742	8	0.1	1	R	1.5	12	2	Minor Water Feature	6	313.380575	78.368045	3	27.87	2	18	3	6
7	319356.478	645838.2785	337.994057	15.112773	8	0.2	1	G	1	8	2	Minor Water Feature	6	336.036158	10.24044	3	1.96	1	18	3	6
8	319358.824	645741.7821	364.967112	18.076822	8	0.1	1	R	1.5	12	2	Minor Water Feature	6	354.110596	37.021325	3	10.86	2	18	3	6
9	319256.344	645740.2984	365.161029	12.519276	6	0.2	1	G	1	6	2	Minor Water Feature	6	352.89834	131.828266	3	12.26	2	18	3	6
10	319252.483	645642.2577	389.910305	15.872618	8	0.2	1	G	1	8	2	Minor Water Feature	6	369.26925	160.32858	3	20.64	2	18	3	6
11	319364.582	645646.663	395.92446	20.268774	8	0.2	1	G	1	8	2	Minor Water Feature	6	373.056418	61.002814	3	22.87	2	18	3	6
12	319357.314	645536.5371	428.936843	13.977969	6	0.4	1	G	1	6	2	Minor Water Feature	6	376.742943	152.375774	3	52.19	2	18	3	6
13	319362.497	645441.9311	449.188143	14.548294	6	0.1	1	G	1	6	2	Minor Water Feature	6	384.90287	239.128562	3	64.29	2	18	3	6
14	319459.905	645436.1967	457.021185	13.343694	6	0.2	1	G	1	6	2	Minor Water Feature	6	385.844822	228.100336	3	71.18	2	18	3	6
15	319554.34	645441.0822	454.273158	9.330902	6	0.1	1	R	1.5	9	2	Minor Water Feature	6	385.844822	245.169436	3	68.43	2	18	3	6
16	319456.849	645541.3919	432.449209	13.424921	6	0.5	1	R	1.5	9	2	Minor Water Feature	6	385.844822	122.827774	3	46.60	2	18	3	6
17	319555.558	645541.9439	435.574382	12.522577	6	0.3	1	G	1	6	2	Minor Water Feature	6	385.844822	159.743711	3	49.73	2	18	3	6
18	319659.255	645560.7903	424.16969	11.723269	6	0.4	1	G	1	6	2	Minor Water Feature	6	406.810924	163.238316	3	17.36	2	18	3	6
19	319652.026	645634.3375	412.852344	12.454034	6	0.5	1	G	1	6	2	Minor Water Feature	6	406.407295	197.308793	3	6.45	1	18	3	6
20	319560.705	645637.6284	409.577002	18.216507	8	0.3	1	G	1	8	2	Minor Water Feature	6	385.844822	111.226799	3	23.73	2	18	3	6
21	319454.003	645637.7787	398.617641	27.306371	8	0.2	1	G	1	8	2	Minor Water Feature	6	385.844822	26.372066	3	12.77	2	18	3	6
22	319458.944	645739.4667	366.004575	14.597925	6	0.2	1	G	1	6	2	Minor Water Feature	6	355.484558	40.657729	3	10.52	2	18	3	6
23	319555.537	645733.3649	378.547046	16.796306	8	0.3	1	G	1	8	2	Minor Water Feature	6	355.484558	107.551813	3	23.06	2	18	3	6
24	319459.747	645838.1035	346.869573	11.258272	6	0.1	1	R	1.5	9	2	Minor Water Feature	6	346.475313	43.171733	3	0.39	1	18	3	6
25	319551.647	645840.9683	372.504343	23.518897	8	0.1	1	R	1.5	12	2	Minor Water Feature	6	355.484558	111.121827	3	17.02	2	18	3	6
26	319662.197	645840.9347	403.017214	20.866939	8	0.1	1	R	1.5	12	2	Minor Water Feature	6	355.484558	212.447126	3	47.53	2	18	3	6
27	319655.279	645742.0142	414.254125	9.704652	6	0.2	1	G	1	6	2	Minor Water Feature	6	355.484558	200.287595	3	58.77	2	18	3	6
28	319446.846	646131.5781	306.957584	11.543637	6	0.1	1	G	1	6	2	Tracks or Paths	2	314.872651	36.197816	3	-7.92	1	6	1	2
29	319444.553	646237.6652	297.12157	7.300737	4	0.1	1	R	1.5	6	2	Minor Water Feature	6	294.73865	27.591765	3	2.38	1	18	3	6
30	319632.283	646239.7254	327.095216	8.914376	6	0.2	1	R	1.5	9	2	Tracks or Paths	2	332.295769	33.981363	3	-5.20	1	6	1	2
31	319763.211	646229.1892	338.847256	8.427148	6	0.2	1	G	1	6	2	Tracks or Paths	2	339.775735	7.098145	4	-0.93	1	8	2	4
32	319858.046	646227.7034	342.87165	7.723456	4	0.1	1	G	1	4	1	Tracks or Paths	2	343.085826	1.727534	4	-0.21	1	8	2	2
33	319966.603	646225.824	345.698268	12.710051	6	0.1	1	G	1	6	2	Tracks or Paths	2	345.641472	0.307306	4	0.06	1	8	2	4
34	320054.404	646238.3129	348.981319	13.289057	6	0.1	1	R	1.5	9	2	Tracks or Paths	2	349.042702	0.369592	4	-0.06	1	8	2	4
35	320166.418	646248.7518	354.464524	11.39078	6	0.4	1	G	1	6	2	Tracks or Paths	2	350.151031	18.173771	3	4.31	1	6	1	2
36	320254.904	646336.5905	343.76183	12.06598	6	0.2	1	G	1	6	2	Tracks or Paths	2	346.266497	12.970868	3	-2.50	1	6	1	2
37	320358.573	646342.8231	350.669217	2.581393	2	0.2	1	G	1	2	1	Minor Water Feature	6	350.72517	13.373896	3	-0.06	1	18	3	3
38	320455.818	646340.3289	350.017049	11.57208	6	0.2	1	G	1	6	2	Tracks or Paths	2	348.791307	9.196907	4	1.23	1	8	2	4
39	320555.738	646339.6758	357.077332	11.943545	6	0.2	1	G	1	6	2	Tracks or Paths	2	355.112658	10.483829	3	1.96	1	6	1	2
40	320664.848	646335.9372	373.342434	16.263756	8	0.2	1	G	1	8	2	Tracks or Paths	2	381.328849	39.839436	3	-7.99	1	6	1	2
41	320753.816	646336.795	383.726113	6.645673	4	0.1	1	G	1	4	1	New Site Infrastructure	6	386.380349	32.425156	3	-2.65	1	18	3	3
42	320867.883	646341.8563	390.908551	0.957336	1	0.1	1	G	1	1	1	Tracks or Paths	2	390.702595	21.768365	3	0.21	1	6	1	1
43	320962.261	646331.068	397.199823	4.854105	4	0.1	1	G	1	4	1	Tracks or Paths	2	394.819299	55.530516	3	2.38	1	6	1	1
44	321050.663	646334.4564	401.251616	1.692113	1	0.2	1	G	1	1	1	Tracks or Paths	2	394.641473	122.18968	3	6.61	1	6	1	1
45	321149.752	646343.9148	399.182508	2.020054	2	0.1	1	G	1	2	1	Tracks or Paths	2	393.930122	162.75114	3	5.25	1	6	1	1
46	321153.523	646241.3469	397.06129	2.420328	2	0.2	1	G	1	2	1	Tracks or Paths	2	394.456284	61.88644	3	2.61	1	6	1	1
47	320452.76	645641.0518	387.550007	17.999945	8	0.4	1	G	1	8	2	Tracks or Paths	2	383.695383	13.383896	3	3.85	1	6	1	2
48	320356.497	645637.6733	401.562254	14.458262	6	0.4	1	G	1	6	2	Tracks or Paths	2	384.525884	63.536474	3	17.04	2	6	1	2
49	320254.234	645635.7286	408.078118	13.040831	6	0.2	1	G	1	6	2	Minor Water Feature	6	364.465709	146.085258	3	43.61	2	18	3	6
50	320160.892	645633.1635	405.644019	12.606183	6	0.3	1	G	1	6	2	Minor Water Feature	6	378.72138	112.509902	3	26.92	2	18	3	6
51	320214.424	645782.378	424.14435	1.641725	1	0.2	1	G	1	1	1	New Site Infrastructure	6	401.658265	211.816815	3	22.49	2	18	3	3
52	320061.37	645642.8402	397.470903	11.763134	6	1	2	G	1	12	2	Minor Water Feature	6	385.846187	79.765804	3	11.62	2	18	3	6
53	319957.374	645641.1959	397.059643	7.583993	4	1.1	3	G	1	12	2	Minor Water Feature	6	388.138405	75.137926	3	8.92	1	18	3	6
54	320187.666	645873.085	418.767419	5.892956	4	0.1	1	G	1	4	1	New Site Infrastructure	6	401.658265	117.224958	3	17.11	2	18	3	3
55	319755.4	645635.6079	412.824408	4.789489	4	0.2	1	G	1	4	1	Minor Water Feature	6	406.149482	121.299041	3	6.67	1	18	3	3
56	319855.3	645641.3468	406.889253	7.684314	4	0.1	1	G	1	4	1	Minor Water Feature	6	404.987723	105.711775	3	1.90	1	18	3	3
57	319853.75	645545.6523	401.856328	6.389683	4	0.2	1	G	1	4	1	Minor Water Feature	6	402.267947	11.591684	3	-0.41	1	18	3	3
58	319950.716	645549.7419	389.873314	6.025187	4	0.1	1	R	1.5	6	2	Minor Water Feature	6	388.785192	18.685374	3	1.09	1	18	3	6
59	320054.207	645539.0554	382.892335	6.645237	4	0.4	1	G	1	4	1	Minor Water Feature	6	382.398632	16.136059	3	0.49	1	18	3	3
60	320169.775	645531.1075	379.079713	18.419367	8	0.1	1	G	1	8	2	Minor Water Feature	6	373.199892	21.442361	3	5.88	1	18	3	6
61	320159.994	645540.5081	381.578929	14.059113	6	0.2	1	G	1	6	2	Minor Water Feature	6	374.244497	24.251482	3	7.33	1	18	3	6
62	320256.238	645535.7986	379.345859	19.587925	8	0.3	1	G	1	8	2	Minor Water Feature	6	364.465709	50.092552	3	14.88	2	18	3	6
63	320357.681	645532.4375	370.183202	13.728143	6	0.3	1	G	1	6	2	Minor Water Feature	6	361.398091	68.514279	3	8.79	1	18	3	6
64	320354.238	645440.2612	356.543884	9.377639	6	0.2	1	G	1	6	2	Minor Water Feature	6	357.575296	9.038885	4	-1.03	1	24	3	6
65	320264.707	645441.4762	355.533036	9.401172	6	0.4	1	G	1	6	2	Minor Water Feature	6	355.601118	3.312611	4	-0.07	1	24	3	6
66	320153.284	645444.0809	370.984426	5.614245	4	0.2	1	G	1	4	1	Minor Water Feature	6	370.245553	9.533801	4	0.74	1	24	3	3
67	320062.506	645440.7793	381.253205	8.278883	6	0.3	1	G	1	6	2	Minor Water Feature	6	379.506307	15.37015	3	1.75	1	18	3	6
68	319960.453	645732.6235	408.434313	8.948488	6	0.4	1	G	1	6	2	Minor Water Feature	6	388.138405	165.182543	3	20.30	2	18	3	6
69	320058.837	645725.389	410.7889	10.651531	6	0.2	1	G	1	6	2	Minor Water Feature	6	385.686809	161.45798	3	25.10	2	18	3	6
70	320146.877	645696.4755	415.758873	8.850249	6	0.2	1	G	1	6	2	Minor Water Feature	6	384.906534	162.434724	3	30.85	2	18	3	6
71	320156.58	645724.9554	419.629783	6.190017	4	0.2	1	R	1.5	6	2	Minor Water Feature	6	384.906534	191.768295	3	34.72	2	18	3	6
72	320250.453	645702.5792	418.998462	6.182015	4	0.2	1	G	1	4	1	Tracks or Paths	2	384.525884	187.817157	3	34.47	2	6	1	1
73	320255.766	645731.6079	420.957587	4.731233	4	0.2	1	G	1	4	1	Tracks or Paths	2	384.525884	199.774412	3	36.43	2	6	1	1
74	320351.177	645735.7851	417.078769	9.011858	6	0.2	1	G	1	6	2	Tracks or Paths	2	384.680136	140.867319	3	32.40	2	6	1	2
75	320453.565	645740.8254	410.105909	13.180872	6	0.2	1	G	1	6	2	Tracks or Paths	2	382.623745	91.291233	3	27.48	2	6	1	2
76	320553.896	645739.8403	386.518803	20.455413	8	0.1	1	G	1	8	2	Tracks or Paths	2	380.602453	21.616492	3	5.92	1	6	1	2
77	320597.39	645740.3677	378.438067	7.058037	4	0.4	1	G	1	4	1	Tracks or Paths	2	379.49138	8.809885	4	-1.05	1	8	2	2
78	320956.284	646243.7484	396.058987	1.462484	1	0.1	1	G	1	1	1	Tracks or Paths	2	396.069633	0.562298	4	-0.01	1	8	2	2
79	321052.305	646239.9497	394.586244	7.951781	4	0.2	1	G	1	4	1	Tracks or Paths	2	390.568711	33.852273	3	4.02	1	6	1	1
80	320865.72	646236.5353	394.460573	3.415731	2	0.4	1	G	1	2	1	Tracks or Paths	2	395.825798	71.66167	3	-1.37	1	6	1	1
81	320755.073	646244.3791	392.051821	4.653588	4	0.2	1	G	1	4	1	New Site Infrastructure	6	390.969221	21.306725	3	1.08	1	18	3	3
82	320653.248	646248.1457	386.410566	8.644659	6	0.1	1	G	1	6	2	Tracks or Paths	2	381.026866	39.981533	3	5.38	1	6	1	2
83	320554.75	646245.3652	378.127585	15.307403	8	0.4	1	G	1	8	2	Upgraded Site Infrastructure	6	367.2739	41.588388	3	10.85	2	18	3	6
84	320451.963	646231.4625	370.751127	12.537034	6	0.9	2	G	1	12	2	Upgraded Site Infrastructure	6	373.62418	15.639487	3	-2.87	1	18	3	6
85	320458.947	646239.8965	369.197353	12.323299	6	0.9	2	G	1	12	2	Upgraded Site Infrastructure	6	372.20759	16.658993	3	-3.01	1	18	3	6
86	320352.934	646237.1305	364.609098	12.734519	6	0.4	1	G	1	6	2	Minor Water Feature	6	352.799583	62.758579	3	11.81	2	18	3	6
87	320255.962	646233.3806	359.886785	9.515351	6	0.2	1	G	1	6	2	Minor Water Feature	6	354.721569	38.893102	3	5.17	1	18	3	6
88	320159.45	646229.5064	357.834711	13.758141	6	0.2	1	G	1	6	2	Tracks or Paths	2	351.270645	30.935983	3	6.56	1	6	1	2
89	320163.138	646140.9927	374.737133	11.259106	6	0.4	1	G	1	6	2	Minor Water Feature	6	373.071407	26.555988	3	1.67	1	18	3	6
90	320250.685	646142.4059	376.753907	10.632801	6	0.4	1	G	1	6	2	Minor Water Feature	6	369.652018	49.970506	3	7.10	1	18	3	6
91	320351.507	646149.987	381.861903	11.383013	6	0.2	1	G	1	6	2	New Site Infrastructure	6	384.084808	12.971578	3	-2.22	1	18	3	6
92	320442.119	646136.8232	390.96099	13.306459	6	1	2	G	1	12	2	Upgraded Site Infrastructure	6	380.572521	44.694239	3	10.39	2	18	3	6
93	320451.763	646134.9726	392.693662	13.947651	6	0.3	1	G	1	6	2	New Site Infrastructure	6	398.036076	36.61154	3	-5.34	1	18	3	6
94	320522.163	646150.8822	395.767642	13.104099	6	0.2	1	G	1	6	2	New Site Infrastructure	6	396.814746	5.32998	4	-1.05	1	24	3	6
95	320557.999	646143.1357	399.990346	8.285233	6	0.2	1	G	1	6	2	New Site Infrastructure	6	399.882173	1.20948	4	0.11	1	24	3	6
96	320662.287	646139.8416	400.587147	3.581369	2	0.4	1	G	1	2	1	New Site Infrastructure	6	398.833229	24.013594	3	1.75	1	18	3	3
97	320756.996	646143.6933	399.025182	3.821511	2	0.4	1	G	1	2	1	New Site Infrastructure	6	393.328013	88.915492	3	5.70	1	18	3	3
98	320867.387	646129.0747	396.011378	2.927537	2	0.2	1	G	1	2	1	Tracks or Paths	2	395.900846	141.889499	3	0.11	1	6	1	1
99	320860.426	646135.8425	396.510903	3.926629	2	0.5	1	G	1	2	1	Tracks or Paths	2	395.929399	141.859761	3	0.58	1	6	1	1
100	320958.538	646076.5333	390.327527	4.938778	4	0.5	1	R	1.5	6	2	Minor Water Feature	6	382.794506	78.350497	3	7.53	1	18	3	6
101	321046.681	646035.9041	379.97214	9.986432	6	0.3	1	G	1	6	2	Minor Water Feature	6	379.423889	4.274617	4	0.55	1	24	3	6
102	320964.21	646037.3098	388.195234	5.136239	4	0.3	1	R	1.5	6	2	Minor Water Feature	6	381.135344	61.946715	3	7.06	1	18	3	6
103	320859.173	646033.2921	398.684807	5.443897	4	0.2	1	G	1	4	1	Tracks or Paths	2	397.247445	121.410596	3	1.44	1	6	1	1
104	320766.308	646037.0152	405.345889	2.39648	2	0.2	1	G	1	2	1	Tracks or Paths	2	400.870703	70.415662	3	4.48	1	6	1	1
105	320358.398	646036.438	403.539492	8.662258	6	0.1	1	G	1	6	2	New Site Infrastructure	6	403.599289	0.454957	4	-0.06	1	24	3	6
106	320459.843	646039.9915	405.712717	8.525525	6	0.2	1	G	1	6	2	New Site Infrastructure	6	403.58894	12.382414	3	2.12	1	18	3	6
107	320562.009	646037.0525	409.356526	4.984331	4	0.2	1	G	1	4	1	New Site Infrastructure	6	406.482724	39.105002	3	2.87	1	18	3	3
108	320652.791	646039.5711	408.716436	3.129772	2	0.2	1	G	1	2	1	Tracks or Paths	2	407.575318	55.47819	3	1.14	1	6	1	1
109	320952.502	645934.7428	389.241115	6.212417	4	0.1	1	G	1	4	1	Minor Water Feature	6	381.135344	114.933302	3	8.11	1	18	3	3
110	320856.129	645943.0808	396.968688	4.779183	4	0.1	1	G	1	4	1	Tracks or Paths	2	393.633892	57.681474	3	3.33	1	6	1	1
111	320763.951	645942.2757	397.001814	5.246485	4	0.2	1	G	1	4	1	Tracks or Paths	2	397.169263	6.116343	4	-0.17	1	8	2	2
112	320660.621	645940.9431	403.483085	8.590326	6	0.3	1	G	1	6	2	Tracks or Paths	2	406.370718	39.180406	3	-2.89	1	6	1	2
113	320561.426	645936.1561	411.396634	4.879329	4	0.2	1	G	1	4	1	Tracks or Paths	2	409.632199	41.974243	3	1.76	1	6	1	1
114	320457.511	645940.7102	417.023394	6.222482	4	0.1	1	G	1	4	1	Tracks or Paths	2	411.335027	51.150913	3	5.69	1	6	1	1
115	320358.012	645936.4663	417.319743	12.251671	6	0.1	1	R	1.5	9	2	Tracks or Paths	2	407.740513	77.491209	3	9.58	1	6	1	2
116	320256.655	645839.562	424.863564	3.634311	2	0.4	1	G	1	2	1	New Site Infrastructure	6	401.658265	177.440075	3	23.21	2	18	3	3
117	320355.456	645842.7649	426.843314	0.420311	1	0.1	1	G	1	1	1	Tracks or Paths	2	408.41851	169.375344	3	18.42	2	6	1	1
118	320455.071	645837.677	420.57975	8.285819	6	0.1	1	R	1.5	9	2	Tracks or Paths	2	412.258639	150.757651	3	8.32	1	6	1	2
119	320557.308	645839.0967	403.369138	15.438083	8	0.3	1	R	1.5	12	2	Tracks or Paths	2	381.489561	64.3291	3	21.88	2	6	1	2
120	320657.221	645840.2024	380.675886	8.811442	6	0.5	1	G	1	6	2	Tracks or Paths	2	382.924117	14.44708	3	-2.25	1	6	1	2
121	320756.283	645838.5045	386.483049	7.875526	4	0.2	1	R	1.5	6	2	Tracks or Paths	2	390.970187	43.622462	3	-4.49	1	6	1	2
122	320857.074	645837.0466	389.244965	5.963036	4	0.1	1	G	1	4	1	Tracks or Paths	2	391.973723	34.388959	3	-2.73	1	6	1	1
123	320664.419	646437.9143	349.809922	14.718725	6	0.4	1	R	1.5	9	2	Tracks or Paths	2	353.871692	15.666875	3	-4.06	1	6	1	2
124	320757.028	646452.3492	368.852858	16.145628	8	0.2	1	G	1	8	2	Tracks or Paths	2	354.030184	43.411871	3	14.82	2	6	1	2
125	320760.091	646437.9632	371.694601	15.038255	8	0.3	1	G	1	8	2	Upgraded Site Infrastructure	6	354.148409	54.008652	3	17.55	2	18	3	6
126	320862.125	646432.8011	389.91523	8.024587	6	0.3	1	G	1	6	2	New Site Infrastructure	6	390.880366	7.11871	4	-0.97	1	24	3	6
127	320954.616	646449.9924	398.18407	2.049732	2	0.2	1	G	1	2	1	New Site Infrastructure	6	396.502187	33.344672	3	1.68	1	18	3	3
128	320955.918	646497.6205	397.327856	4.75751	4	0.2	1	G	1	4	1	New Site Infrastructure	6	397.179286	2.767191	4	0.15	1	24	3	3
129	321061.797	646437.9648	401.836043	1.801459	1	0.1	1	G	1	1	1	New Site Infrastructure	6	397.338742	122.605997	3	4.50	1	18	3	3
130	321150.798	646450.21	398.595743	5.889427	4	0.2	1	G	1	4	1	Major Water Feature	8	394.588072	112.83706	3	4.01	1	24	3	3
131	321254.251	646435.6584	383.452487	6.562962	4	0.2	1	G	1	4	1	Major Water Feature	8	394.564743	131.729714	3	-11.11	1	24	3	3
132	321053.982	646540.2065	398.730821	1.94563	1	0.3	1	G	1	1	1	New Site Infrastructure	6	396.947137	71.317215	3	1.78	1	18	3	3
133	320960.255	646533.8864	395.757209	6.415746	4	0.2	1	G	1	4	1	New Site Infrastructure	6	395.776815	0.510992	4	-0.02	1	24	3	3
134	320855.38	646534.7008	378.972983	16.328174	8	0.3	1	G	1	8	2	New Site Infrastructure	6	384.916544	27.348971	3	-5.94	1	18	3	6
135	320761.523	646532.0155	352.503856	24.557895	8	0.1	1	G	1	8	2	Upgraded Site Infrastructure	6	349.096593	9.058262	4	3.41	1	24	3	6
136	320762.441	646636.4005	330.982434	13.305029	6	0.3	1	G	1	6	2	Tracks or Paths	2	339.351253	32.640414	3	-8.37	1	6	1	2
137	320648.994	646642.6387	321.08498	3.137714	2	1.5	3	G	1	6	2	Minor Water Feature	6	324.71532	46.691329	3	-3.63	1	18	3	6
138	320663.392	646733.3706	319.592256	2.052859	2	0.5	1	G	1	2	1	Minor Water Feature	6	320.423944	19.442509	3	-0.83	1	18	3	3
139	320760.414	646737.0208	323.874884	5.485201	4	0.3	1	G	1	4	1	Tracks or Paths	2	330.298591	60.13913	3	-6.42	1	6	1	1
140	320864.986	646640.4118	360.495439	21.580593	8	0.2	1	G	1	8	2	Tracks or Paths	2	340.232729	48.472392	3	20.26	2	6	1	2
141	320965.127	646635.4493	383.392197	9.093721	6	0.2	1	G	1	6	2	New Site Infrastructure	6	384.416996	28.194176	3	-1.02	1	18	3	6
142	321064.521	646638.6577	391.677713	6.990222	4	0.2	1	G	1	4	1	New Site Infrastructure	6	386.478008	37.296176	3	5.20	1	18	3	3
143	321108.213	646783.6496	384.564422	9.246272	6	0.4	1	G	1	6	2	New Site Infrastructure	6	384.594541	0.680959	4	-0.03	1	24	3	6
144	321059.112	646739.5352	381.493854	7.950891	4	0.3	1	G	1	4	1	New Site Infrastructure	6	383.617864	13.778118	3	-2.12	1	18	3	3
145	320963.942	646737.9411	367.679657	16.497554	8	0.2	1	G	1	8	2	New Site Infrastructure	6	384.886881	93.345504	3	-17.21	1	18	3	6
146	320853.378	646739.128	334.731724	9.176771	6	0.4	1	G	1	6	2	Upgraded Site Infrastructure	6	331.787128	24.399794	3	2.94	1	18	3	6
147	320762.167	646839.1687	322.525046	3.935482	2	0.4	1	G	1	2	1	New Site Infrastructure	6	322.555098	26.989945	3	-0.03	1	18	3	3
148	320652.632	646835.8097	337.323789	23.0637	8	0.1	1	G	1	8	2	Tracks or Paths	2	334.855763	5.50977	4	2.47	1	8	2	4

1 TO 4	Negligible
5 TO 10	Low
11 TO 16	Medium
17 TO 25	High

149	320555.846	646832.7811	358.773633	16.692832	8	0.2	1	G	1	8	2	New Site Infrastructure	6	339.24095	60.416253	3	19.53	2	18	3	6
150	320453.127	646745.5651	342.436338	19.459852	8	0.1	1	G	1	8	2	Tracks or Paths	2	329.603446	35.468105	3	12.83	2	6	1	2
151	320355.271	646746.8068	341.345931	15.205896	8	0.1	1	G	1	8	2	New Site Infrastructure	6	337.619445	14.711277	3	3.73	1	18	3	6
152	320260.992	646740.9551	335.349644	8.997812	6	0.1	1	G	1	6	2	Tracks or Paths	2	332.658285	20.922002	3	2.69	1	6	1	2
153	320158.76	646742.5881	348.297591	14.177786	6	0.2	1	G	1	6	2	New Site Infrastructure	6	338.936053	42.828618	3	9.36	1	18	3	6
154	320061.61	646743.2186	360.308684	13.286608	6	0.2	1	G	1	6	2	Tracks or Paths	2	355.671324	22.913424	3	4.64	1	6	1	2
155	320057.992	646835.3798	380.473697	14.798502	6	0.2	1	G	1	6	2	Tracks or Paths	2	360.096789	109.393698	3	20.38	2	6	1	2
156	320153.102	646843.5165	366.208423	18.24969	8	0.1	1	G	1	8	2	Minor Water Feature	6	343.53337	104.075261	3	22.68	2	18	3	6
157	320255.272	646842.1023	349.865378	13.230531	6	0.2	1	G	1	6	2	Minor Water Feature	6	349.182485	7.70575	4	0.68	1	24	3	6
158	320361.208	646839.5628	361.985947	14.294006	6	0.2	1	G	1	6	2	New Site Infrastructure	6	379.186522	93.624376	3	-17.20	1	18	3	6
159	320463.003	646833.1157	366.215848	12.722131	6	0.2	1	G	1	6	2	New Site Infrastructure	6	380.458462	79.68796	3	-14.24	1	18	3	6
160	320557.618	646739.9837	331.992494	19.988214	8	0.3	1	G	1	8	2	New Site Infrastructure	6	332.160969	0.913482	4	-0.17	1	24	3	6
161	320757.823	646951.3814	332.943149	16.943774	8	0.2	1	G	1	8	2	Tracks or Paths	2	333.00761	1.151773	4	-0.06	1	8	2	4
162	320663.354	646953.9714	361.835521	16.727686	8	0.2	1	G	1	8	2	Tracks or Paths	2	331.598742	78.295029	3	30.24	2	6	1	2
163	320560.654	646950.3776	381.213741	11.535285	6	0.2	1	G	1	6	2	New Site Infrastructure	6	388.327118	45.37474	3	-7.11	1	18	3	6
164	320457.021	646937.5618	383.503504	6.553121	4	0.2	1	G	1	4	1	New Site Infrastructure	6	383.546407	0.629356	4	-0.04	1	24	3	3
165	320355.082	646938.7848	377.10644	11.402589	6	0.2	1	G	1	6	2	New Site Infrastructure	6	381.105614	40.000711	3	-4.00	1	18	3	6
166	320259.333	646938.0747	363.045309	5.443352	4	0.1	1	G	1	4	1	Minor Water Feature	6	362.723973	13.253568	3	0.32	1	18	3	3
167	320153.096	646943.5633	381.582807	18.157831	8	0.3	1	G	1	8	2	Minor Water Feature	6	362.123965	88.672935	3	19.46	2	18	3	6
168	320061.604	646941.8573	400.092024	11.069042	6	0.1	1	G	1	6	2	New Site Infrastructure	6	402.834006	64.911284	3	-2.74	1	18	3	6
169	319958.341	646938.3363	400.770642	7.191834	4	0.3	1	G	1	4	1	New Site Infrastructure	6	400.756993	0.435578	4	0.01	1	24	3	3
170	319857.06	646943.5907	391.739499	11.146331	6	0.2	1	G	1	6	2	New Site Infrastructure	6	390.384212	8.720968	4	1.36	1	24	3	6
171	319759.397	646940.9583	373.568823	9.303566	6	0.1	1	G	1	6	2	New Site Infrastructure	6	380.033954	55.40786	3	-6.47	1	18	3	6
172	319659.589	646939.275	355.106788	13.465129	6	0.2	1	G	1	6	2	New Site Infrastructure	6	380.033954	155.178778	3	-24.93	1	18	3	6
173	319661.647	647037.9848	344.627189	19.813942	8	0.2	1	G	1	8	2	Minor Water Feature	6	318.52364	107.25629	3	26.10	2	18	3	6
174	319762.685	647041.4062	373.466724	16.830181	8	0.2	1	G	1	8	2	New Site Infrastructure	6	393.123705	100.192434	3	-19.66	1	18	3	6
175	319859.992	647045.3465	396.699845	10.413309	6	0.3	1	G	1	6	2	New Site Infrastructure	6	399.667323	18.226076	3	-2.97	1	18	3	6
176	319959.212	647037.9167	411.278227	5.888122	4	0.2	1	G	1	4	1	New Site Infrastructure	6	411.247646	0.534847	4	0.03	1	24	3	3
177	320054.136	647037.7949	411.69299	8.179116	6	0.2	1	G	1	6	2	New Site Infrastructure	6	414.042364	45.791335	3	-2.35	1	18	3	6
178	320159.525	647036.6619	392.901865	15.209602	8	0.2	1	G	1	8	2	New Site Infrastructure	6	414.700492	83.614296	3	-21.80	1	18	3	6
179	320258.189	647041.6826	388.807202	15.991995	8	0.1	1	G	1	8	2	Minor Water Feature	6	382.937165	60.903457	3	5.87	1	18	3	6
180	320358.868	647040.5336	396.151529	10.876281	6	0.2	1	G	1	6	2	Minor Water Feature	6	382.937165	72.006389	3	13.21	2	18	3	6
181	320457.539	647038.4858	395.293228	12.853326	6	0.2	1	G	1	6	2	New Site Infrastructure	6	389.078563	37.087775	3	6.21	1	18	3	6
182	320562.194	647030.9703	389.504695	6.58355	4	0.3	1	R	1.5	6	2	New Site Infrastructure	6	389.213885	2.662548	4	0.29	1	24	3	6
183	320655.749	647041.2719	372.43684	15.043684	8	0.2	1	G	1	8	2	New Site Infrastructure	6	388.530449	77.064738	3	-16.09	1	18	3	6
184	320758.453	647036.5261	344.871915	14.82003	6	0.3	1	G	1	6	2	Minor Water Feature	6	339.158942	24.902616	3	5.71	1	18	3	6
185	320855.435	647036.3049	327.408344	1.8518	1	0.2	1	G	1	1	1	Minor Water Feature	6	327.445434	1.293764	4	-0.04	1	24	3	3
186	320957.195	647136.4419	330.099035	9.400919	6	0.1	1	R	1.5	9	2	Upgraded Site Infrastructure	6	332.258912	12.653469	3	-2.16	1	18	3	6
187	320859.747	647138.3675	340.766451	17.860325	8	0.3	1	G	1	8	2	Tracks or Paths	2	339.879352	2.979043	4	0.89	1	8	2	4
188	320757.019	647139.9996	356.632976	14.302513	6	0.2	1	G	1	6	2	Minor Water Feature	6	350.635582	35.522015	3	6.00	1	18	3	6
189	320657.19	647138.4601	373.251109	21.025665	8	0.1	1	G	1	8	2	Minor Water Feature	6	365.930692	24.880359	3	7.32	1	18	3	6
190	320556.886	647135.2192	395.653238	8.056214	6	0.2	1	G	1	6	2	New Site Infrastructure	6	393.680325	16.388426	3	1.97	1	18	3	6
191	320455.975	647139.9278	412.336063	7.96952	4	0.2	1	G	1	4	1	New Site Infrastructure	6	414.91207	38.161218	3	-2.58	1	18	3	3
192	320356.8	647141.1171	411.895504	9.513858	6	0.2	1	G	1	6	2	New Site Infrastructure	6	414.24433	53.93987	3	-2.35	1	18	3	6
193	320254.249	647133.9681	412.236029	16.348256	8	0.2	1	G	1	8	2	New Site Infrastructure	6	419.006098	81.967266	3	-6.77	1	18	3	6
194	320159.153	647138.409	419.553143	17.022061	8	0.2	1	G	1	8	2	New Site Infrastructure	6	419.521729	0.531617	4	0.03	1	24	3	6
195	320053.788	647140.6893	425.031755	6.545954	4	0.1	1	G	1	4	1	New Site Infrastructure	6	425.167403	28.449527	3	-0.14	1	18	3	3
196	319957.259	647138.8159	415.067835	10.053771	6	0.3	1	G	1	6	2	New Site Infrastructure	6	416.502467	14.286701	3	-1.43	1	18	3	6
197	319861.667	647138.2989	392.45758	8.048731	6	0.2	1	G	1	6	2	New Site Infrastructure	6	408.045481	82.926139	3	-15.59	1	18	3	6
198	319753.471	647136.4957	364.948055	16.872987	8	0.3	1	G	1	8	2	Minor Water Feature	6	330.968083	117.223813	3	33.98	2	18	3	6
199	319659.57	647137.4543	338.121081	16.973155	8	0.3	1	G	1	8	2	Minor Water Feature	6	328.371862	48.741624	3	9.75	1	18	3	6
200	319658.857	647238.8768	331.314937	8.831803	6	0.1	1	G	1	6	2	Minor Water Feature	6	333.41676	19.172369	3	-2.10	1	18	3	6
201	319756.74	647241.2085	356.487264	19.23694	8	0.3	1	G	1	8	2	Minor Water Feature	6	343.083685	59.896122	3	13.40	2	18	3	6
202	319860.143	647243.1467	386.56168	16.623276	8	0.2	1	G	1	8	2	Minor Water Feature	6	360.268373	115.405093	3	26.29	2	18	3	6
203	319956.453	647196.6268	414.711642	11.340929	6	0.2	1	G	1	6	2	New Site Infrastructure	6	420.474316	61.057692	3	-5.76	1	18	3	6
204	319956.625	647234.8713	411.898837	13.461942	6	0.1	1	G	1	6	2	Minor Water Feature	6	417.085742	74.529537	3	-5.19	1	18	3	6
205	320055.911	647238.7562	429.273813	7.3016	4	0.5	1	G	1	4	1	New Site Infrastructure	6	431.20535	28.758089	3	-1.93	1	18	3	3
206	320157.333	647238.4005	436.888493	4.952711	4	0.3	1	G	1	4	1	New Site Infrastructure	6	437.640466	18.912865	3	-0.75	1	18	3	3
207	320257.973	647238.5466	438.235179	9.751937	6	0.3	1	G	1	6	2	New Site Infrastructure	6	442.479092	73.639244	3	-4.24	1	18	3	6
208	320359.759	647239.4533	431.833493	10.258479	6	0.4	1	G	1	6	2	New Site Infrastructure	6	425.422112	72.617323	3	6.41	1	18	3	6
209	321257.559	648938.5673	361.128055	5.929241	4	0.3	1	R	1.5	6	2	Tracks or Paths	2	344.657601	205.524174	3	16.47	2	6	1	2
210	321297.487	648855.4658	357.871179	2.978521	2	0.2	1	R	1.5	3	1	Tracks or Paths	2	346.092489	115.564273	3	11.78	2	6	1	1
211	321271.051	648723.5951	354.177224	5.445747	4	0.3	1	G	1	4	1	Tracks or Paths	2	351.072187	31.016791	3	3.11	1	6	1	1
212	320458.335	647242.2546	426.814937	10.751112	6	0.1	1	G	1	6	2	New Site Infrastructure	6	428.437255	13.752202	3	-1.62	1	18	3	6
213	320557.916	647240.0756	403.049381	25.681241	8	0.2	1	G	1	8	2	Minor Water Feature	6	398.618537	44.452331	3	4.43	1	18	3	6
214	320658.059	647236.6757	382.838715	10.686922	6	0.1	1	G	1	6	2	New Site Infrastructure	6	383.68779	4.796639	4	-0.85	1	24	3	6
215	320761.732	647240.8139	377.92001	11.410686	6	0.3	1	G	1	6	2	New Site Infrastructure	6	383.939625	34.725019	3	-6.02	1	18	3	6
216	320859.502	647235.8196	359.090306	17.026834	8	0.4	1	G	1	8	2	Tracks or Paths	2	337.357708	62.452204	3	21.73	2	6	1	2
217	320953.105	647233.1363	331.429505	20.552372	8	0.3	1	R	1.5	12	2	Minor Water Feature	6	330.029309	3.752406	4	1.40	1	24	3	6
218	321263.259	649142.3696	360.949862	3.981635	2	0.5	1	G	1	2	1	Tracks or Paths	2	340.336233	359.275842	3	20.61	2	6	1	1
219	321160.031	649136.6157	368.583963	6.159429	4	0.2	1	G	1	4	1	Minor Water Feature	6	338.607437	396.029697	3	29.98	2	18	3	3
220	321058.369	649137.8889	372.396024	5.045232	4	0.3	1	G	1	4	1	Minor Water Feature	6	351.00009	330.987342	3	21.40	2	18	3	3
221	321058.781	649037.1408	380.943769	5.310636	4	0.3	1	R	1.5	6	2	Tracks or Paths	2	367.869437	369.712513	3	13.07	2	6	1	2
222	320961.247	649035.5997	381.67009	2.747517	2	0.5	1	G	1	2	1	Tracks or Paths	2	368.213419	281.742668	3	13.46	2	6	1	1
223	320856.322	649029.1594	381.226052	2.681239	2	0.3	1	G	1	2	1	Tracks or Paths	2	368.213419	199.891112	3	13.01	2	6	1	1
224	320780.913	649022.1836	381.348213	3.346426	2	0.5	1	G	1	2	1	Minor Water Feature	6	369.522902	154.0402	3	11.83	2	18	3	3
225	320663.499	649042.8784	375.623617	8.894505	6	0.6	2	G	1	12	2	Minor Water Feature	6	369.511159	47.519313	3	6.11	1	18	3	6
226	320558.032	649038.084	379.480109	8.928516	6	0.3	1	G	1	6	2	Minor Water Feature	6	372.858355	29.779072	3	6.62	1	18	3	6
227	320461.024	649124.1331	385.159049	6.19494	4	0.3	1	G	1	4	1	New Site Infrastructure	6	385.190986	0.310901	4	-0.03	1	24	3	3
228	320369.663	649149.369	381.740766	11.811115	6	0.3	1	R	1.5	9	2	New Site Infrastructure	6	385.53858	34.608378	3	-3.80	1	18	3	6
229	320273.701	649152.0554	386.397687	10.243634	6	0.3	1	R	1.5	9	2	Minor Water Feature	6	384.909627	48.330864	3	1.49	1	18	3	6
230	320162.851	649136.4636	405.666492	14.761391	6	0.2	1	G	1	6	2	Minor Water Feature	6	404.841538	11.437442	3	0.82	1	18	3	6
231	320057.479	649139.8842	417.242464	7.527527	4	0.1	1	G	1	4	1	Minor Water Feature	6	416.547209	48.085308	3	0.70	1	18	3	3
232	319958.116	649137.5706	420.4173	11.149886	6	0.2	1	R	1.5	9	2	Minor Water Feature	6	422.003105	127.856892	3	-1.59	1	18	3	6
233	319961.281	649027.3623	440.049292	9.861924	6	0.4	1	G	1	6	2	Minor Water Feature	6	439.915287	51.194551	3	0.13	1	18	3	6
234	319859.997	649036.8352	432.099801	8.304087	6	0.2	1	G	1	6	2	Minor Water Feature	6	451.116029	121.472404	3	-19.02	1	18	3	6
235	319858.167	648937.6605	443.5693	10.847796	6	0.1	1	R	1.5	9	2	Minor Water Feature	6	451.116029	83.004465	3	-7.55	1	18	3	6
236	319856.929	648836.3242	450.484328	6.620914	4	0.2	1	G	1	4	1	Minor Water Feature	6	451.116029	138.148964	3	-0.63	1	18	3	3
237	319856.734	648734.838	443.901686	8.542924	6	0.2	1	G	1	6	2	Minor Water Feature	6	421.055094	129.412336	3	22.85	2	18	3	6
238	319856.983	648640.3942	421.936492	13.812702	6	0.3	1	G	1	6	2	Minor Water Feature	6	421.055094	41.633966	3	0.88	1	18	3	6
239	319957.858	648534.2634	395.074456	14.193471	6	0.9	2	G	1	12	2	Minor Water Feature	6	398.400348	19.150939	3	-3.33	1	18	3	6
240	319960.307	648638.8621	426.735784	14.164262	6	0.3	1	C	2	12	2	Minor Water Feature	6	409.136336	96.562337	3	17.60	2	18	3	6
241	319952.653	648729.3604	443.635133	8.105733	6	0.2	1	G	1	6	2	Minor Water Feature	6	409.644332	166.887154	3	33.99	2	18	3	6
242	319962.706	648831.7782	454.891281	3.198371	2	0.3	1	G	1	2	1	Minor Water Feature	6	451.271228	115.776758	3	3.62	1	18	3	3
243	319962.155	648944.0393	452.104608	6.641528	4	0.6	2	G	1	8	2	Minor Water Feature	6	451.611734	4.110943	4	0.49	1	24	3	6
244	320055.156	648939.5451	449.231734	7.24541	4	0.1	1	G	1	4	1	Minor Water Feature	6	440.806964	58.092574	3	8.42	1	18	3	3
245	320065.513	649035.8348	429.182272	19.845904	8	0.3	1	R	1.5	12	2	Minor Water Feature	6	423.868371	17.906087	3	5.31	1	18	3	6
246	320153.565	649029.9494	425.731223	12.389899	6	0.4	1	G	1	6	2	Minor Water Feature	6	427.200946	26.860694	3	-1.47	1	18	3	6
247	320155.87	648938.8076	440.614528	9.509435	6	0.1	1	G	1	6	2	New Site Infrastructure	6	441.042379	43.882522	3	-0.43	1	18	3	6
248	320252.43	648928.5006	430.362925	8.625582	6	0.1	1	G	1	6	2	New Site Infrastructure	6	434.568883	35.187933	3	-4.21	1	18	3	6
249	320261.655	649031.8619	413.410971	12.186099	6	0.3	1	G	1	6	2	New Site Infrastructure	6	413.832097	78.692199	3	-0.42	1	18	3	6
250	320353.052	649042.8031	404.69767	10.974888	6	0.2	1	R	1.5	9	2	New Site Infrastructure	6	404.662514	1.800447	4	0.04	1	24	3	6
251	320365.31	648940.3469	415.447257	10.460071	6	0.1	1	G	1	6	2	New Site Infrastructure	6	415.565728	0.642104	4	-0.12	1	24	3	6
252	320460.16	648937.3561	394.932264	4.384279	4	0.7	2	G	1	8	2	New Site Infrastructure	6	399.108811	16.167304	3	-4.18	1	18	3	6
253	320557.637	648927.9226	387.897537	8.183285	6	0.3	1	G	1	6	2	Minor Water Feature	6	388.918529	8.398329	4	-1.02	1	24	3	6
254	320658.703	648946.4862	392.926752	14.220665	6	0.6	2	G	1	12	2	Minor Water Feature	6	383.46285	67.403389	3	9.46	1	18	3	6
255	320754.286	648944.9619	395.812534	15.566617	8	0.3	1	G	1	8	2	Minor Water Feature	6	378.952121	159.998114	3	16.86	2	18	3	6
256	320849.737	648939.9836	394.438244	13.290145	6	0.3	1	G	1	6	2	Minor Water Feature	6	377.917362	254.100504	3	16.52	2	18	3	6
257	320945.377	648914.9993	399.316559	17.203217	8	0.4	1	G	1	8	2	Tracks or Paths	2	368.213419	343.90986	3	31.10	2	6	1	2
258	321036.682	648930.3724	394.57547	8.968135	6	0.3	1	R	1.5	9	2	Minor Water Feature	6	359.018269	337.650103	3	35.56	2	18	3	6
259	321164.113	648928.0153	375.41835	15.078089	8	0.1	1	R	1.5	12	2	Tracks or Paths	2	349.841023	254.951994	3	25.58	2	6	1	2
260	321059.336	647343.1659	331.967535	1.707869	1	1	2	G	1	2	1	Minor Water Feature	6	330.984429	33.980174	3	0.98	1	18	3	3
261	320955.665	647342.1233	356.910998	20.087242	8	0.1	1	G	1	8	2	Tracks or Paths	2	345.718603	30.143391	3	11.19	2	6	1	2
262	320854.356	647343.0136	381.337691	15.309816	8	0.2	1	G	1	8	2	New Site Infrastructure	6	386.164988	21.654109	3	-4.83	1	18	3	6
263	320756.726	647336.7151	390.36601	9.324004	6	0.1	1	G	1	6	2	New Site Infrastructure	6	390.321404	6.020252	4	0.04	1	24	3	6
264	320658.426	647337.6625	404.19971	14.942585	6	0.2	1	G	1	6	2	New Site Infrastructure	6	385.008163	81.292052	3	19.19	2	18	3	6
265	320556.66	647336.5806	413.024293	20.167492	8	0.4	1	G	1	8	2	Minor Water Feature	6	415.133336	7.441475	4	-2.11	1	24	3	6
266	320455.778	647334.8924	439.377132	9.54676	6	0.2	1	G	1	6	2	New Site Infrastructure	6	439.173366	1.219278	4	0.20	1	24	3	6
267	320355.692	647340.1249	447.925894	9.756147	6	0.3	1	G	1	6	2	New Site Infrastructure	6	454.110224	41.667692	3	-6.18	1	18	3	6
268	320259.253	647338.8684	449.192656	7.006299	4	0.2	1	G	1	4	1	New Site Infrastructure	6	448.933406	2.810857	4	0.26	1	24	3	3
269	320160.688	647339.132	436.892233	9.996361	6	0.2	1	G	1	6	2	Minor Water Feature	6	434.077046	37.543794	3	2.82	1	18	3	6
270	320059.174	647339.1535	415.448527	18.883385	8	0.1	1	G	1	8	2	Minor Water Feature	6	410.57092	20.679244	3	4.88	1	18	3	6
271	319960.327	647336.4689	393.762245	19.732904	8	0.2	1	G	1	8	2	Minor Water Feature	6	375.610041	58.4568	3	18.15	2	18	3	6
272	319854.213	647339.8737	367.340285	21.312884	8	0.1	1	G	1	8	2	Minor Water Feature	6	360.704955	23.283392	3	6.64	1	18	3	6
273	319754.445	647332.3866	352.983571	3.68472	2	0.2	1	G	1	2	1	Minor Water Feature	6	353.443904	12.487618	3	-0.46	1	18	3	3
274	319654.725	647340.3484	340.383385	10.946125	6	0.2	1	G	1	6	2	Minor Water Feature	6	345.804018	79.469684	3	-5.42	1	18	3	6
275	319654.925	647435.5583	340.56647	12.758235	6	0.2	1	G	1	6	2	Minor Water Feature	6	348.518505	150.790464	3	-7.95	1	18	3	6
276	319754.375	647439.4004	356.775547	11.7323	6	0.1	1	G	1	6	2	Minor Water Feature	6	357.555303	97.046482	3	-0.78	1	18	3	6
277	319859.802	647439.6963	372.208545	9.56836	6	0.2	1	G	1	6	2	Minor Water Feature	6	368.305673	67.230001	3	3.90	1	18	3	6
278	319957.693	647438.0572	384.870059	18.916678	8	0.2	1	G	1	8	2	Minor Water Feature	6	377.536601	41.971259	3	7.33	1	18	3	6
279	320059.861	647433.9063	407.937339	15.557691	8	0.1	1	G	1	8	2	Minor Water Feature	6	395.569017	54.627245	3	12.37	2	18	3	6
280	320158.147	647438.6096	433.812509	15.66592	8	0.2	1	G	1	8	2	New Site Infrastructure	6	433.892357	0.755118	4	-0.08	1	24	3	6
281	320253.911	647438.8264	454.291796	9.409323	6	0.2	1	G	1	6	2	New Site Infrastructure	6	452.939893	8.494801	4	1.35	1	24	3	6
282	320358.2	647437.97	459.20809	5.948915	4	0.3	1	G	1	4	1	New Site Infrastructure	6	456.332332	27.159061	3	2.88	1	18	3	3
283	320458.774	647440.2634	450.119608	6.951174	4	0.3	1	G	1	4	1	New Site Infrastructure	6	449.634251	5.943069	4	0.49	1	24	3	3
284	320463.627	647427.3866	448.399809	7.974186	4	0.3	1	G	1	4	1	New Site Infrastructure	6	448.372246	1.305823	4	0.03	1	24	3	3
285	320556.803	647438.7146	439.936821	13.860524	6	0.3	1	G	1	6	2	Minor Water Feature	6	422.743206	81.156422	3	17.19	2	18	3	6
286	320659.907	647440.5185	427.311961	16.136959	8	0.3	1	G	1	8	2	New Site Infrastructure	6	406.116518	99.423133	3	21.20	2	18	3	6
287	320759.631	647436.6246	411.659914	15.989163	8	0.2	1	G	1	8	2	New Site Infrastructure	6	408.808024	9.625686	4	2.85	1	24	3	6
288	320856.746	647436.7227	393.252495	9.220981	6	0.1	1	G	1	6	2	New Site Infrastructure	6	393.272482	3.310671	4	-0.02	1	24	3	6
289	320957.807	647438.5568	369.343684	18.883064	8	0.1	1	G	1	8	2	Tracks or Paths	2	341.38291	71.255954	3	27.96	2	6	1	2
290	321058.201	647435.3061	332.683535	3.076096	2	1.2	3	G	1	6	2	Tracks or Paths	2	333.801385	12.947426	3	-1.12	1	6	1	2
291	321156.918	647440.9664	330.741752	0.690222	1	1.5	3	G	1	3	1	Tracks or Paths	2	330.733322	0.879914	4	0.01	1	8	2	2
292	321059.857	647539.0499	348.32169	14.906691	6	0.1	1	G	1	6	2	Minor Water Feature	6	346.660095	21.485203	3	1.66	1	18	3	6
293	321059.857	647539.0499	348.32169	14.906691	6	0.1	1	G	1	6	2	Minor Water Feature	6	346.660095	21.485203	3	1.66	1	18	3	6
294	320935.539	647557.5484	374.793908	22.420255	8	0.3	1	G	1	8	2	Minor Water Feature	6	366.870214	26.993728	3	7.92	1	18	3	6
295	320856.683	647539.7794	401.20171	15.384541	8	0.1	1	G	1	8	2	New Site Infrastructure	6	401.715819	80.214168	3	-0.51	1	18	3	6
296	320758.524	647536.0519	426.203518	14.211742	6	0.3	1	G	1	6	2	New Site Infrastructure	6	406.933238	80.000456	3	19.27	2	18	3	6
297	320658.648	647539.5755	443.984907	9.506649	6	0.3	1	G	1	6	2	Minor Water Feature	6	451.16892	80.835984	3	-7.18	1	18	3	6
298	320555.548	647537.5896	453.183223	5.220579	4	0.2	1	G	1	4	1	New Site Infrastructure	6	456.262822	95.788363	3	-3.08	1	18	3	3
299	320453.422	647539.9133	457.485531	3.115889	2	0.2	1	G	1	2	1	New Site Infrastructure	6	457.476311	0.735941	4	0.01	1	24	3	3
300	320351.054	647531.6065	462.037601	0.606473	1	0.5	1	G	1	1	1	New Site Infrastructure	6	456.381981	94.169561	3	5.66	1	18	3	3

301	320258.049	647540.1408	456.819292	6.833159	4	0.3	1	G	1	4	1	New Site Infrastructure	6	450.926153	60.389235	3	5.89	1	18	3	3
302	320159.214	647536.6352	444.893716	8.690977	6	0.4	1	G	1	6	2	New Site Infrastructure	6	444.78692	0.725143	4	0.11	1	24	3	6
303	320058.912	647535.9067	426.606194	13.071636	6	0.2	1	G	1	6	2	New Site Infrastructure	6	434.729026	44.19716	3	-8.12	1	18	3	6
304	319960.259	647542.3117	404.352113	13.645077	6	0.3	1	G	1	6	2	New Site Infrastructure	6	434.729026	143.02204	3	-30.38	1	18	3	6
305	319861.444	647538.5186	384.120012	12.048144	6	0.2	1	G	1	6	2	Minor Water Feature	6	369.217806	158.956743	3	14.90	2	18	3	6
306	319757.237	647538.8441	360.310838	15.597821	8	0.3	1	G	1	8	2	Minor Water Feature	6	324.489801	153.340114	3	35.82	2	18	3	6
307	320060.101	647637.2567	424.271344	10.249666	6	0.4	1	G	1	6	2	New Site Infrastructure	6	436.356915	112.257609	3	-12.09	1	18	3	6
308	320152.349	647639.5606	436.695328	13.36093	6	0.4	1	G	1	6	2	Minor Water Feature	6	440.879603	63.203275	3	-4.18	1	18	3	6
309	320257.851	647639.3653	451.058914	9.50379	6	0.3	1	G	1	6	2	Minor Water Feature	6	447.932236	33.56237	3	3.13	1	18	3	6
310	320355.914	647636.7568	456.10539	6.277292	4	0.3	1	G	1	4	1	New Site Infrastructure	6	455.65043	92.831947	3	0.45	1	18	3	3
311	320458.402	647638.8424	456.106941	5.378961	4	0.2	1	G	1	4	1	New Site Infrastructure	6	455.962053	3.761955	4	0.14	1	24	3	3
312	320554.011	647635.7	457.071087	3.521923	2	0.2	1	G	1	2	1	Minor Water Feature	6	451.616302	77.253062	3	5.45	1	18	3	3
313	320656.732	647636.6476	448.835042	8.967664	6	0.4	1	G	1	6	2	Minor Water Feature	6	448.489015	3.22024	4	0.35	1	24	3	6
314	320762.15	647642.5732	425.191476	21.905452	8	0.2	1	G	1	8	2	Minor Water Feature	6	421.340824	23.983623	3	3.85	1	18	3	6
315	320854.162	647637.7721	397.104461	20.085476	8	0.3	1	G	1	8	2	Minor Water Feature	6	396.690149	4.374981	4	0.41	1	24	3	6
316	320957.086	647640.6546	388.193986	20.091635	8	0.2	1	G	1	8	2	Minor Water Feature	6	374.377347	50.178298	3	13.82	2	18	3	6
317	321058.506	647639.0366	380.730147	19.460856	8	0.1	1	G	1	8	2	Minor Water Feature	6	356.12583	99.967435	3	24.60	2	18	3	6
318	321156.041	647639.5863	355.996587	28.490369	8	0.2	1	G	1	8	2	Tracks or Paths	2	334.55091	37.198896	3	21.45	2	6	1	2
319	321255.289	647638.782	335.113842	3.407603	2	0.3	1	R	1.5	3	1	Tracks or Paths	2	337.621526	14.213066	3	-2.51	1	6	1	1
320	320456.405	648338.0312	416.077284	11.258394	6	0.1	1	G	1	6	2	Minor Water Feature	6	409.988737	37.787279	3	6.09	1	18	3	6
321	320557.543	648337.8782	423.438262	8.398041	6	0	1	G	1	6	2	New Site Infrastructure	6	423.458643	0.861675	4	-0.02	1	24	3	6
322	320550.131	648238.0105	415.68549	6.76271	4	0.3	1	R	1.5	6	2	Minor Water Feature	6	415.227585	5.930341	4	0.46	1	24	3	6
323	320667.07	648247.3548	423.21349	2.538068	2	2	3	C	2	12	2	Minor Water Feature	6	423.394311	31.033556	3	-0.18	1	18	3	6
324	320668.237	648345.0248	433.348308	13.067526	6	0.3	1	G	1	6	2	New Site Infrastructure	6	425.636442	38.134913	3	7.71	1	18	3	6
325	320661.515	648433.0589	450.098178	9.13154	6	0.1	1	C	2	12	2	New Site Infrastructure	6	449.919718	1.241695	4	0.18	1	24	3	6
326	320561.124	648435.7082	443.29838	10.278371	6	0.1	1	G	1	6	2	New Site Infrastructure	6	443.32178	0.57516	4	-0.02	1	24	3	6
327	320467.235	648439.9366	432.968059	7.338216	4	0.3	1	G	1	4	1	Tracks or Paths	2	426.761362	38.73218	3	6.21	1	6	1	1
328	320362.365	648437.2286	432.16884	5.092073	4	0.1	1	G	1	4	1	New Site Infrastructure	6	430.868442	16.144696	3	1.30	1	18	3	3
329	320357.576	648546.7115	436.961123	1.106102	1	0.1	1	G	1	1	1	Minor Water Feature	6	436.907452	47.099554	3	0.05	1	18	3	3
330	320253.786	648543.8305	431.417999	5.568841	4	0.1	1	G	1	4	1	Tracks or Paths	2	430.899588	5.357422	4	0.52	1	8	2	2
331	320053.355	648838.5227	451.201041	2.154164	2	0.4	1	R	1.5	3	1	New Site Infrastructure	6	445.071712	121.397899	3	6.13	1	18	3	3
332	320161.734	648841.9082	446.401702	5.24412	4	0.2	1	C	2	8	2	New Site Infrastructure	6	445.011243	12.984943	3	1.39	1	18	3	6
333	320258.729	648836.7439	435.019371	7.775813	4	0.2	1	G	1	4	1	New Site Infrastructure	6	435.53132	4.066802	4	-0.51	1	24	3	3
334	320356.767	648839.7562	419.262283	11.319886	6	0.6	2	G	1	12	2	New Site Infrastructure	6	416.292678	14.188367	3	2.97	1	18	3	6
335	320458.682	648837.3672	406.679777	8.41412	6	0.2	1	G	1	6	2	Minor Water Feature	6	404.365832	48.073916	3	2.31	1	18	3	6
336	320557.779	648833.4514	409.176753	22.197641	8	0.4	1	G	1	8	2	Minor Water Feature	6	403.321645	17.696025	3	5.86	1	18	3	6
337	320664.39	648826.3728	426.320679	16.895398	8	0.3	1	C	2	16	3	Minor Water Feature	6	398.786251	119.475867	3	27.53	2	18	3	9
338	320761.185	648823.3385	429.485456	15.023118	8	0.7	2	G	1	16	3	Minor Water Feature	6	387.873557	209.758631	3	41.61	2	18	3	9
339	320861.736	648841.6009	423.706134	14.462577	6	0.3	1	G	1	6	2	Minor Water Feature	6	386.79161	292.907578	3	36.91	2	18	3	6
340	320959.51	648833.6439	418.40672	13.183992	6	0.2	1	G	1	6	2	Minor Water Feature	6	360.050031	309.299103	3	58.36	2	18	3	6
341	320944.827	648732.3513	433.818989	10.694093	6	0.1	1	R	1.5	9	2	Minor Water Feature	6	361.089112	265.785717	3	72.73	2	18	3	6
342	320860.539	648725.9139	445.083746	12.847253	6	0.3	1	G	1	6	2	Minor Water Feature	6	398.61525	317.888431	3	46.47	2	18	3	6
343	320757.724	648737.9911	449.397901	9.543282	6	0.3	1	G	1	6	2	Minor Water Feature	6	407.393599	237.2731	3	42.00	2	18	3	6
344	320653.9	648740.6267	448.04091	13.84841	6	0.2	1	G	1	6	2	Minor Water Feature	6	411.717794	142.195299	3	36.32	2	18	3	6
345	320563.46	648633.3673	458.680504	10.718803	6	0.2	1	G	1	6	2	Minor Water Feature	6	431.597701	129.847241	3	27.08	2	18	3	6
346	320559.739	648538.6253	457.001617	8.103235	6	0.1	1	R	1.5	9	2	New Site Infrastructure	6	452.673534	61.025443	3	4.33	1	18	3	6
347	320667.61	648527.9357	460.397951	4.843408	4	0.4	1	C	2	8	2	New Site Infrastructure	6	454.96874	53.934607	3	5.43	1	18	3	6
348	320653.038	648641.7507	464.107705	5.394947	4	0.5	1	G	1	4	1	New Site Infrastructure	6	454.569248	157.053861	3	9.54	1	18	3	3
349	320464.449	648538.6974	444.422167	8.931412	6	0.1	1	R	1.5	9	2	Minor Water Feature	6	436.693464	59.292584	3	7.73	1	18	3	6
350	320456.55	648639.2181	437.352402	17.32434	8	0.4	1	G	1	8	2	Minor Water Feature	6	432.738093	29.901247	3	4.61	1	18	3	6
351	320553.843	648743.196	435.590172	17.784505	8	0.1	1	G	1	8	2	Minor Water Feature	6	418.151963	53.327129	3	17.44	2	18	3	6
352	320450.457	648735.4383	422.98957	14.515415	6	0.7	2	C	2	24	3	Minor Water Feature	6	424.416437	14.284692	3	-1.43	1	18	3	9
353	320360.189	648735.0499	423.162597	7.462068	4	0.2	1	G	1	4	1	Tracks or Paths	2	420.846176	25.143301	3	2.32	1	6	1	1
354	320335.204	648640.1409	431.654437	6.629986	4	0.4	1	G	1	4	1	Tracks or Paths	2	427.055874	37.840306	3	4.60	1	6	1	1
355	320226.297	648884.8452	436.285883	6.563469	4	0.1	1	C	2	8	2	New Site Infrastructure	6	436.263981	0.844555	4	0.02	1	24	3	6
356	320257.881	648738.2038	432.139767	3.686672	2	0.3	1	G	1	2	1	New Site Infrastructure	6	432.640667	9.171313	4	-0.50	1	24	3	3
357	320156.641	648735.6287	439.852712	8.876914	6	0.3	1	G	1	6	2	New Site Infrastructure	6	435.129086	64.243781	3	4.72	1	18	3	6
358	320058.929	648740.3928	444.553493	7.806118	4	0.2	1	C	2	8	2	New Site Infrastructure	6	443.966647	137.490399	3	0.59	1	18	3	6
359	320060.417	648639.0613	423.071813	10.445981	6	0.1	1	C	2	12	2	Minor Water Feature	6	411.53904	69.040127	3	11.53	2	18	3	6
360	320157.683	648638.7518	428.622186	8.271715	6	0.1	1	R	1.5	9	2	Minor Water Feature	6	414.274647	79.798519	3	14.35	2	18	3	6
361	320057.214	648538.8687	396.249364	22.948278	8	0.8	2	G	1	16	3	Minor Water Feature	6	400.545747	10.853016	3	-4.30	1	18	3	9
362	320161.857	648534.9659	418.891165	10.164495	6	3	3	G	1	18	3	Minor Water Feature	6	415.154912	19.841583	3	3.74	1	18	3	9
363	320070.536	648443.3177	387.645908	16.632222	8	0.2	1	G	1	8	2	Minor Water Feature	6	385.352483	14.634634	3	2.29	1	18	3	6
364	320060.11	648337.5669	384.577425	16.578834	8	0.2	1	G	1	8	2	Minor Water Feature	6	368.019252	57.373257	3	16.56	2	18	3	6
365	320063.107	648249.9376	373.986229	16.490812	8	0.3	1	G	1	8	2	Minor Water Feature	6	362.178565	46.444028	3	11.81	2	18	3	6
366	320154.044	648234.9082	388.378038	16.266798	8	0.4	1	G	1	8	2	Minor Water Feature	6	381.194504	38.815612	3	7.18	1	18	3	6
367	320254.847	648243.8198	401.312553	13.594141	6	0.3	1	R	1.5	9	2	Minor Water Feature	6	391.8884	42.074112	3	9.42	1	18	3	6
368	320256.682	648332.4734	419.339353	10.755191	6	0.2	1	G	1	6	2	New Site Infrastructure	6	423.935287	29.646925	3	-4.60	1	18	3	6
369	320162.175	648335.5063	408.57057	12.999864	6	0.2	1	G	1	6	2	New Site Infrastructure	6	408.753411	0.810095	4	-0.18	1	24	3	6
370	320151.041	648442.0242	413.087243	12.921744	6	0.4	1	G	1	6	2	New Site Infrastructure	6	413.064029	21.984217	3	0.02	1	18	3	6
371	320262.727	648439.4182	429.888123	3.620069	2	0.1	1	C	2	4	1	New Site Infrastructure	6	428.478502	16.503071	3	1.41	1	18	3	3
372	320361.669	648341.3107	416.66326	11.877211	6	0.3	1	G	1	6	2	Minor Water Feature	6	404.736795	42.001242	3	11.93	2	18	3	6
373	320363.625	648253.7009	400.847989	5.161249	4	0.7	2	R	1.5	12	2	Minor Water Feature	6	401.206161	13.81588	3	-0.36	1	18	3	6
374	320452.287	648234.452	406.920309	3.576072	2	0.8	2	G	1	4	1	Minor Water Feature	6	406.3744	8.454129	4	0.55	1	24	3	3
375	321146.003	648441.4325	379.634302	12.289245	6	0.1	1	G	1	6	2	Minor Water Feature	6	381.560588	9.317235	4	-1.93	1	24	3	6
376	321261.656	648241.0662	352.145654	7.18277	4	2	3	R	1.5	18	3	Tracks or Paths	2	353.184689	7.547811	4	-1.04	1	8	2	6
377	321332.927	648247.8509	346.655468	3.998982	2	0.2	1	R	1.5	3	1	Minor Water Feature	6	346.810114	3.164153	4	-0.15	1	24	3	3
378	321359.316	648337.539	342.840683	4.007008	4	2.2	3	C	2	24	3	Minor Water Feature	6	344.541348	63.451551	3	-1.70	1	18	3	9
379	321268.992	648344.3777	348.079659	9.536889	6	0.3	1	G	1	6	2	Tracks or Paths	2	354.294132	28.973941	3	-6.21	1	6	1	2
380	321357.264	648430.8325	344.953489	4.10118	4	4.4	8	G	1	32	4	Tracks or Paths	2	353.950852	126.040155	3	-9.00	1	6	1	4
381	321361.267	648535.0654	343.743173	1.559991	1	4.5	8	G	1	8	2	Tracks or Paths	2	351.117296	111.895552	3	-7.37	1	6	1	2
382	321158.97	649034.8	375.017343	5.758607	4	0.3	1	C	2	8	2	Tracks or Paths	2	346.092489	342.20591	3	28.92	2	6	1	2
383	321052.581	648842.061	401.773043	11.768876	6	0.1	1	G	1	6	2	Minor Water Feature	6	359.018269	253.618502	3	42.75	2	18	3	6
384	321047.768	648741.3681	409.532275	6.748895	4	0.4	1	G	1	4	1	Minor Water Feature	6	360.050031	182.129955	3	49.48	2	18	3	3
385	320960.692	648638.4183	429.654026	18.549661	8	0.1	1	R	1.5	12	2	Minor Water Feature	6	398.61525	193.123842	3	31.04	2	18	3	6
386	320938.811	648533.1154	436.141073	11.713159	6	0.2	1	G	1	6	2	Minor Water Feature	6	398.61525	120.567081	3	37.53	2	18	3	6
387	320855.48	648534.4532	454.345524	9.434596	6	0.2	1	G	1	6	2	New Site Infrastructure	6	447.772134	168.845402	3	6.57	1	18	3	6
388	320830.613	648592.482	459.513911	7.065612	4	0.3	1	G	1	4	1	New Site Infrastructure	6	453.202387	196.869113	3	6.31	1	18	3	3
389	320862.863	648654.2801	452.989294	10.003515	6	0.1	1	R	1.5	9	2	Minor Water Feature	6	398.61525	259.379535	3	54.37	2	18	3	6
390	320753.387	648626.4284	464.405005	3.679102	2	0.2	1	G	1	2	1	New Site Infrastructure	6	454.427722	178.638761	3	9.98	1	18	3	3
391	320756.833	648535.2368	462.184849	5.516788	4	0.3	1	G	1	4	1	New Site Infrastructure	6	453.962919	104.154302	3	8.22	1	18	3	3
392	320761.044	648440.124	451.138014	5.763394	4	0.4	1	G	1	4	1	New Site Infrastructure	6	447.875988	36.901402	3	3.26	1	18	3	3
393	320743.841	648329.126	440.565176	8.930446	6	0.2	1	R	1.5	9	2	New Site Infrastructure	6	442.440925	23.423709	3	-1.88	1	18	3	6
394	320759.817	648241.4132	438.815593	8.671495	6	0.6	2	G	1	12	2	New Site Infrastructure	6	438.346547	3.181472	4	0.47	1	24	3	6
395	320861.08	648238.0218	444.076704	3.939137	2	0.7	2	G	1	4	1	New Site Infrastructure	6	439.048889	102.801452	3	5.03	1	18	3	3
396	320967.601	648238.3666	429.4833	12.750174	6	3	3	G	1	18	3	Minor Water Feature	6	421.349451	65.964536	3	8.13	1	18	3	9
397	320952.557	648333.331	421.465469	21.307765	8	0.2	1	G	1	8	2	Minor Water Feature	6	417.758773	10.657919	3	3.71	1	18	3	6
398	320863.277	648346.9962	441.836931	10.438609	6	0.2	1	G	1	6	2	New Site Infrastructure	6	444.657311	86.595596	3	-2.82	1	18	3	6
399	320855.253	648435.4582	449.017234	5.463492	4	0.3	1	G	1	4	1	New Site Infrastructure	6	447.310131	102.383949	3	1.71	1	18	3	3
400	320953.52	648420.4975	425.003714	29.997564	8	0.1	1	R	1.5	12	2	Minor Water Feature	6	409.631945	53.467293	3	15.37	2	18	3	6
401	321054.825	648434.4279	397.561799	9.837449	6	0.3	1	G	1	6	2	Minor Water Feature	6	395.596596	14.900864	3	1.97	1	18	3	6
402	321061.093	648533.0088	390.342295	11.048424	6	0.2	1	G	1	6	2	Minor Water Feature	6	397.292503	77.144932	3	-6.95	1	18	3	6
403	321102.994	648640.387	379.305558	12.981587	6	0.3	1	R	1.5	9	2	Minor Water Feature	6	361.89952	84.612992	3	17.41	2	18	3	6
404	321149.586	648737.7059	369.229581	11.097101	6	0.5	1	R	1.5	9	2	Minor Water Feature	6	358.55325	114.690537	3	10.68	2	18	3	6
405	321164.494	648638.1991	365.024532	16.663729	8	0.4	1	C	2	16	3	Minor Water Feature	6	360.050031	27.07755	3	4.97	1	18	3	9
406	321160.418	648546.2464	371.420901	11.988968	6	2	3	R	1.5	27	3	Minor Water Feature	6	371.019135	5.964539	4	0.40	1	24	3	9
407	321256.286	648639.7155	351.331048	7.096267	4	0.1	1	G	1	4	1	Upgraded Site Infrastructure	6	351.52139	1.621754	4	-0.19	1	24	3	3
408	321358.11	648638.773	343.851799	3.982944	2	1	2	G	1	4	1	Minor Water Feature	6	345.971532	44.461859	3	-2.12	1	18	3	3
409	321259.583	648537.398	349.251892	8.582465	6	0.8	2	G	1	12	2	Tracks or Paths	2	351.102678	11.206725	3	-1.85	1	6	1	2
410	321268.467	648438.4973	347.843526	5.557461	4	0.6	2	G	1	8	2	Tracks or Paths	2	354.5969	38.180967	3	-6.75	1	6	1	2
411	321268.467	648438.4973	347.843526	5.557461	4	0.8	2	G	1	8	2	Tracks or Paths	2	354.5969	38.180967	3	-6.75	1	6	1	2
412	321157.183	648207.8142	378.219858	15.327417	8	0.3	1	G	1	8	2	Minor Water Feature	6	383.332935	85.73233	3	-5.11	1	18	3	6
413	321057	648243.7549	409.585821	11.262934	6	0.5	1	G	1	6	2	Minor Water Feature	6	419.596293	118.626848	3	-10.01	1	18	3	6
414	321323.747	648138.3428	354.60503	6.460489	4	0.2	1	G	1	4	1	Tracks or Paths	2	356.21148	14.451823	3	-1.61	1	6	1	1
415	321256.983	648138.4454	358.213621	6.304739	4	0.4	1	G	1	4	1	Minor Water Feature	6	358.049528	1.687609	4	0.16	1	24	3	3
416	321156.997	648135.7035	383.313599	14.564761	6	0.3	1	G	1	6	2	Minor Water Feature	6	383.332935	13.600042	3	-0.02	1	18	3	6
417	321055.722	648135.6746	413.806581	16.66568	8	0.3	1	G	1	8	2	Minor Water Feature	6	395.0875	62.454499	3	18.72	2	18	3	6
418	320951.092	648134.7386	441.502607	11.172857	6	0.3	1	G	1	6	2	Minor Water Feature	6	398.51304	158.954377	3	42.99	2	18	3	6
419	320914.465	648106.8332	449.760521	7.723523	4	0.1	1	G	1	4	1	New Site Infrastructure	6	449.374734	169.807687	3	0.39	1	18	3	3
420	320855.958	648137.3134	450.392427	8.036146	6	0.2	1	G	1	6	2	New Site Infrastructure	6	442.032198	112.014221	3	8.36	1	18	3	6
421	320753.763	648136.2212	445.629745	10.214698	6	0.6	2	G	1	12	2	New Site Infrastructure	6	444.329522	11.053607	3	1.30	1	18	3	6
422	320654.217	648138.6055	430.716502	8.999392	6	0.3	1	G	1	6	2	Minor Water Feature	6	431.493196	10.511331	3	-0.78	1	18	3	6
423	320554.932	648139.9563	425.049697	13.517351	6	0.2	1	G	1	6	2	Minor Water Feature	6	417.209305	79.807077	3	7.84	1	18	3	6
424	320458.204	648139.1584	412.90849	20.87765	8	0.4	1	G	1	8	2	Minor Water Feature	6	410.527673	9.611706	4	2.38	1	24	3	6
425	320362.298	648143.0177	402.002826	8.161237	6	0.4	1	G	1	6	2	Minor Water Feature	6	402.024688	1.169887	4	-0.02	1	24	3	6
426	320261.868	648136.2642	393.575774	5.779967	4	0.1	1	G	1	4	1	Minor Water Feature	6	393.729558	2.314108	4	-0.15	1	24	3	3
427	320149.426	648134.7628	383.884515	10.777642	6	0.1	1	G	1	6	2	Minor Water Feature	6	381.902777	15.369465	3	1.98	1	18	3	6
428	320058.975	648142.8349	371.198267	12.587762	6	0.1	1	G	1	6	2	Minor Water Feature	6	369.863953	29.274004	3	1.33	1	18	3	6
429	320058.765	648036.5448	381.716782	10.961414	6	0.1	1	G	1	6	2	Minor Water Feature	6	378.94789	49.62069	3	2.77	1	18	3	6
430	320163.058	648042.1405	400.63504	11.459098	6	0.3	1	G	1	6	2	Minor Water Feature	6	393.083301	107.810541	3	7.55	1	18	3	6
431	320258.479	648037.6045	412.686021	8.303213	6	0.2	1	G	1	6	2	Minor Water Feature	6	393.47627	96.537546	3	19.21	2	18	3	6
432	320360.04	648032.9722	419.714172	7.388008	4	0.8	2	G	1	8	2	Minor Water Feature	6	399.755463	110.604175	3	19.96	2	18	3	6
433	320457.207	648040.0584	435.119465	11.520126	6	0.5	1	R	1.5	9	2	Minor Water Feature	6	410.495461	101.129222	3	24.62	2	18	3	6
434	320560.01	648040.8293	441.23364	5.336199	4	0.2	1	G	1	4	1	New Site Infrastructure	6	444.413911	64.811539	3	-3.18	1	18	3	3
435	320661.628	648035.5358	446.993185	11.683347	6	0.4	1	G	1	6	2	New Site Infrastructure	6	447.093995	1.229224	4	-0.10	1	24	3	6
436	320757.325	648044.405	456.951085	5.169712	4	0.4	1	G	1	4	1	New Site Infrastructure	6	453.338518	32.649372	3	3.61	1	18	3	3
437	320861.144	648037.084	458.768906	5.813749	4	0.2	1	G	1	4	1	New Site Infrastructure	6	451.830836	129.328309	3	6.94	1	18	3	3
438	320959.948	648040.1439	442.987378	13.176243	6	0.1	1	G	1	6	2	Minor Water Feature	6	398.841289	153.859596	3	44.15	2	18	3	6
439	321058.315	648037.3868	414.68685	14.241374	6	0.2	1	G	1	6	2	Minor Water Feature	6	398.841289	71.7696	3	15.85	2	18	3	6
440	321158.278	648041.3259	384.920776	12.680952	6	0.2	1	G	1	6	2	Minor Water Feature	6	378.122522	67.148643	3	6.80	1	18	3	6
441	321258.474	648039.5993	371.174736	9.624158	6	0.2	1	G	1	6	2	Minor Water Feature	6	367.772625	27.831913	3	3.40	1	18	3	6
442	321357.26	648043.1211	358.912236	14.259237	6	0.1	1	G	1	6	2	Tracks or Paths	2	356.717634	8.868395	4	2.19	1	8	2	4
443	321359.98	647842.8445	367.327433	11.866001	6	0.2	1	G	1	6	2	Tracks or Paths	2	356.708727	55.980516	3	10.62	2	6	1	2
444	321257.845	647837.8668	384.147302	8.395979	6	0.3	1	G	1	6	2	Minor Water Feature	6	395.98187	88.661555	3	-11.83	1	18	3	6
445	321157.478	647838.2948	399.482953	12.827961	6	0.2	1	G	1	6	2	Minor Water Feature	6	399.199221	2.510105	4	0.28	1	24	3	6
446	321057.376	647838.2351	419.807331	11.39512	6	0.1	1	G	1	6	2	Minor Water Feature	6	400.009024	97.514458	3	19.80	2	18	3	6
447	320959.146	647836.0209	432.972477	8.733139	6	0.2	1	G	1	6	2	Minor Water Feature	6	421.363127	138.598931	3	11.61	2	18	3	6
448	320857.749	647840.9813	438.675373	11.042349	6	0.3	1	G	1	6	2	Minor Water Feature	6	421.363127	78.760957	3	17.31	2	18	3	6
449	320760.668	647837.631	443.599928	12.811985	6	0.1	1	G	1	6	2	Minor Water Feature	6	443.790576	101.69076	3	-0.19	1	18	3	6
450	320656.002	647836.8705	451.120812	1.644836	1	0.2	1	G	1	1	1	New Site Infrastructure	6	449.415104	73.404969	3	1.71	1	18	3	3
451	320556.57	647840.0759	449.730223	4.75077	4	0.1	1	R	1.5	6	2	New Site Infrastructure	6	450.033427	2.90926	4	-0.30	1	24	3	6
452	320454.138	647838.2531	454.317559	1.821742	1	0.2	1	G	1	1	1	New Site Infrastructure	6	452.2524	85.45927	3	2.07	1	18	3	3

453	320354.671	647831.2183	445.466843	8.747908	6	0.3	1	G	1	6	2	Minor Water Feature	6	422.095499	144.957234	3	23.37	2	18	3	6
454	320325.234	647869.5525	435.836461	13.753495	6	0.4	1	G	1	6	2	Minor Water Feature	6	420.770379	130.003688	3	15.07	2	18	3	6
455	320257.013	647838.4523	424.260211	14.97978	6	0.7	2	G	1	12	2	Minor Water Feature	6	420.770379	55.373762	3	3.49	1	18	3	6
456	320155.526	647839.6238	411.56775	11.118527	6	0.2	1	G	1	6	2	Minor Water Feature	6	409.972755	31.51833	3	1.59	1	18	3	6
457	320060.66	647840.4846	399.237155	14.712215	6	0.4	1	G	1	6	2	Minor Water Feature	6	400.226593	95.161607	3	-0.99	1	18	3	6
458	320061.568	647741.1862	413.046198	13.32454	6	0.2	1	G	1	6	2	Minor Water Feature	6	430.800954	134.845996	3	-17.75	1	18	3	6
459	320057.989	647934.73	389.756567	13.809979	6	0.1	1	G	1	6	2	Minor Water Feature	6	389.63955	40.043055	3	0.12	1	18	3	6
460	320158.081	647939.1991	405.428127	6.55553	4	0.2	1	G	1	4	1	Minor Water Feature	6	401.873549	37.735632	3	3.55	1	18	3	3
461	320257.244	647932.8962	416.049575	8.565998	6	0.2	1	G	1	6	2	Minor Water Feature	6	404.654497	102.146257	3	11.40	2	18	3	6
462	320364.275	647951.3093	434.104013	11.860667	6	0.4	1	G	1	6	2	Minor Water Feature	6	399.755463	191.482849	3	34.35	2	18	3	6
463	320455.911	647940.404	447.598044	7.770527	4	0.3	1	G	1	4	1	New Site Infrastructure	6	447.198596	124.853977	3	0.40	1	18	3	3
464	320558.251	647928.6566	448.607136	4.432652	4	0.5	1	G	1	4	1	New Site Infrastructure	6	447.198596	26.192245	3	1.41	1	18	3	3
465	320660.272	647937.8655	453.246034	3.492655	2	0.2	1	G	1	2	1	New Site Infrastructure	6	453.169924	2.734291	4	0.08	1	24	3	3
466	320655.234	647738.1724	448.698722	7.03428	4	0.2	1	G	1	4	1	Minor Water Feature	6	444.165814	47.050093	3	4.53	1	18	3	3
467	320560.186	647735.5545	453.840033	1.531809	1	1.1	3	G	1	3	1	New Site Infrastructure	6	452.721884	54.329008	3	1.12	1	18	3	3
468	320457.72	647741.2248	452.573598	1.236331	1	0.2	1	G	1	1	1	New Site Infrastructure	6	452.548894	27.09397	3	0.02	1	18	3	3
469	320357.045	647739.1062	446.842974	10.242608	6	0.1	1	G	1	6	2	New Site Infrastructure	6	451.742513	111.095733	3	-4.90	1	18	3	6
470	320259.806	647740.5332	436.395594	8.94381	6	0.4	1	G	1	6	2	Minor Water Feature	6	427.944544	57.847129	3	8.45	1	18	3	6
471	320160.186	647745.6966	426.468244	6.887843	4	0.2	1	G	1	4	1	Minor Water Feature	6	429.891876	37.318834	3	-3.42	1	18	3	3
472	320759.774	647738.2401	431.080609	16.822486	8	0.5	1	R	1.5	12	2	Minor Water Feature	6	430.4402	22.707824	3	0.64	1	18	3	6
473	320857.332	647736.6783	416.642347	11.994513	6	0.1	1	G	1	6	2	Minor Water Feature	6	419.931242	31.169718	3	-3.29	1	18	3	6
474	320961.55	647743.1251	414.851977	17.619809	8	0.2	1	G	1	8	2	Minor Water Feature	6	397.935021	115.028626	3	16.92	2	18	3	6
475	321062.59	647738.99	404.892589	13.681618	6	0.1	1	G	1	6	2	Minor Water Feature	6	399.536043	106.812124	3	5.36	1	18	3	6
476	321159.043	647740.4224	388.00329	16.695393	8	0.4	1	G	1	8	2	Minor Water Feature	6	399.536043	62.567432	3	-11.53	1	18	3	6
477	321247.977	647738.3051	368.617988	17.907719	8	0.4	1	G	1	8	2	Tracks or Paths	2	343.604286	66.084899	3	25.01	2	6	1	2
478	321340.671	647734.0555	350.857667	16.938478	8	0.2	1	G	1	8	2	Tracks or Paths	2	348.319901	8.47925	4	2.54	1	8	2	4
479	321359.95	647939.0887	367.120261	10.451466	6	0.2	1	G	1	6	2	Upgraded Site Infrastructure	6	358.055826	48.788659	3	9.06	1	18	3	6
480	321259.446	647936.7456	384.851527	6.811226	4	0.3	1	G	1	4	1	Minor Water Feature	6	386.234345	46.973145	3	-1.38	1	18	3	3
481	321157.535	647937.0057	396.230114	16.029604	8	0.2	1	G	1	8	2	Minor Water Feature	6	389.004557	35.201733	3	7.23	1	18	3	6
482	321059.163	647939.6345	420.944847	10.460189	6	0.4	1	G	1	6	2	Minor Water Feature	6	392.311569	115.83567	3	28.63	2	18	3	6
483	320956.438	647937.7166	438.481397	13.618129	6	0.2	1	R	1.5	9	2	Minor Water Feature	6	421.363127	208.708468	3	17.12	2	18	3	6
484	320859.37	647941.6094	452.375527	10.835214	6	0.1	1	G	1	6	2	New Site Infrastructure	6	455.235883	167.871961	3	-2.86	1	18	3	6
485	320756.345	647938.0128	457.238489	4.298597	4	0.2	1	G	1	4	1	New Site Infrastructure	6	455.274545	76.636379	3	1.96	1	18	3	3
486	321131.858	647542.8151	331.286709	4.471888	4	1.3	3	G	1	12	2	Upgraded Site Infrastructure	6	332.312559	7.262989	4	-1.03	1	24	3	6
487	321239.347	647337.7848	369.142623	23.513152	8	0.1	1	G	1	8	2	New Site Infrastructure	6	368.837089	0.712245	4	0.31	1	24	3	6
488	321242.742	647237.8499	380.383174	14.069396	6	0.2	1	G	1	6	2	New Site Infrastructure	6	375.238334	21.460978	3	5.14	1	18	3	6
489	321242.041	647139.1882	385.196959	7.88801	4	0.3	1	G	1	4	1	New Site Infrastructure	6	383.573183	69.655473	3	1.62	1	18	3	3
490	321221.11	647040.2257	389.725953	7.40103	4	0.4	1	G	1	4	1	New Site Infrastructure	6	387.762956	16.402294	3	1.96	1	18	3	3
491	321211.341	646990.6455	391.651291	7.180655	4	0.3	1	G	1	4	1	New Site Infrastructure	6	391.68678	2.612013	4	-0.04	1	24	3	3
492	321190.904	646937.6196	389.96859	8.179802	6	0.3	1	G	1	6	2	New Site Infrastructure	6	389.647129	2.245622	4	0.32	1	24	3	6
493	321185.447	646839.366	391.031792	10.36233	6	0.4	1	G	1	6	2	New Site Infrastructure	6	386.29669	28.804258	3	4.74	1	18	3	6
494	321208.975	646738.1334	398.806462	3.403297	2	0.3	1	G	1	2	1	New Site Infrastructure	6	385.451061	105.097537	3	13.36	2	18	3	3
495	321160.668	646643.264	397.49373	3.671465	2	0.2	1	G	1	2	1	Major Water Feature	8	394.875973	91.473215	3	2.62	1	24	3	3
496	321246.299	646740.0143	400.576621	0.96126	1	0.3	1	G	1	1	1	New Site Infrastructure	6	385.721543	135.106694	3	14.86	2	18	3	3
497	321169.018	647042.1957	383.352577	6.529336	4	0.3	1	G	1	4	1	New Site Infrastructure	6	383.329359	0.316602	4	0.02	1	24	3	3
498	321158.962	646938.4456	385.41878	9.3184	6	0.2	1	G	1	6	2	New Site Infrastructure	6	385.376146	0.417199	4	0.04	1	24	3	6
499	321120.35	646838.6749	381.406104	11.018142	6	0.3	1	G	1	6	2	New Site Infrastructure	6	381.51472	0.671454	4	-0.11	1	24	3	6
500	321062.752	646845.6633	372.266158	8.823723	6	0.6	2	G	1	12	2	New Site Infrastructure	6	374.822385	26.40771	3	-2.56	1	18	3	6
501	320959.122	646842.926	353.243663	13.471133	6	0.4	1	R	1.5	9	2	New Site Infrastructure	6	374.243029	108.218059	3	-21.00	1	18	3	6
502	320866.381	646846.2541	338.56295	10.997355	6	0.5	1	G	1	6	2	Upgraded Site Infrastructure	6	326.908896	64.894769	3	11.65	2	18	3	6
503	320854.363	646937.4399	332.00338	12.111535	6	0.1	1	G	1	6	2	Upgraded Site Infrastructure	6	329.02388	11.955803	3	2.98	1	18	3	6
504	320900.768	647036.9407	332.066794	4.42817	4	0.3	1	G	1	4	1	Upgraded Site Infrastructure	6	329.74024	15.782625	3	2.33	1	18	3	3
505	320953.898	647077.8896	339.17706	18.628764	8	0.2	1	G	1	8	2	Upgraded Site Infrastructure	6	332.966484	20.810461	3	6.21	1	18	3	6
506	321064.272	647138.7991	348.758519	13.86285	6	0.3	1	G	1	6	2	Minor Water Feature	6	347.782668	5.602858	4	0.98	1	24	3	6
507	321123.015	647115.2648	370.297233	12.770562	6	0.1	1	G	1	6	2	New Site Infrastructure	6	374.451072	18.997613	3	-4.15	1	18	3	6
508	321074.909	647033.75	374.034447	10.565919	6	0.3	1	G	1	6	2	Minor Water Feature	6	375.613996	15.813415	3	-1.58	1	18	3	6
509	321110.611	647190.9162	355.730144	19.036881	8	0.2	1	G	1	8	2	New Site Infrastructure	6	354.069457	55.70857	3	1.66	1	18	3	6
510	321062.499	647229.4813	336.487358	15.301819	8	0.4	1	R	1.5	12	2	Tracks or Paths	2	334.682258	7.411897	4	1.81	1	8	2	4
511	321157.038	647345.2803	337.497637	13.285695	6	0.4	1	G	1	6	2	New Site Infrastructure	6	338.623386	4.855221	4	-1.13	1	24	3	6
512	319963.162	646148.2056	364.780884	12.323233	6	0.1	1	G	1	6	2	Tracks or Paths	2	364.784662	0.458165	4	0.00	1	8	2	4
513	319860.942	646116.5933	366.975325	9.319329	6	0.3	1	G	1	6	2	Tracks or Paths	2	366.506714	61.30086	3	0.47	1	6	1	2
514	319760.106	646099.2622	366.551904	11.861951	6	0.2	1	G	1	6	2	Tracks or Paths	2	340.196608	118.888167	3	26.36	2	6	1	2
515	319658.493	646036.1933	370.240249	14.882932	6	0.2	1	G	1	6	2	Tracks or Paths	2	328.593706	151.990112	3	41.65	2	6	1	2
516	319596.885	645940.4334	376.115463	11.497897	6	0.2	1	G	1	6	2	Tracks or Paths	2	314.950134	199.364047	3	61.17	2	6	1	2
517	319556.559	646084.4606	331.79856	9.477558	6	0.3	1	G	1	6	2	Tracks or Paths	2	324.140981	66.122283	3	7.66	1	6	1	2
518	319563.62	646146.6284	327.467151	5.453855	4	0.2	1	G	1	4	1	Tracks or Paths	2	326.665864	9.921131	4	0.80	1	8	2	2
519	319554.964	646172.9152	324.395589	9.868811	6	0.2	1	G	1	6	2	Tracks or Paths	2	326.118795	12.242715	3	-1.72	1	6	1	2
520	319656.151	646199.3001	335.149776	14.751749	6	0.2	1	G	1	6	2	Tracks or Paths	2	333.951667	6.962975	4	1.20	1	8	2	4
521	319961.363	646109.9817	372.98709	13.580381	6	0.1	1	R	1.5	9	2	Tracks or Paths	2	367.007359	27.252314	3	5.98	1	6	1	2
522	320058.988	646065.3302	388.087891	11.811529	6	0.2	1	G	1	6	2	New Site Infrastructure	6	394.463658	29.23005	3	-6.38	1	18	3	6
523	320059.715	646039.5168	393.900328	10.010826	6	0.1	1	G	1	6	2	New Site Infrastructure	6	394.509886	3.550481	4	-0.61	1	24	3	6
524	319959.131	645982.0719	400.629662	11.572396	6	0.2	1	G	1	6	2	New Site Infrastructure	6	402.551302	27.461888	3	-1.92	1	18	3	6
525	319879.214	645939.0711	405.651708	12.578587	6	0.2	1	G	1	6	2	New Site Infrastructure	6	403.918483	108.464828	3	1.73	1	18	3	6
526	319768.266	645836.4728	414.567333	9.445143	6	0.2	1	G	1	6	2	New Site Infrastructure	6	404.682238	251.089635	3	9.89	1	18	3	6
527	319727.606	645739.3312	420.680092	1.288355	1	0.4	1	G	1	1	1	Minor Water Feature	6	405.60334	225.266165	3	15.08	2	18	3	3
528	319855.851	645692.4778	413.379862	13.809991	6	0.2	1	G	1	6	2	Minor Water Feature	6	404.987723	156.141317	3	8.39	1	18	3	6
529	320055.386	645805.2913	416.163924	2.584352	2	0.4	1	G	1	2	1	New Site Infrastructure	6	409.131728	145.607539	3	7.03	1	18	3	3
530	320260.21	645907.622	420.399154	8.087622	6	0.3	1	G	1	6	2	Tracks or Paths	2	400.496157	116.011688	3	19.90	2	6	1	2
531	320255.983	646025.5166	397.888851	8.59754	6	0.2	1	G	1	6	2	Tracks or Paths	2	397.828673	0.941796	4	0.06	1	8	2	4
532	320158.386	646031.6216	394.7798	10.868132	6	0.1	1	G	1	6	2	New Site Infrastructure	6	396.727173	11.74756	3	-1.95	1	18	3	6
533	320008.775	646007.6264	398.134935	13.745715	6	0.3	1	G	1	6	2	New Site Infrastructure	6	398.019042	0.488445	4	0.12	1	24	3	6
534	320109.171	646237.7219	352.508271	15.527195	8	0.2	1	G	1	8	2	Tracks or Paths	2	352.362709	0.600345	4	0.15	1	8	2	4
535	320217.237	648894.701	436.941816	6.929129	4	0.1	1	g	1	4	1	New Site Infrastructure	6	437.015048	0.789368	4	-0.07	1	24	3	3
536	320217.329	648904.4699	436.410422	8.112175	6	0.1	1	G	1	6	2	New Site Infrastructure	6	436.756954	4.403779	4	-0.35	1	24	3	6
537	320217.292	648914.7273	435.650151	9.020895	6	0.1	1	G	1	6	2	New Site Infrastructure	6	437.157051	13.425882	3	-1.51	1	18	3	6
538	320217.511	648924.548	434.281215	10.12663	6	0.1	1	g	1	6	2	New Site Infrastructure	6	437.157051	22.951788	3	-2.88	1	18	3	6
539	320216.816	648884.9771	437.29738	7.358286	4	0.1	1	g	1	4	1	New Site Infrastructure	6	437.340425	0.872658	4	-0.04	1	24	3	3
540	320207.614	648874.6598	439.180211	9.210236	6	0.1	1	G	1	6	2	New Site Infrastructure	6	439.346846	1.055251	4	-0.17	1	24	3	6
541	320193.641	648875.224	441.29719	9.102343	6	0.1	1	G	1	6	2	New Site Infrastructure	6	441.39214	1.283638	4	-0.09	1	24	3	6
542	320187.599	648874.8635	442.209057	8.592691	6	0	1	G	1	6	2	New Site Infrastructure	6	442.374958	1.162174	4	-0.17	1	24	3	6
543	320177.136	648873.9746	443.60431	7.536341	4	0.1	1	g	1	4	1	New Site Infrastructure	6	443.64791	0.443767	4	-0.04	1	24	3	3
544	320168.204	648875.7579	444.586125	7.427452	4	0.1	1	G	1	4	1	New Site Infrastructure	6	443.783425	6.521349	4	0.80	1	24	3	3
545	320157.495	648874.8056	445.917549	6.344327	4	0.1	1	G	1	4	1	New Site Infrastructure	6	443.889194	17.238238	3	2.03	1	18	3	3
546	320185.876	648438.071	420.586512	10.411304	6	0.1	1	G	1	6	2	New Site Infrastructure	6	419.3606	21.997984	3	1.23	1	18	3	6
547	320186.801	648426.4801	420.242474	10.448191	6	0.1	1	G	1	6	2	New Site Infrastructure	6	419.3606	10.580768	3	0.88	1	18	3	6
548	320187.35	648413.7374	419.731805	10.702626	6	0.1	1	G	1	6	2	New Site Infrastructure	6	419.632609	0.73818	4	0.10	1	24	3	6
549	320187.798	648404.7331	419.381476	10.703715	6	0.1	1	g	1	6	2	New Site Infrastructure	6	419.518174	1.107084	4	-0.14	1	24	3	6
550	320187.442	648395.2126	418.841421	10.555808	6	0.1	1	g	1	6	2	New Site Infrastructure	6	418.759247	1.156738	4	0.08	1	24	3	6
551	320190.357	648389.2459	418.882945	10.457976	6	0.1	1	g	1	6	2	New Site Infrastructure	6	419.015115	0.935868	4	-0.13	1	24	3	6
552	320187.27	648384.6591	417.982008	10.559531	6	0.1	1	G	1	6	2	New Site Infrastructure	6	417.841688	0.781484	4	0.14	1	24	3	6
553	320186.51	648375.6023	417.050563	10.601378	6	0	1	G	1	6	2	New Site Infrastructure	6	417.128767	0.54807	4	-0.08	1	24	3	6
554	320187.063	648365.6063	416.247089	10.654827	6	0	1	G	1	6	2	New Site Infrastructure	6	416.234409	0.61416	4	0.01	1	24	3	6
555	320186.874	648351.9313	414.870396	10.907438	6	0.1	1	G	1	6	2	New Site Infrastructure	6	414.86344	0.240802	4	0.01	1	24	3	6
556	320186.8	648336.6091	412.868247	12.50629	6	0	1	G	1	6	2	New Site Infrastructure	6	413.696339	3.991691	4	-0.83	1	24	3	6
557	320137.802	648381.543	407.857672	13.467358	6	0.1	1	G	1	6	2	New Site Infrastructure	6	408.115243	1.074314	4	-0.26	1	24	3	6
558	320137.865	648389.4402	408.357514	13.325381	6	0.1	1	g	1	6	2	New Site Infrastructure	6	408.577501	1.081775	4	-0.22	1	24	3	6
559	320147.459	648390.6559	410.623008	13.230304	6	0	1	R	1.5	9	2	New Site Infrastructure	6	410.429368	0.923501	4	0.19	1	24	3	6
560	320158.407	648391.2783	413.173825	12.773998	6	0.1	1	R	1.5	9	2	New Site Infrastructure	6	413.292517	0.887483	4	-0.12	1	24	3	6
561	320166.987	648390.8186	414.860338	11.039245	6	0.1	1	G	1	6	2	New Site Infrastructure	6	414.769905	0.758903	4	0.09	1	24	3	6
562	320177.079	648390.7102	416.721516	10.776611	6	0.1	1	G	1	6	2	New Site Infrastructure	6	416.619911	0.702429	4	0.10	1	24	3	6
563	320197.694	648390.6288	420.189867	10.297104	6	0.1	1	G	1	6	2	New Site Infrastructure	6	419.987125	1.109187	4	0.20	1	24	3	6
564	320206.98	648389.1207	421.474222	9.473093	6	0	1	G	1	6	2	New Site Infrastructure	6	421.52045	1.025772	4	-0.05	1	24	3	6
565	320833.324	647465.1597	398.580397	14.370095	6	0	1	G	1	6	2	New Site Infrastructure	6	398.465875	5.529211	4	0.11	1	24	3	6
566	320832.311	647454.7156	396.771532	8.089663	6	0	1	G	1	6	2	New Site Infrastructure	6	396.686893	0.726503	4	0.08	1	24	3	6
567	320833.051	647445.3049	395.625057	6.379034	4	0.1	1	G	1	4	1	New Site Infrastructure	6	395.729973	0.874075	4	-0.10	1	24	3	3
568	320833.291	647434.5811	394.977941	6.247189	4	0.1	1	G	1	4	1	New Site Infrastructure	6	395.03479	0.745014	4	-0.06	1	24	3	3
569	320833.48	647425.8682	394.64853	7.04917	4	0.1	1	G	1	4	1	New Site Infrastructure	6	394.750034	0.804425	4	-0.10	1	24	3	3
570	320829.929	647414.5313	393.95884	7.700887	4	0.1	1	G	1	4	1	New Site Infrastructure	6	393.843271	0.890377	4	0.12	1	24	3	3
571	320834.166	647406.0829	392.718313	8.051325	6	0.2	1	G	1	6	2	New Site Infrastructure	6	392.665297	0.547987	4	0.05	1	24	3	6
572	320832.12	647395.3635	391.889489	8.102058	6	0.1	1	G	1	6	2	New Site Infrastructure	6	391.897199	0.954924	4	-0.01	1	24	3	6
573	320832.279	647385.7126	390.889862	8.948135	6	0.1	1	G	1	6	2	New Site Infrastructure	6	390.889805	0.589852	4	0.00	1	24	3	6
574	320832.931	647376.1659	389.681614	9.309437	6	0.1	1	G	1	6	2	New Site Infrastructure	6	389.699396	0.224734	4	-0.02	1	24	3	6
575	320832.34	647365.1524	388.396853	9.983087	6	0.1	1	G	1	6	2	New Site Infrastructure	6	388.472765	1.029047	4	-0.08	1	24	3	6
576	320885.341	647424.4979	387.461519	12.00265	6	0.1	1	G	1	6	2	New Site Infrastructure	6	390.360637	21.095856	3	-2.90	1	18	3	6
577	320887.393	647415.6617	386.0709	12.114312	6	0.1	1	G	1	6	2	New Site Infrastructure	6	389.892967	22.690851	3	-3.82	1	18	3	6
578	320879.61	647415.2015	387.308451	11.523823	6	0.1	1	G	1	6	2	New Site Infrastructure	6	389.892967	14.929432	3	-2.58	1	18	3	6
579	320867.781	647414.2607	389.167303	11.511901	6	0.1	1	G	1	6	2	New Site Infrastructure	6	389.892967	3.583048	4	-0.73	1	24	3	6
580	320857.337	647414.445	390.937548	11.101668	6	0.2	1	G	1	6	2	New Site Infrastructure	6	390.999075	0.707823	4	-0.06	1	24	3	6
581	320848.524	647415.2395	392.1816	8.319864	6	0.2	1	G	1	6	2	New Site Infrastructure	6	392.24974	0.892041	4	-0.07	1	24	3	6
582	320837.278	647415.2902	393.30952	7.795173	4	0.2	1	G	1	4	1	New Site Infrastructure	6	393.443013	0.996562	4	-0.13	1	24	3	3
583	320819.375	647416.0892	394.818657	6.322835	4	0.1	1	G	1	4	1	New Site Infrastructure	6	394.821511	0.661666	4	0.00	1	24	3	3
584	320808.081	647415.0778	394.66116	11.035954	6	0.2	1	G	1	6	2	New Site Infrastructure	6	394.515204	1.156021	4	0.15	1	24	3	6
585	320796.921	647411.5441	397.58736	20.865362	8	0.1	1	G	1	8	2	New Site Infrastructure	6	397.742346	0.603723	4	-0.15	1	24	3	6
586	320787.169	647415.3092	401.251032	16.814246	8	0	1	G	1	8	2	New Site Infrastructure	6	401.497528	0.922027	4	-0.25	1	24	3	6
587	320778.377	647415.6334	403.34428	16.391016	8	0.1	1	G	1	8	2	New Site Infrastructure	6	403.35119	0.584262	4	-0.01	1	24	3	6
588	320784.49	647366.2508	392.847167	6.686343	4	0.3	1	G	1	4	1	New Site Infrastructure	6	392.819912	0.263982	4	0.03	1	24	3	3
589	320795.331	647352.2809	390.615416	8.664973	6	0.1	1	G	1	6	2	New Site Infrastructure	6	390.651339	0.64061	4	-0.04	1	24	3	6
590	320766.566	647296.9126	385.665903	6.63198	4	0.1	1	G	1	4	1	New Site Infrastructure	6	385.57783	0.815589	4	0.09	1	24	3	3
591	320717.899	647267.8487	384.606236	8.873985	6	0.1	1	G	1	6	2	New Site Infrastructure	6	384.611875	0.855622	4	-0.01	1	24	3	6
592	320669.952	647252.5255	384.736286	8.254921	6	0.1	1	G	1	6	2	New Site Infrastructure	6	384.626743	0.867025	4	0.11	1	24	3	6
593	320620.563	647220.7126	386.497511	11.983835	6	0.1	1	R	1.5	9	2	New Site Infrastructure	6	386.433363	0.620581	4	0.06	1	24	3	6
594	320605.955	647190.4585	389.531001	14.023007	6	0.2	1	G	1	6	2	New Site Infrastructure	6	389.332678	0.834574	4	0.20	1	24	3	6
595	320597.404	647150.3883	390.161464	9.771908	6	0.1	1	G	1	6	2	New Site Infrastructure	6	390.271803	0.744693	4	-0.11	1	24	3	6
596	320579.825	647086.3946	390.757415	9.166413	6	0.1	1	G	1	6	2	New Site Infrastructure	6	391.486764	5.120918	4	-0.73	1	24	3	6
597	320507.931	647002.0982	390.618312	4.679866	4	0.1	1	G	1	4	1	New Site Infrastructure	6	390.601979	0.783053	4	0.02	1	24	3	3
598	320497.861	646973.5035	388.349774	5.161936	4	0.1	1	G	1	4	1	New Site Infrastructure	6	388.3834	1.046868	4	-0.03	1	24	3	3
599	320477.804	646939.3269	384.549255	6.446847	4	0.1	1	G	1	4	1	New Site Infrastructure	6	384.650556	1.200862	4	-0.10	1	24	3	3
600	320467.936	646939.4022	384.268298	6.672566	4	0	1	G	1	4	1	New Site Infrastructure	6	384.374225	1.052594	4	-0.11	1	24	3	3
601	320447.88	646939.2266	383.289188	5.860105	4	0	1	G	1	4	1	New Site Infrastructure	6	383.404423	1.215517	4	-0.12	1	24	3	3
602	320437.575	646940.0892	383.035791	5.897945	4	0.1	1	G	1	4	1	New Site Infrastructure	6	382.98652	0.861948	4	0.05	1	24	3	3
603	320425.11	646941.6382	382.441422	4.560111	4	0.1	1	G	1	4	1	New Site Infrastructure	6	382.478197	0.617096	4	-0.04	1	24	3	3
604	320417.88	646941.5162	382.533222	5.659402	4	0	1	G	1	4	1	New Site Infrastructure	6	382.586614	1.024506	4	-0.05	1	24	3	3

605	320407.981	646942.4347	381.919327	8.316871	6	0	1	G	1	6	2	New Site Infrastructure	6	381.935624	0.800899	4	-0.02	1	24	3	6	
606	320397.51	646940.3902	380.854907	8.277242	6	0	1	G	1	6	2	New Site Infrastructure	6	380.91361	1.236293	4	-0.06	1	24	3	6	
607	320386.016	646940.3133	379.976999	7.935698	4	0.1	1	G	1	4	1	New Site Infrastructure	6	381.105614	9.493896	4	-1.13	1	24	3	3	
608	320378.025	646940.7147	379.425702	8.812965	6	0	1	G	1	6	2	New Site Infrastructure	6	381.105614	17.035917	3	-1.68	1	18	3	6	
609	320424.663	646885.8453	375.844533	9.970401	6	0	1	G	1	6	2	New Site Infrastructure	6	379.186522	24.351528	3	-3.34	1	18	3	6	
610	320423.905	646893.8758	377.147025	9.102303	6	0.1	1	G	1	6	2	New Site Infrastructure	6	379.186522	16.283906	3	-2.04	1	18	3	6	
611	320421.11	646906.0407	378.595757	7.768266	4	0.1	1	G	1	4	1	New Site Infrastructure	6	379.186522	4.376092	4	-0.59	1	24	3	3	
612	320420.458	646916.4965	379.783909	7.403391	4	0.1	1	G	1	4	1	New Site Infrastructure	6	379.757771	0.463019	4	0.03	1	24	3	3	
613	320421.857	646923.2802	380.61779	7.557814	4	0	1	G	1	4	1	New Site Infrastructure	6	380.778677	1.193771	4	-0.16	1	24	3	3	
614	320421.635	646934.7128	381.940858	5.923831	4	0.1	1	G	1	4	1	New Site Infrastructure	6	381.821994	1.101065	4	0.12	1	24	3	3	
615	320424.456	646961.1806	383.803845	6.316105	4	0	1	G	1	4	1	New Site Infrastructure	6	383.898783	0.965413	4	-0.09	1	24	3	3	
616	320425.082	646953.1557	383.255631	4.919686	4	0.1	1	G	1	4	1	New Site Infrastructure	6	383.303419	1.023908	4	-0.05	1	24	3	3	
617	320423.749	646973.6746	385.763652	10.24955	6	0.1	1	G	1	6	2	New Site Infrastructure	6	385.811132	1.058618	4	-0.05	1	24	3	6	
618	320423.652	646985.8427	388.01741	10.604224	6	0	1	G	1	6	2	New Site Infrastructure	6	386.349986	10.474342	3	1.67	1	18	3	6	
619	320423.69	646991.7366	389.109946	10.554356	6	0.2	1	G	1	6	2	New Site Infrastructure	6	386.966174	14.639672	3	2.14	1	18	3	6	
620	320420.112	647087.7338	406.823696	8.22472	6	0.1	1	G	1	6	2	New Site Infrastructure	6	407.787896	10.668912	3	-0.96	1	18	3	6	
621	320414.523	647132.3799	413.155993	6.971924	4	0.1	1	G	1	4	1	New Site Infrastructure	6	413.119348	0.329579	4	0.04	1	24	3	3	
622	320422.92	647182.3015	418.746045	5.533167	4	0.1	1	G	1	4	1	New Site Infrastructure	6	418.720815	0.281175	4	0.03	1	24	3	3	
623	320436.875	647235.5363	427.398465	10.915125	6	0.1	1	G	1	6	2	New Site Infrastructure	6	427.511692	0.59696	4	-0.11	1	24	3	6	
624	320453.849	647287.7684	434.214867	11.385883	6	0.1	1	G	1	6	2	New Site Infrastructure	6	434.119367	0.930136	4	0.10	1	24	3	6	
625	320464.679	647382.158	443.119939	9.728377	6	0.1	1	G	1	6	2	New Site Infrastructure	6	443.110305	0.05872	4	0.01	1	24	3	6	
626	320464.625	647479.385	453.621235	4.534047	4	0.1	1	G	1	4	1	New Site Infrastructure	6	453.673353	0.731411	4	-0.05	1	24	3	3	
627	320452.115	647483.932	454.212973	3.839441	2	0.1	1	G	1	2	1	New Site Infrastructure	6	454.181144	8.87281	4	0.03	1	24	3	3	
628	320420.642	647468.9894	456.252624	7.081245	4	0	1	G	1	4	1	New Site Infrastructure	6	455.982569	2.251121	4	0.27	1	24	3	3	
629	320404.506	647433.9563	455.341157	8.057387	6	0.1	1	G	1	6	2	New Site Infrastructure	6	455.54244	1.800023	4	-0.20	1	24	3	6	
630	320369.036	647406.2028	455.63424	8.344149	6	0.1	1	G	1	6	2	New Site Infrastructure	6	455.650329	0.335858	4	-0.02	1	24	3	6	
631	320323.293	647380.764	454.711653	5.605287	4	0.1	1	G	1	4	1	New Site Infrastructure	6	454.649812	0.873421	4	0.06	1	24	3	3	
632	320267.635	647376.0388	452.630245	5.664508	4	0.1	1	G	1	4	1	New Site Infrastructure	6	452.563758	0.924605	4	0.07	1	24	3	3	
633	320231.001	647410.3504	449.23009	10.518896	6	0.1	1	G	1	6	2	New Site Infrastructure	6	449.168773	0.374065	4	0.06	1	24	3	6	
634	320225.697	648777.9294	436.550365	9.122813	6	0.5	1	R	1.5	9	2	New Site Infrastructure	6	436.668666	0.999918	4	-0.12	1	24	3	6	
635	320235.867	648806.1369	437.755084	6.720695	4	0.3	1	G	1	4	1	New Site Infrastructure	6	437.660948	0.846974	4	0.09	1	24	3	3	
636	320212.758	648823.1613	440.930308	6.730601	4	0.3	1	G	1	4	1	New Site Infrastructure	6	440.907051	0.950847	4	0.02	1	24	3	3	
637	320212.132	648835.8855	440.359664	8.349034	6	0.1	1	G	1	6	2	New Site Infrastructure	6	440.268051	0.623541	4	0.09	1	24	3	6	
638	320212.063	648845.4055	439.926614	8.942467	6	0.3	1	G	1	6	2	New Site Infrastructure	6	439.794545	0.959854	4	0.13	1	24	3	6	
639	320211.886	648862.9478	439.149986	9.096988	6	0.1	1	G	1	6	2	New Site Infrastructure	6	439.065439	1.177165	4	0.08	1	24	3	6	
640	320212.061	648854.2782	439.518562	8.981992	6	0.1	1	G	1	6	2	New Site Infrastructure	6	439.42696	0.674332	4	0.09	1	24	3	6	
641	320212.201	648875.0999	438.455388	9.201738	6	0	1	G	1	6	2	New Site Infrastructure	6	438.43013	1.11444	4	0.03	1	24	3	6	
642	320222.085	648874.7528	437.038456	7.313213	4	0.1	1	G	1	4	1	New Site Infrastructure	6	436.979173	0.898438	4	0.06	1	24	3	3	
643	320232.285	648875.6375	435.928498	6.230713	4	0.1	1	G	1	4	1	New Site Infrastructure	6	435.869476	0.638593	4	0.06	1	24	3	3	
644	320241.114	648874.9999	435.03643	6.62392	4	0.1	1	G	1	4	1	New Site Infrastructure	6	435.1908	2.917594	4	-0.15	1	24	3	3	
645	320252.723	648875.1832	433.592522	8.444539	6	0.1	1	G	1	6	2	New Site Infrastructure	6	434.333054	5.053248	4	-0.74	1	24	3	6	
646	320262.249	648875.063	432.304958	8.505507	6	0.1	1	G	1	6	2	New Site Infrastructure	6	434.342871	13.47292	3	-2.04	1	18	3	6	
647	320244.124	648708.5431	431.994981	3.71627	2	0.2	1	G	1	2	1	New Site Infrastructure	6	431.949468	0.731015	4	0.05	1	24	3	3	
648	320249.716	648667.5727	429.963224	4.256429	4	0	1	G	1	4	1	New Site Infrastructure	6	429.942751	1.133923	4	0.02	1	24	3	3	
649	320252.954	648636.724	428.867948	2.70351	2	0.6	2	G	1	4	1	New Site Infrastructure	6	428.895028	0.658851	4	-0.03	1	24	3	3	
650	320254.569	648608.7036	428.943229	3.66483	2	0	1	G	1	2	1	New Site Infrastructure	6	428.94948	0.610401	4	-0.01	1	24	3	3	
651	320221.635	648533.7773	427.869734	6.812826	4	0.1	1	G	1	4	1	Tracks or Paths	2	429.822193	19.967861	3	-1.95	1	6	1	1	
652	320220.588	648489.5419	426.815129	7.452356	4	0.1	1	G	1	4	1	Minor Water Feature	6	419.872097	38.041992	3	6.94	1	18	3	3	
653	320222.548	648388.6218	423.626173	7.708573	4	0.4	1	G	1	4	1	New Site Infrastructure	6	423.608504	0.537366	4	0.02	1	24	3	3	
654	320234.83	648391.595	424.974486	6.695524	4	0.4	1	G	1	4	1	New Site Infrastructure	6	425.004429	0.529051	4	-0.03	1	24	3	3	
655	320244.156	648392.6717	425.879131	6.708026	4	0.1	1	G	1	4	1	New Site Infrastructure	6	425.884432	0.791015	4	-0.01	1	24	3	3	
656	320517.752	648517.7091	450.069147	10.28632	6	0.2	1	G	1	6	2	New Site Infrastructure	6	452.164365	73.357365	3	-2.10	1	18	3	6	
657	320561.057	648478.0207	449.933729	10.500564	6	0.1	1	G	1	6	2	New Site Infrastructure	6	451.845796	19.663125	3	-1.91	1	18	3	6	
658	320551.224	648439.1665	442.887456	10.426956	6	0.1	1	G	1	6	2	New Site Infrastructure	6	443.057786	3.647061	4	-0.17	1	24	3	6	
659	320540.5	648439.4238	441.725134	12.766298	6	0.1	1	G	1	6	2	New Site Infrastructure	6	443.057786	14.279003	3	-1.33	1	18	3	6	
660	320574.339	648442.5693	445.597514	10.450366	6	0.2	1	G	1	6	2	New Site Infrastructure	6	445.561444	0.592451	4	0.04	1	24	3	6	
661	320583.726	648445.1097	446.910052	10.511297	6	0.1	1	G	1	6	2	New Site Infrastructure	6	446.847001	1.404931	4	0.06	1	24	3	6	
662	320594.001	648445.9999	448.044966	10.002362	6	0.2	1	G	1	6	2	New Site Infrastructure	6	448.131456	0.721509	4	-0.09	1	24	3	6	
663	320591.992	648454.9877	449.273736	9.799307	6	0.2	1	G	1	6	2	New Site Infrastructure	6	449.198223	1.136188	4	0.08	1	24	3	6	
664	320599.59	648433.4889	446.587769	9.636092	6	0.1	1	G	1	6	2	New Site Infrastructure	6	446.602396	1.074897	4	-0.01	1	24	3	6	
665	320595.032	648421.9643	444.351506	10.21369	6	0.2	1	G	1	6	2	New Site Infrastructure	6	444.344491	0.350508	4	0.01	1	24	3	6	
666	320594.352	648410.5245	442.525081	10.670872	6	0.1	1	G	1	6	2	New Site Infrastructure	6	443.000256	2.845823	4	-0.48	1	24	3	6	
667	320592.386	648399.1282	440.288674	11.774536	6	0.1	1	G	1	6	2	New Site Infrastructure	6	443.000256	13.689124	3	-2.71	1	18	3	6	
668	320653.003	648451.1379	452.135218	7.280377	4	0.2	1	G	1	4	1	New Site Infrastructure	6	452.241517	1.015328	4	-0.11	1	24	3	3	
669	320642.57	648451.3237	451.669446	7.268651	4	0.2	1	G	1	4	1	New Site Infrastructure	6	451.766623	0.800296	4	-0.10	1	24	3	3	
670	320630.828	648450.4903	450.747677	8.326022	6	0.1	1	G	1	6	2	New Site Infrastructure	6	450.692021	0.396409	4	0.06	1	24	3	6	
671	320622.716	648450.7917	450.109758	8.411192	6	0.1	1	G	1	6	2	New Site Infrastructure	6	450.026446	0.681125	4	0.08	1	24	3	6	
672	320612.435	648447.3264	448.915318	7.84899	4	0.1	1	G	1	4	1	New Site Infrastructure	6	449.035625	0.832574	4	-0.12	1	24	3	3	
673	320601.993	648447.7236	448.748817	8.003269	6	0.2	1	G	1	6	2	New Site Infrastructure	6	448.816125	0.818214	4	-0.07	1	24	3	6	
674	320592.582	648465.7504	450.947361	8.576355	6	0	1	G	1	6	2	New Site Infrastructure	6	450.998542	0.383696	4	-0.05	1	24	3	6	
675	320592.872	648477.7489	452.560315	7.869556	4	0	1	G	1	4	1	New Site Infrastructure	6	452.604938	0.395094	4	-0.04	1	24	3	3	
676	320591.64	648493.4913	454.63226	7.69888	4	0.2	1	G	1	4	1	New Site Infrastructure	6	452.969618	12.404963	3	1.66	1	18	3	3	
677	320592.466	648503.7955	456.022848	7.897689	4	0.2	1	G	1	4	1	New Site Infrastructure	6	452.969618	22.441924	3	3.05	1	18	3	3	
678	320513.475	648541.4399	451.61788	8.320404	6	0.1	1	G	1	6	2	New Site Infrastructure	6	452.164365	91.036324	3	-0.55	1	18	3	6	
679	320481.728	648581.8774	447.369399	9.942329	6	0.1	1	G	1	6	2	Minor Water Feature	6	435.779114	74.43702	3	11.59	2	18	3	6	
680	320426.576	648628.3542	434.118079	8.256656	6	1.6	3	C	2	36	4	Minor Water Feature	6	433.359855	6.964894	4	0.76	1	24	3	12	
681	320443.936	648610.0632	438.516612	11.10429	6	1	2	C	2	24	3	Minor Water Feature	6	434.601762	30.319716	3	3.91	1	18	3	9	
682	320414.934	648639.3452	432.95144	2.826044	2	0.3	1	G	1	2	1	Minor Water Feature	6	433.178765	6.625202	4	-0.23	1	24	3	3	
683	320415.956	648611.0156	435.510059	6.289535	4	1.7	3	G	1	12	2	Minor Water Feature	6	435.357782	3.36784	4	0.15	1	24	3	6	
684	320439.975	648637.3275	434.320699	9.704586	6	1	2	G	1	12	2	Minor Water Feature	6	432.865329	15.911598	3	1.46	1	18	3	6	
685	320389.328	648667.5344	430.969139	3.761837	2	0.6	2	G	1	4	1	Minor Water Feature	6	432.697758	41.259184	3	-1.73	1	18	3	3	
686	320379.955	648707.6644	427.413866	6.874203	4	0.1	1	G	1	4	1	Tracks or Paths	2	421.952201	55.912102	3	5.46	1	6	1	1	
687	320364.045	648768.2934	419.295281	6.267141	4	0	1	R	1.5	6	2	Tracks or Paths	2	419.448334	13.770933	3	-0.15	1	6	1	2	
688	320582.816	647919.6708	448.901736	2.537058	2	0.9	2	G	1	4	1	Tracks or Paths	2	449.189448	10.521374	3	-0.29	1	6	1	1	
689	320581.984	647929.0389	448.50203	3.94256	2	1.2	3	G	1	6	2	New Site Infrastructure	6	447.790052	8.510208	4	0.71	1	24	3	6	
690	320582.962	647940.0177	447.418431	8.399582	6	1	2	G	1	12	2	New Site Infrastructure	6	447.418533	0.265453	4	0.00	1	24	3	6	1 TO 4
691	320580.842	647949.8097	446.118105	5.14438	4	1	2	G	1	8	2	New Site Infrastructure	6	446.100804	0.3274	4	0.02	1	24	3	6	
692	320580.528	647962.6919	445.456731	4.054337	4	0.7	2	G	1	8	2	New Site Infrastructure	6	445.92647	6.704763	4	-0.47	1	24	3	6	
693	320580.284	647970.7585	445.01995	3.33199	2	1	2	G	1	4	1	New Site Infrastructure	6	445.778591	11.42234	3	-0.76	1	18	3	3	
694	320580.36	647976.8908	444.802425	2.768508	2	1.2	3	G	1	6	2	New Site Infrastructure	6	445.629233	14.096716	3	-0.83	1	18	3	6	
695	320569.748	647975.8953	444.645195	2.301337	2	1	2	G	1	4	1	New Site Infrastructure	6	445.778591	23.14338	3	-1.13	1	18	3	3	
696	320559.545	647978.1945	444.640465	2.882255	2	1.6	3	C	2	12	2	New Site Infrastructure	6	445.92647	32.647256	3	-1.29	1	18	3	6	
697	320550.064	647977.406	445.200737	5.01247	4	1.3	3	G	1	12	2	New Site Infrastructure	6	445.802498	40.120867	3	-0.60	1	18	3	6	
698	320541.434	647980.2104	445.593553	4.527461	4	1.2	3	G	1	12	2	New Site Infrastructure	6	445.802498	48.853981	3	-0.21	1	18	3	6	
699	320532.235	647978.8368	445.926222	4.424793	4	1.1	3	G	1	12	2	New Site Infrastructure	6	445.802498	56.226907	3	0.12	1	18	3	6	
700	320581.301	648030.883	441.980622	3.791765	2	0	1	R	1.5	3	1	New Site Infrastructure	6	444.413911	41.607407	3	-2.43	1	18	3	3	
701	320582.586	648019.3566	442.304651	4.021385	4	0.1	1	G	1	4	1	New Site Infrastructure	6	444.481555	34.725825	3	-2.18	1	18	3	3	
702	320581.812	648009.4383	442.74751	4.020221	4	0.3	1	G	1	4	1	New Site Infrastructure	6	444.692177	30.031436	3	-1.94	1	18	3	3	
703	320582.297	647998.4396	443.57523	5.083257	4	0.3	1	G	1	4	1	New Site Infrastructure	6	445.372927	24.62056	3	-1.80	1	18	3	3	
704	320582.053	647988.3868	444.445201	3.944516	2	1	2	G	1	4	1	New Site Infrastructure	6	445.465967	19.127919	3	-1.02	1	18	3	3	
705	320590.479	647977.4874	445.147807	3.198962	2	2	3	G	1	6	2	New Site Infrastructure	6	445.465967	6.386723	4	-0.32	1	24	3	6	
706	320605.378	647977.8343	445.794874	5.249713	4	1	2	G	1	8	2	New Site Infrastructure	6	445.746902	0.719685	4	0.05	1	24	3	6	
707	320616.984	647979.3096	446.595111	7.212535	4	0	1	G	1	4	1	New Site Infrastructure	6	446.496122	0.845775	4	0.10	1	24	3	3	
708	320624.964	647979.6379	447.415151	7.592806	4	0.2	1	G	1	4	1	New Site Infrastructure	6	447.358468	0.535509	4	0.06	1	24	3	3	
709	320636.197	647979.7913	448.806681	7.818943	4	0.2	1	G	1	4	1	New Site Infrastructure	6	448.855132	0.607443	4	-0.05	1	24	3	3	
710	320196.885	647455.558	444.48206	13.262888	6	0	1	G	1	6	2	New Site Infrastructure	6	444.508499	0.579007	4	-0.03	1	24	3	6	
711	320199.831	647527.604	450.333205	8.077407	6	0.2	1	G	1	6	2	New Site Infrastructure	6	448.887571	10.337848	3	1.45	1	18	3	6	
712	320189.344	647527.9601	448.817799	8.890742	6	0.1	1	G	1	6	2	New Site Infrastructure	6	448.327	3.216777	4	0.49	1	24	3	6	
713	320180.575	647531.9616	447.718361	9.107788	6	0.1	1	G	1	6	2	New Site Infrastructure	6	447.74744	0.203504	4	-0.03	1	24	3	6	
714	320167.763	647526.6687	445.475486	9.115619	6	0.2	1	G	1	6	2	New Site Infrastructure	6	445.591192	1.102748	4	-0.12	1	24	3	6	
715	320159.356	647527.8001	444.327428	9.040995	6	0.1	1	G	1	6	2	New Site Infrastructure	6	444.25599	0.71373	4	0.07	1	24	3	6	
716	320149.595	647527.076	442.872826	9.164946	6	0.1	1	G	1	6	2	New Site Infrastructure	6	442.680286	1.307439	4	0.19	1	24	3	6	
717	320152.097	647540.0221	443.93478	8.604173	6	0.2	1	G	1	6	2	New Site Infrastructure	6	444.028145	0.623543	4	-0.09	1	24	3	6	
718	320152.821	647552.022	444.211471	8.625392	6	0.1	1	G	1	6	2	New Site Infrastructure	6	444.196589	0.139478	4	0.01	1	24	3	6	
719	320152.383	647562.025	444.256799	8.791902	6	0.2	1	G	1	6	2	New Site Infrastructure	6	444.268673	3.929405	4	-0.01	1	24	3	6	
720	320152.953	647572.1592	444.119148	9.01732	6	0.1	1	G	1	6	2	New Site Infrastructure	6	444.268673	14.054946	3	-0.15	1	18	3	6	
721	320151.968	647580.7509	443.48626	9.484004	6	0.1	1	G	1	6	2	New Site Infrastructure	6	444.268673	22.659637	3	-0.78	1	18	3	6	
722	320101.02	647531.2931	434.512669	11.617398	6	0.2	1	G	1	6	2	New Site Infrastructure	6	434.729026	2.065873	4	-0.22	1	24	3	6	
723	320112.154	647528.4164	436.344226	11.591084	6	0.1	1	G	1	6	2	New Site Infrastructure	6	436.42223	0.638163	4	-0.08	1	24	3	6	
724	320123.917	647532.6321	438.903156	11.580494	6	0.1	1	G	1	6	2	New Site Infrastructure	6	439.011513	0.952065	4	-0.11	1	24	3	6	
725	320132.921	647529.4926	440.341633	11.006097	6	0.2	1	G	1	6	2	New Site Infrastructure	6	440.349262	0.652431	4	-0.01	1	24	3	6	
726	320140.872	647527.6481	441.573271	10.124577	6	0.1	1	G	1	6	2	New Site Infrastructure	6	441.577823	0.489187	4	0.00	1	24	3	6	
727	320154.889	647518.9544	443.103561	9.118493	6	0.1	1	G	1	6	2	New Site Infrastructure	6	443.024601	0.861938	4	0.08	1	24	3	6	
728	320154.069	647505.1325	442.144439	10.616693	6	0.3	1	G	1	6	2	New Site Infrastructure	6	442.328325	1.171947	4	-0.18	1	24	3	6	
729	320154.248	647494.868	441.164532	12.396415	6	0.2	1	G	1	6	2	New Site Infrastructure	6	441.171025	0.888971	4	-0.01	1	24	3	6	
730	320154.226	647483.9873	439.67822	13.968341	6	0.1	1	G	1	6	2	New Site Infrastructure	6	439.794305	0.503352	4	-0.12	1	24	3	6	
731	320150.298	647474.1804	437.411746	14.24831	6	0.2	1	G	1	6	2	New Site Infrastructure	6	437.484326	0.421029	4	-0.07	1	24	3	6	
732	320206.119	647312.4512	442.383591	6.678703	4	0.2	1	G	1	4	1	New Site Infrastructure	6	442.592419	10.635956	3	-0.21	1	18	3	3	
733	320152.361	647273.6935	437.983346	5.01712	4	0.1	1	G	1	4	1	New Site Infrastructure	6	438.37068	7.081475	4	-0.39	1	24	3	3	
734	320102.231	647236.5915	434.042001	4.540429	4	0.3	1	G	1	4	1	New Site Infrastructure	6	434.185492	3.510354	4	-0.14	1	24	3	3	
735	320053.59	647189.5198	428.988401	5.069539	4	0.1	1	G	1	4	1	New Site Infrastructure	6	428.949835	1.057141	4	0.04	1	24	3	3	
736	320009.618	647135.3729	422.502557	6.98926	4	0.1	1	G	1	4	1	New Site Infrastructure	6	422.478869	1.167531	4	0.02	1	24	3	3	
737	320001.34	647082.8989	418.478039	5.839568	4	0.1	1	G	1	4	1	New Site Infrastructure	6	418.38382	1.00679	4	0.09	1	24	3	3	
738	319964.301	647028.1615	411.120956	5.85896	4	0.2	1	G	1	4	1	New Site Infrastructure	6	411.152581	0.415936	4	-0.03	1	24	3	3	
739	319965.926	647017.4492	410.479661	6.82553	4	0.2	1	G	1	4	1	New Site Infrastructure	6	410.60527	1.028705	4	-0.13	1	24	3	3	
740	319962.238	647007.1632	409.237145	6.744205	4	0.1	1	G	1	4	1	New Site Infrastructure	6	409.357028	1.06064	4	-0.12	1	24	3	3	
741	319963.979	646997.6598	408.357861	6.621325	4	0.2	1	G	1	4	1	New Site Infrastructure	6	408.432448	0.862358	4	-0.07	1	24	3	3	
742	319964.703	646986.2046	407.122406	6.575378	4	0.1	1	G	1	4	1	New Site Infrastructure	6	407.112445	0.094416	4	0.01	1	24	3	3	
743	319967.229	646979.0321	406.405827	6.746825	4	0.2	1	G	1	4	1	New Site Infrastructure	6	406.284262	1.056248	4	0.12	1	24	3	3	
744	319973.44	646976.1093	406.279275	6.818762	4	0.3	1	G	1	4	1	New Site Infrastructure	6	406.255803	0.726534	4	0.02	1	24	3	3	
745	319982.333	646980.8362	407.114641	6.798866	4	0.2	1	G	1	4	1	New Site Infrastructure	6	407.044681	0.819446	4	0.07	1	24	3	3	
746	319994.747	646982.9512	407.767848	6.753385	4	0.2	1	G	1	4	1	New Site Infrastructure	6	407.670553	0.841345	4	0.10	1	24	3	3	
747	320003.636	646981.8858	407.80756	6.66783	4	0.1	1	G	1	4	1	New Site Infrastructure	6	407.826524	0.949847	4	-0.02	1	24	3	3	
748	320011.197	646979.3519	407.565356	6.14003	4	0.1	1	G	1	4	1	New Site Infrastructure	6	407.826524	8.923598	4	-0.26	1	24	3	3	
749	319964.234	646929.8921	399.913413	7.359892	4	0	1	G	1	4	1	New Site Infrastructure	6	399.955363	0.527462	4	-0.04	1	24	3	3	
750	319967.249	646941.9199	401.518041	7.274158	4	0.2	1	G	1	4	1	New Site Infrastructure	6	401.523021	0.568409	4	0.00	1	24	3	3	
751	319967.56	646952.5748	402.893414	8.292803	6	0.1	1	G	1	6	2	New Site Infrastructure	6	402.800331	0.965549	4	0.09	1	24	3	6	
752	319966.374	646960.4636	403.976798	8.502834	6	0.1	1	G	1	6	2	New Site Infrastructure	6	403.941286	0.489847	4	0.04	1	24	3	6	
753	319968.053	646971.8716	405.610484	7.207792	4	0.1	1	G	1	4	1	New Site Infrastructure	6	405.661522	0.702516	4	-0.05	1	24	3	3	
754	319957.059	646979.5554	406.116049	6.736303	4	0.2	1	G	1	4	1	New Site Infrastructure	6	406.159906	0.65404	4	-0.04	1	24	3	3	
755	319948.414	646980.594	405.653271	7.146373	4	0.1	1	G	1	4	1	New Site Infrastructure	6	405.634557	0.568568	4	0.02	1	24	3	3	
756	319937.44	646980.8597	404.727227	7.367015	4	0.1	1	G	1	4	1	New Site Infrastructure	6	404.591434	1.043441	4	0.14	1	24	3	3	

757	319926.739	646980.3503	403.736621	7.40099	4	0.1	1	G	1	4	1	New Site Infrastructure	6	403.711429	0.240878	4	0.03	1	24	3	3
758	319917.509	646981.2134	403.049804	7.202014	4	0.1	1	G	1	4	1	New Site Infrastructure	6	403.062764	1.199744	4	-0.01	1	24	3	3
759	319908.244	646981.1587	402.127399	8.028488	6	0.2	1	G	1	6	2	New Site Infrastructure	6	403.065251	7.113488	4	-0.94	1	24	3	6
760	319916.875	646897.5477	392.960305	9.338895	6	0	1	G	1	6	2	New Site Infrastructure	6	399.964989	45.169158	3	-7.00	1	18	3	6
761	319891.461	646827.7081	379.769956	10.932522	6	0.3	1	G	1	6	2	New Site Infrastructure	6	375.666922	21.472022	3	4.10	1	18	3	6
762	319907.046	646786.8528	371.4049	14.582032	6	0.1	1	G	1	6	2	New Site Infrastructure	6	371.191896	0.813149	4	0.21	1	24	3	6
763	321117.578	647057.4759	377.530084	7.447381	4	0.1	1	G	1	4	1	New Site Infrastructure	6	379.099968	15.153396	3	-1.57	1	18	3	3
764	321129.664	647057.2096	378.837619	6.943823	4	0.1	1	G	1	4	1	New Site Infrastructure	6	379.099968	3.180902	4	-0.26	1	24	3	3
765	321141.488	647058.6328	379.935448	6.360721	4	0.1	1	G	1	4	1	New Site Infrastructure	6	379.888906	0.934041	4	0.05	1	24	3	3
766	321149.026	647058.2054	380.668144	6.098919	4	0.1	1	G	1	4	1	New Site Infrastructure	6	380.643527	0.326323	4	0.02	1	24	3	3
767	321158.301	647060.4199	381.430264	6.094429	4	0.2	1	G	1	4	1	New Site Infrastructure	6	381.484798	0.515386	4	-0.05	1	24	3	3
768	321166.907	647062.0676	382.173832	6.146014	4	0.2	1	G	1	4	1	New Site Infrastructure	6	382.153173	0.198425	4	0.02	1	24	3	3
769	321166.416	647071.7029	381.654186	6.409925	4	0.1	1	G	1	4	1	New Site Infrastructure	6	381.663177	0.505087	4	-0.01	1	24	3	3
770	321166.02	647083.6888	380.657296	9.408279	6	0.2	1	G	1	6	2	New Site Infrastructure	6	380.700287	0.812066	4	-0.04	1	24	3	6
771	321163.109	647093.5176	379.218596	9.312786	6	0.3	1	G	1	6	2	New Site Infrastructure	6	379.106019	0.713075	4	0.11	1	24	3	6
772	321163.618	647101.0334	378.484105	8.334806	6	0.4	1	G	1	6	2	New Site Infrastructure	6	378.469731	1.292505	4	0.01	1	24	3	6
773	321163.149	647109.4779	378.038925	8.883365	6	0.3	1	G	1	6	2	New Site Infrastructure	6	378.469731	9.380248	4	-0.43	1	24	3	6
774	321214.535	647064.797	387.373134	7.557321	4	0.3	1	G	1	4	1	New Site Infrastructure	6	386.866959	14.518837	3	0.51	1	18	3	3
775	321201.033	647064.8342	385.731623	7.858762	4	0.3	1	G	1	4	1	New Site Infrastructure	6	385.001384	6.362722	4	0.73	1	24	3	3
776	321190.462	647064.1582	384.47526	7.659011	4	0.2	1	G	1	4	1	New Site Infrastructure	6	384.508952	0.255814	4	-0.03	1	24	3	3
777	321179.603	647061.7305	383.411388	6.490339	4	0.2	1	G	1	4	1	New Site Infrastructure	6	383.305941	0.967424	4	0.11	1	24	3	3
778	321170.836	647060.6082	382.62109	6.14385	4	0.2	1	G	1	4	1	New Site Infrastructure	6	382.633177	0.5125	4	-0.01	1	24	3	3
779	321168.391	647050.3854	382.88129	6.159331	4	0.2	1	G	1	4	1	New Site Infrastructure	6	382.925961	0.423554	4	-0.04	1	24	3	3
780	321170.286	647028.2037	384.43048	7.113892	4	0.2	1	G	1	4	1	New Site Infrastructure	6	384.481443	0.437619	4	-0.05	1	24	3	3
781	321170.274	647017.1043	385.216147	7.193538	4	0.2	1	G	1	4	1	New Site Infrastructure	6	385.331451	1.086924	4	-0.12	1	24	3	3
782	321170.049	647006.4643	385.943713	7.205846	4	0.4	1	G	1	4	1	New Site Infrastructure	6	386.038873	0.75292	4	-0.10	1	24	3	3
783	320931.706	646559.9376	389.806291	10.505753	6	0.1	1	G	1	6	2	New Site Infrastructure	6	389.646589	1.007627	4	0.16	1	24	3	6
784	320945.788	646563.4158	391.378843	10.255781	6	0.1	1	G	1	6	2	New Site Infrastructure	6	391.426548	1.158013	4	-0.05	1	24	3	6
785	320958.164	646561.3969	393.092289	8.076558	6	0.2	1	G	1	6	2	New Site Infrastructure	6	393.077258	0.90112	4	0.02	1	24	3	6
786	320969.985	646549.2594	395.26529	7.257096	4	0.1	1	G	1	4	1	New Site Infrastructure	6	395.254247	1.121024	4	0.01	1	24	3	3
787	320981.947	646543.2289	396.816267	5.881509	4	0.2	1	G	1	4	1	New Site Infrastructure	6	396.810493	1.168693	4	0.01	1	24	3	3
788	320991.744	646539.7786	397.718665	5.131768	4	0.1	1	G	1	4	1	New Site Infrastructure	6	396.947137	9.329993	4	0.77	1	24	3	3
789	320923.189	646553.2945	389.411177	10.988403	6	0.1	1	G	1	6	2	New Site Infrastructure	6	389.246595	0.945199	4	0.16	1	24	3	6
790	320918.729	646535.8169	390.795298	10.919276	6	0.2	1	G	1	6	2	New Site Infrastructure	6	390.758972	0.294419	4	0.04	1	24	3	6
791	320930.063	646542.2383	391.694608	9.593242	6	0.2	1	G	1	6	2	New Site Infrastructure	6	391.794848	0.663582	4	-0.10	1	24	3	6
792	320942.272	646579.2574	388.939111	10.537017	6	0.1	1	G	1	6	2	New Site Infrastructure	6	388.875971	0.96138	4	0.06	1	24	3	6
793	320939.878	646589.3603	387.145385	12.076871	6	0.2	1	G	1	6	2	New Site Infrastructure	6	387.161645	1.123815	4	-0.02	1	24	3	6
794	320925.202	646579.5247	386.395208	12.581028	6	0.2	1	G	1	6	2	New Site Infrastructure	6	386.215805	0.763423	4	0.18	1	24	3	6
795	320913.104	646577.3833	384.7155	13.195542	6	0.1	1	G	1	6	2	New Site Infrastructure	6	384.528629	0.825709	4	0.19	1	24	3	6
796	320900.822	646574.7889	382.754065	14.38009	6	0.1	1	G	1	6	2	New Site Infrastructure	6	383.912729	4.725502	4	-1.16	1	24	3	6
797	320938.268	646513.3683	394.903088	7.65907	4	0.1	1	G	1	4	1	New Site Infrastructure	6	394.906083	0.866278	4	0.00	1	24	3	3
798	320919.531	646484.6591	394.469587	5.938572	4	0.1	1	G	1	4	1	New Site Infrastructure	6	394.420167	0.984996	4	0.05	1	24	3	3
799	320891.783	646445.7122	393.290552	7.011433	4	0.2	1	G	1	4	1	New Site Infrastructure	6	393.146605	1.141357	4	0.14	1	24	3	3
800	320864.925	646397.8128	390.596109	6.307549	4	0.9	2	G	1	8	2	New Site Infrastructure	6	390.12868	4.22329	4	0.47	1	24	3	6
801	320836.093	646342.4124	388.539905	7.015051	4	0.4	1	G	1	4	1	New Site Infrastructure	6	387.470173	9.326404	4	1.07	1	24	3	3
802	320820.976	646284.8444	391.378155	1.852949	1	0.2	1	G	1	1	1	Tracks or Paths	2	390.10705	18.372763	3	1.27	1	6	1	1
803	320816.236	646226.1308	394.442881	3.985542	2	0.4	1	R	1.5	3	1	Tracks or Paths	2	390.083056	71.9578	3	4.36	1	6	1	1
804	320778.144	646197.9422	395.351617	5.535572	4	0.3	1	G	1	4	1	New Site Infrastructure	6	391.842099	70.452077	3	3.51	1	18	3	3
805	320718.512	646162.4407	397.985545	6.21252	4	0.2	1	G	1	4	1	New Site Infrastructure	6	393.474305	47.722796	3	4.51	1	18	3	3
806	320607.541	646111.7801	403.328935	3.670808	2	0.2	1	G	1	2	1	New Site Infrastructure	6	402.639052	15.126759	3	0.69	1	18	3	3
807	320598.574	646106.7333	403.854859	3.10178	2	0.1	1	G	1	2	1	New Site Infrastructure	6	403.06762	14.609711	3	0.79	1	18	3	3
808	320585.31	646102.1683	404.310944	2.591061	2	0	1	G	1	2	1	New Site Infrastructure	6	403.770771	11.935715	3	0.54	1	18	3	3
809	320578.57	646098.785	404.503989	1.390282	1	0	1	G	1	1	1	New Site Infrastructure	6	404.577953	6.439777	4	-0.07	1	24	3	3
810	320570.95	646092.916	404.669643	2.456768	2	0.1	1	G	1	2	1	New Site Infrastructure	6	404.70819	0.839596	4	-0.04	1	24	3	3
811	320575.37	646087.6024	404.803325	3.154138	2	0.2	1	G	1	2	1	New Site Infrastructure	6	404.753522	3.654884	4	0.05	1	24	3	3
812	320579.429	646083.4236	404.899119	3.417722	2	0.3	1	G	1	2	1	New Site Infrastructure	6	404.753522	9.480137	4	0.15	1	24	3	3
813	321023.606	646674.3389	383.835399	8.83765	6	0.1	1	G	1	6	2	New Site Infrastructure	6	385.033288	8.05721	4	-1.20	1	24	3	6
814	320997.178	646617.4275	389.038557	12.944084	6	0.1	1	G	1	6	2	New Site Infrastructure	6	389.265124	1.396614	4	-0.23	1	24	3	6
815	320977.617	646614.4928	388.026076	11.176166	6	0.1	1	G	1	6	2	New Site Infrastructure	6	390.479843	16.395255	3	-2.45	1	18	3	6
816	320968.506	646601.5184	389.044051	10.652675	6	0.1	1	G	1	6	2	New Site Infrastructure	6	388.323747	10.371887	3	0.72	1	18	3	6
817	320955.609	646584.7665	389.823678	10.515527	6	0.1	1	G	1	6	2	New Site Infrastructure	6	389.805745	1.110251	4	0.02	1	24	3	6
818	320950.602	646574.3353	390.607516	10.177114	6	0.1	1	G	1	6	2	New Site Infrastructure	6	390.650571	0.250968	4	-0.04	1	24	3	6
819	320943.886	646571.3056	390.174686	10.192609	6	0.1	1	G	1	6	2	New Site Infrastructure	6	390.178378	1.15483	4	0.00	1	24	3	6
820	320057.412	645994.8811	402.104784	9.003007	6	0.1	1	R	1.5	9	2	New Site Infrastructure	6	402.23376	1.039836	4	-0.13	1	24	3	6
821	320044.392	645994.6235	402.154343	9.531332	6	0	1	R	1.5	9	2	New Site Infrastructure	6	402.244515	0.605358	4	-0.09	1	24	3	6
822	320032.044	645994.7542	401.852194	9.630488	6	0	1	R	1.5	9	2	New Site Infrastructure	6	401.979007	0.929202	4	-0.13	1	24	3	6
823	320074.872	646011.3825	399.22011	9.355764	6	0.1	1	G	1	6	2	New Site Infrastructure	6	399.108734	0.745523	4	0.11	1	24	3	6
824	320123.306	646019.4766	397.210361	8.906107	6	0.2	1	G	1	6	2	New Site Infrastructure	6	397.731395	3.418718	4	-0.52	1	24	3	6
825	320185.719	646021.4494	396.118506	11.325225	6	0	1	G	1	6	2	New Site Infrastructure	6	395.969442	1.194487	4	0.15	1	24	3	6
826	321270.453	648755.322	355.773309	4.627742	4	0.1	1	C	2	8	2	Tracks or Paths	2	351.1057	53.943037	3	4.67	1	6	1	2
827	321174.862	648763.9676	364.43657	8.701305	6	0.4	1	G	1	6	2	Minor Water Feature	6	353.198701	123.663062	3	11.24	2	18	3	6
828	321141.971	648779.0956	371.409216	15.531771	8	0.1	1	C	2	16	3	Minor Water Feature	6	353.198701	154.958112	3	18.21	2	18	3	9
829	321123.473	648821.921	383.130323	24.139324	8	0	1	R	1.5	12	2	Minor Water Feature	6	353.198701	200.349913	3	29.93	2	18	3	6
830	321159.745	648852.3456	372.542452	18.636241	8	0.1	1	C	2	16	3	Tracks or Paths	2	351.1057	200.329003	3	21.44	2	6	1	3
831	321185.257	648881.6041	366.982382	10.136894	6	0.1	1	C	2	12	2	Tracks or Paths	2	350.662017	205.485433	3	16.32	2	6	1	2
832	321240.561	648839.1068	359.365255	3.609115	2	0.1	1	C	2	4	1	Tracks or Paths	2	349.841023	137.746444	3	9.52	1	6	1	1
833	320562.574	646089.4912	405.104191	3.488193	2	0.6	2	G	1	4	1	New Site Infrastructure	6	405.067613	0.635402	4	0.04	1	24	3	3
834	320569.614	646103.7324	404.42121	2.616544	2	0.5	1	G	1	2	1	New Site Infrastructure	6	404.500473	1.855645	4	-0.08	1	24	3	3
835	320570.114	646114.133	403.607802	5.198161	4	0.9	2	G	1	8	2	New Site Infrastructure	6	403.608601	0.599704	4	0.00	1	24	3	6
836	320568.892	646126.2296	402.516163	5.802604	4	0.8	2	G	1	8	2	New Site Infrastructure	6	402.527125	0.214072	4	-0.01	1	24	3	6
837	320567.412	646134.881	401.462995	7.660238	4	0.5	1	G	1	4	1	New Site Infrastructure	6	401.542616	1.039763	4	-0.08	1	24	3	3
838	320560.09	646093.7599	404.955482	3.339982	2	0.1	1	G	1	2	1	New Site Infrastructure	6	404.917768	0.715603	4	0.04	1	24	3	3
839	320554.688	646090.2839	405.30965	3.457411	2	0.2	1	G	1	2	1	New Site Infrastructure	6	405.318188	0.174995	4	-0.01	1	24	3	3
840	320549.39	646086.2593	405.617718	3.806883	2	0.1	1	G	1	2	1	New Site Infrastructure	6	405.632962	0.692927	4	-0.02	1	24	3	3
841	320544.366	646082.061	405.814259	4.293423	4	0.1	1	G	1	4	1	New Site Infrastructure	6	405.824492	0.351658	4	-0.01	1	24	3	3
842	320503.122	646090.7001	403.889494	6.156703	4	0.3	1	G	1	4	1	New Site Infrastructure	6	403.931864	0.717499	4	-0.04	1	24	3	3
843	320466.07	646068.33	402.779187	6.997876	4	0.3	1	G	1	4	1	New Site Infrastructure	6	402.857213	0.680028	4	-0.08	1	24	3	3
844	320419.641	646046.5298	403.455909	9.590505	6	0.1	1	G	1	6	2	New Site Infrastructure	6	403.551313	1.017713	4	-0.10	1	24	3	6
845	320379.186	646053.2087	401.786853	9.12934	6	0.1	1	G	1	6	2	New Site Infrastructure	6	401.623418	1.018679	4	0.16	1	24	3	6
846	320355.902	646076.5355	396.330719	12.477539	6	0.1	1	G	1	6	2	New Site Infrastructure	6	396.480322	0.915856	4	-0.15	1	24	3	6
847	320343.786	646117.3079	387.152333	11.457448	6	0	1	G	1	6	2	New Site Infrastructure	6	387.032024	1.227064	4	0.12	1	24	3	6
848	320219.83	646026.6549	396.524585	7.310929	4	0	1	G	1	4	1	New Site Infrastructure	6	396.644891	1.037764	4	-0.12	1	24	3	3
849	320157.412	646014.881	397.702376	8.715277	6	0.2	1	G	1	6	2	New Site Infrastructure	6	397.812488	1.039762	4	-0.11	1	24	3	6
850	320111.593	646029.8182	395.437472	9.653664	6	0.3	1	G	1	6	2	New Site Infrastructure	6	397.63471	13.73997	3	-2.20	1	18	3	6
851	319997.771	646004.0658	396.963039	15.456011	8	0.3	1	G	1	8	2	New Site Infrastructure	6	397.237668	0.943576	4	-0.27	1	24	3	6
852	319969.827	645982.3651	400.729706	11.032329	6	0.3	1	G	1	6	2	New Site Infrastructure	6	401.316431	17.041961	3	-0.59	1	18	3	6
853	319984.878	645995.751	398.018584	11.630535	6	0.2	1	G	1	6	2	New Site Infrastructure	6	398.268839	7.845869	4	-0.25	1	24	3	6
854	319992.52	646009.4101	395.51514	11.326906	6	0.2	1	G	1	6	2	New Site Infrastructure	6	395.38261	0.72708	4	0.13	1	24	3	6
855	319978.171	646023.2988	392.497274	12.466676	6	0.2	1	R	1.5	9	2	New Site Infrastructure	6	393.49317	11.017886	3	-1.00	1	18	3	6
856	319985.46	646018.0283	393.834208	10.652	6	0.2	1	G	1	6	2	New Site Infrastructure	6	393.871462	3.255488	4	-0.04	1	24	3	6
857	320003.906	645993.0974	400.806172	14.059175	6	0.2	1	G	1	6	2	New Site Infrastructure	6	401.065555	1.275144	4	-0.26	1	24	3	6
858	319999.111	645978.2644	403.04304	11.446633	6	0.2	1	G	1	6	2	New Site Infrastructure	6	403.024214	0.426281	4	0.02	1	24	3	6
859	320009.711	645981.9362	403.20939	10.503812	6	0.3	1	G	1	6	2	New Site Infrastructure	6	403.13405	1.012596	4	0.08	1	24	3	6
860	320014.098	645985.4525	402.775588	10.340519	6	0.2	1	G	1	6	2	New Site Infrastructure	6	402.68427	0.901578	4	0.09	1	24	3	6
861	320020.808	645989.6362	402.317258	10.148105	6	0.1	1	R	1.5	9	2	New Site Infrastructure	6	402.230692	0.48415	4	0.09	1	24	3	6
862	320033.622	645982.3609	403.982662	10.143252	6	0.1	1	R	1.5	9	2	New Site Infrastructure	6	404.007441	0.942405	4	-0.02	1	24	3	6
863	320027.993	645975.4218	405.132405	10.329448	6	0.2	1	G	1	6	2	New Site Infrastructure	6	405.026673	0.99738	4	0.11	1	24	3	6
864	320028.461	645966.5086	406.696659	9.164332	6	0.2	1	G	1	6	2	New Site Infrastructure	6	406.755243	0.47116	4	-0.06	1	24	3	6
865	320417.412	648934.8811	405.888801	12.323951	6	0	1	G	1	6	2	New Site Infrastructure	6	406.070237	1.039837	4	-0.18	1	24	3	6
866	320390.968	648984.5655	408.519817	9.391595	6	0.2	1	G	1	6	2	New Site Infrastructure	6	408.590846	0.521245	4	-0.07	1	24	3	6
867	320340.886	648974.2208	415.758505	8.512836	6	0	1	G	1	6	2	New Site Infrastructure	6	415.788971	0.204316	4	-0.03	1	24	3	6
868	320394.855	648970.2807	408.979205	9.452217	6	0.2	1	G	1	6	2	New Site Infrastructure	6	409.012311	0.220986	4	-0.03	1	24	3	6
869	320392.611	649034.9458	402.614443	10.613789	6	0.4	1	G	1	6	2	New Site Infrastructure	6	402.724941	0.841526	4	-0.11	1	24	3	6
870	320405.783	649015.8426	403.209575	10.911212	6	0.3	1	G	1	6	2	New Site Infrastructure	6	403.03987	0.969076	4	0.17	1	24	3	6
871	320450.523	648970.1609	398.705019	12.384621	6	0.1	1	R	1.5	9	2	Upgraded Site Infrastructure	6	398.663021	0.197428	4	0.04	1	24	3	6
872	320540.677	649086.3112	381.733222	8.864768	6	0.1	1	G	1	6	2	New Site Infrastructure	6	384.459219	22.246065	3	-2.73	1	18	3	6
873	320482.391	649134.4487	382.549749	4.332226	4	0.3	1	G	1	4	1	New Site Infrastructure	6	382.548516	0.467527	4	0.00	1	24	3	3
874	320419.92	649069.2231	394.170905	11.332421	6	0	1	R	1.5	9	2	New Site Infrastructure	6	393.936193	1.190835	4	0.23	1	24	3	6
875	320407.648	649115.8184	389.225241	10.757148	6	0.2	1	G	1	6	2	New Site Infrastructure	6	389.170999	0.979874	4	0.05	1	24	3	6
876	320417.607	649130.5343	386.232709	11.358507	6	0	1	G	1	6	2	New Site Infrastructure	6	386.320981	0.988921	4	-0.09	1	24	3	6
877	320431.215	649176.7256	378.206344	6.012697	4	0	1	G	1	4	1	New Site Infrastructure	6	378.297421	0.79359	4	-0.09	1	24	3	3
878	320506.831	649149.0055	380.718797	6.642271	4	0	1	G	1	4	1	New Site Infrastructure	6	380.81919	0.902712	4	-0.10	1	24	3	3
879	320601.512	649241.5346	370.723668	5.740428	4	0.2	1	G	1	4	1	Upgraded Site Infrastructure	6	370.801701	0.984598	4	-0.08	1	24	3	3
880	320559.21	649269.3409	369.500256	5.085211	4	0.1	1	G	1	4	1	New Site Infrastructure	6	369.424477	0.916351	4	0.08	1	24	3	3
881	320610.836	649292.2191	366.51312	5.915653	4	0.1	1	G	1	4	1	New Site Infrastructure	6	366.518218	0.163412	4	-0.01	1	24	3	3
882	320618.099	649346.1522	361.033271	3.93909	2	0.2	1	G	1	2	1	New Site Infrastructure	6	361.027486	0.615792	4	0.01	1	24	3	3
883	320656.575	649332.352	362.698771	5.143268	4	0.3	1	G	1	4	1	New Site Infrastructure	6	363.212109	6.514843	4	-0.51	1	24	3	3
884	320653.199	649321.3306	363.845622	7.586488	4	0.3	1	G	1	4	1	New Site Infrastructure	6	363.722642	0.91922	4	0.12	1	24	3	3
885	321417.412	648034.8811	351.860835	5.057406	4	0.1	1	G	1	4	1	Tracks or Paths	2	355.441074	27.089387	3	-3.58	1	6	1	1
886	321464.122	648035.2865	347.739865	5.864843	4	0.5	1	G	1	4	1	Tracks or Paths	2	354.876165	65.652487	3	-7.14	1	6	1	1
887	321472.526	647936.9553	351.171464	6.323033	4	0	1	G	1	4	1	Tracks or Paths	2	356.856338	57.916761	3	-5.68	1	6	1	1
888	321436.722	647927.3776	355.164026	6.211638	4	0.1	1	G	1	4	1	Upgraded Site Infrastructure	6	357.357421	22.027524	3	-2.19	1	18	3	3
889	321467.412	647834.8811	349.715629	18.717593	8	0	1	G	1	8	2	Tracks or Paths	2	356.936415	42.729507	3	-7.22	1	6	1	2
890	321417.412	647734.8811	338.780519	16.571282	8	0	1	G	1	8	2	Tracks or Paths	2	348.594856	36.933387	3	-9.81	1	6	1	2
891	320445.803	647540.8235	457.329919	2.773583	2	0.3	1	G	1	2	1	New Site Infrastructure	6	457.321087	1.156716	4	0.01	1	24	3	3
892	320461.353	647540.3183	457.72009	3.263265	2	0.3	1	G	1	2	1	New Site Infrastructure	6	457.584496	4.645929	4	0.14	1	24	3	3
893	320450.21	647582.6883	458.341097	2.400119	2	0.2	1	G	1	2	1	New Site Infrastructure	6	458.365998	0.766286	4	-0.02	1	24	3	3
894	320437.504	647582.8277	457.696955	3.227048	2	0.2	1	G	1	2	1	New Site Infrastructure	6	458.201414	9.240228	4	-0.50	1	24	3	3
895	320456.446	647583.2072	458.558225	2.094287	2	0.2	1	G	1	2	1	New Site Infrastructure	6	458.490577	1.954965	4	0.07	1	24	3	3
896	320477.225	647703.0277	452.561259	2.144904	2	1.2	3	G	1	6	2	New Site Infrastructure	6	452.418747	5.465694	4	0.14	1	24	3	6
897	320450.749	647674.1315	452.196889	6.961193	4	0.8	2	G	1	8	2	New Site Infrastructure	6	452.198677	0.040935	4	0.00	1	24	3	6
898	320469.903	647707.5687	452.343358	2.004248	2	0.01	1	G	1	2	1	New Site Infrastructure	6	452.374614	0.975727	4	-0.03	1	24	3	3
899	320466.052	647710.9424	452.3047	2.581129	2	0.01	1	R	1.5	3	1	New Site Infrastructure	6	452.374893	2.789576	4	-0.07	1	24	3	3
900	320530.534	647776.3067	452.680508	1.73118	1	0.01	1	R	1.5	1.5	1	New Site Infrastructure	6	452.54511	6.095834	4	0.14	1	24	3	3
901	320512.045	647790.6547	452.452954	4.426993	4	0.1	1	G	1	4	1	New Site Infrastructure	6	452.331949	10.864603	3	0.12	1	18	3	3
902	320523.775	647781.6232	452.440642	1.703989	1	0.01	1	R	1.5	1.5	1	New Site Infrastructure	6	452.441106	1.058037	4	0.00	1	24	3	3
903	320571.131	647838.2017	450.690967	3.894506	2	0.01	1	R	1.5	3	1	New Site Infrastructure	6	450.554713	4.419955	4	0.14	1	24	3	3
904	320617.742	647895.5537	450.786019	3.680959	2	0.01	1	G	1	2	1	New Site Infrastructure	6	450.386991	8.379182	4	0.40	1	24	3	3
905	320617.173	647903.9274	450.802407	3.261384	2	0.01	1	G	1	2	1	New Site Infrastructure	6	450.639694	3.290033	4	0.16	1	24	3	3
906	320616.698	647914.1864	450.487362	3.187282	2	0.1	1	G	1	2	1	New Site Infrastructure	6	450.490619	0.077218	4	0.00	1	24	3	3
907	320616.447	647926.6159	450.043731	3.195288	2	0.3	1	G	1	2	1	New Site Infrastructure	6	450.072628	0.571231	4	-0.03	1	24	3	3
908	320616.331	647940.9661	449.541429	3.883024	2	0.2	1	R	1.5	3	1	New Site Infrastructure	6	449.587379	0.937316	4	-0.05	1	24	3	3

909	320616.001	647950	449.182051	5.654785	4	0.1	1	G	1	4	1	New Site Infrastructure	6	449.229262	0.721493	4	-0.05	1	24	3	3
910	320625.844	647949.602	450.052016	5.916542	4	0.3	1	G	1	4	1	New Site Infrastructure	6	450.104408	1.007491	4	-0.05	1	24	3	3
911	320636.919	647950.5289	450.982165	6.547736	4	0.1	1	G	1	4	1	New Site Infrastructure	6	450.995779	0.465891	4	-0.01	1	24	3	3
912	320646.416	647949.882	451.875761	6.632691	4	0.1	1	G	1	4	1	New Site Infrastructure	6	451.880294	0.37519	4	0.00	1	24	3	3
913	320616.001	647950	449.182051	5.654785	4	0.1	1	G	1	4	1	New Site Infrastructure	6	449.229262	0.721493	4	-0.05	1	24	3	3
914	320666.349	647949.8382	453.725598	4.149214	4	0.1	1	G	1	4	1	New Site Infrastructure	6	453.750774	0.455627	4	-0.03	1	24	3	3
915	320656.484	647949.7976	452.912718	6.148614	4	0.2	1	G	1	4	1	New Site Infrastructure	6	452.9231	0.388232	4	-0.01	1	24	3	3
916	320616.211	648002.3329	444.688544	5.30801	4	1	2	G	1	8	2	New Site Infrastructure	6	444.735069	0.549663	4	-0.05	1	24	3	6
917	320616.092	647989.5782	445.670866	6.97874	4	0.01	1	G	1	4	1	New Site Infrastructure	6	445.671636	0.818525	4	0.00	1	24	3	3
918	320616.232	647969.9373	447.425667	7.34854	4	0.01	1	G	1	4	1	New Site Infrastructure	6	447.45097	0.51197	4	-0.03	1	24	3	3
919	320616.525	647960.4447	448.361522	7.373698	4	0.01	1	G	1	4	1	New Site Infrastructure	6	448.410156	0.383508	4	-0.05	1	24	3	3
920	320606.766	647948.58	448.397523	7.168362	4	0.1	1	G	1	4	1	New Site Infrastructure	6	448.419279	0.472313	4	-0.02	1	24	3	3
921	320596.641	647949.4441	447.157329	7.614638	4	1	2	C	2	16	3	New Site Infrastructure	6	447.153021	0.670824	4	0.00	1	24	3	9
922	320570.642	647949.6349	446.69469	6.474513	4	0.8	2	G	1	8	2	New Site Infrastructure	6	446.100804	10.085579	3	0.59	1	18	3	6
923	320559.044	647951.1407	447.059973	5.304797	4	0.9	2	G	1	8	2	New Site Infrastructure	6	446.100804	21.700834	3	0.96	1	18	3	6
924	320678.459	648024.6749	450.510514	8.238938	6	0.1	1	G	1	6	2	New Site Infrastructure	6	450.587882	0.618888	4	-0.08	1	24	3	6
925	320701.217	648003.751	454.75988	6.506286	4	0.1	1	G	1	4	1	New Site Infrastructure	6	454.7383	8.871673	4	0.02	1	24	3	3
926	320743.309	648081.2504	452.403098	8.355315	6	0.1	1	G	1	6	2	New Site Infrastructure	6	451.830836	3.863691	4	0.57	1	24	3	6
927	320731	648089.4076	449.776485	11.685729	6	0.5	1	R	1.5	9	2	New Site Infrastructure	6	449.922846	1.328498	4	-0.15	1	24	3	6
928	320735.01	648087.1864	450.700713	11.248479	6	0.1	1	G	1	6	2	New Site Infrastructure	6	450.522846	0.971099	4	0.18	1	24	3	6
929	320729.688	648133.2559	442.6029	14.848465	6	0.2	1	G	1	6	2	New Site Infrastructure	6	443.39318	5.09904	4	-0.79	1	24	3	6
930	320739.635	648135.3135	444.009605	13.296961	6	0.2	1	G	1	6	2	New Site Infrastructure	6	443.736444	1.219163	4	0.27	1	24	3	6
931	320731.072	648239.7	433.93322	13.128741	6	0.01	1	G	1	6	2	New Site Infrastructure	6	434.327123	1.692279	4	-0.39	1	24	3	6
932	320721.802	648267.1972	432.29622	13.554775	6	0.1	1	G	1	6	2	New Site Infrastructure	6	432.561185	1.290674	4	-0.26	1	24	3	6
933	320719.523	648259.6374	431.537193	13.734295	6	0.1	1	G	1	6	2	New Site Infrastructure	6	431.816463	1.28149	4	-0.28	1	24	3	6
934	320631.928	648320.0955	425.977683	11.712278	6	0.01	1	G	1	6	2	New Site Infrastructure	6	425.640086	2.135249	4	0.34	1	24	3	6
935	320630.407	648310.8762	424.171434	8.810669	6	0.01	1	G	1	6	2	New Site Infrastructure	6	424.100426	0.824678	4	0.07	1	24	3	6
936	320562.45	648347.5916	426.078277	15.454325	8	0.1	1	G	1	8	2	New Site Infrastructure	6	425.717515	1.504527	4	0.36	1	24	3	6
937	320471.007	648391.1259	425.978627	10.75602	6	0.1	1	G	1	6	2	New Site Infrastructure	6	425.219568	3.789182	4	0.76	1	24	3	6
938	320465.324	648378.0456	423.202634	11.1805	6	0.01	1	R	1.5	9	2	New Site Infrastructure	6	423.416992	2.154238	4	-0.21	1	24	3	6
939	320374.259	648398.6346	426.799651	8.620062	6	0.2	1	G	1	6	2	New Site Infrastructure	6	427.657631	5.691935	4	-0.86	1	24	3	6
940	320328.803	648413.2564	430.594949	5.937713	4	0.01	1	R	1.5	6	2	New Site Infrastructure	6	430.684718	0.859382	4	-0.09	1	24	3	6
941	320289.054	648511.6333	432.254431	7.172623	4	0.01	1	G	1	4	1	New Site Infrastructure	6	431.443486	7.255162	4	0.81	1	24	3	3
942	320275.407	648503.6774	431.244529	2.478137	2	0.1	1	G	1	2	1	Tracks or Paths	2	431.229516	0.817627	4	0.02	1	8	2	2
943	320268.318	648544.7612	432.512179	3.5122	2	0.01	1	G	1	2	1	New Site Infrastructure	6	432.410727	1.732145	4	0.10	1	24	3	3
944	320258.981	648598.86	429.959436	6.362421	4	0.01	1	G	1	4	1	New Site Infrastructure	6	429.997018	0.795745	4	-0.04	1	24	3	3
945	320273.938	648596.4908	431.300851	6.159366	4	0.01	1	G	1	4	1	New Site Infrastructure	6	430.923006	5.239683	4	0.38	1	24	3	3
946	320307.222	648577.7048	434.49153	4.710165	4	0.2	1	G	1	4	1	New Site Infrastructure	6	431.535301	41.384462	3	2.96	1	18	3	3
947	320308.476	648628.3231	430.532267	8.879011	6	0.1	1	G	1	6	2	Tracks or Paths	2	427.632263	18.559822	3	2.90	1	6	1	2
948	320339.522	648655.9711	429.964229	7.758859	4	0.7	2	G	1	8	2	Tracks or Paths	2	426.148859	37.709654	3	3.82	1	6	1	2
949	320305.743	648659.3033	427.045973	8.550395	6	0.2	1	G	1	6	2	Tracks or Paths	2	426.361627	5.095743	4	0.68	1	8	2	4
950	320294.792	648671.4532	425.91504	3.466475	2	0.01	1	G	1	2	1	Upgraded Site Infrastructure	6	425.888053	0.662458	4	0.03	1	24	3	3
951	320388.995	648825.8584	411.182372	8.648933	6	0.01	1	G	1	6	2	Tracks or Paths	2	411.882992	4.29061	4	-0.70	1	8	2	4
952	320779.899	646866.6869	323.636116	7.398844	4	0.01	1	G	1	4	1	New Site Infrastructure	6	323.432369	3.520509	4	0.20	1	24	3	3
953	320710.883	646860.3984	330.529611	13.278397	6	0.1	1	G	1	6	2	New Site Infrastructure	6	331.27036	5.716738	4	-0.74	1	24	3	6
954	320710.854	646867.3882	331.392186	13.040778	6	0.01	1	G	1	6	2	New Site Infrastructure	6	331.46031	0.736446	4	-0.07	1	24	3	6
955	320708.424	646871.8615	332.104975	16.689561	8	0.1	1	G	1	8	2	Tracks or Paths	2	332.591751	1.728633	4	-0.49	1	8	2	4
956	320671.749	646849.9125	336.600827	23.024167	8	0.1	1	G	1	8	2	New Site Infrastructure	6	336.387207	0.985383	4	0.21	1	24	3	6
957	320617.342	646782.2532	333.251539	20.795075	8	0.1	1	G	1	8	2	Tracks or Paths	2	334.585279	3.909688	4	-1.33	1	8	2	4
958	320613.095	646797.5828	338.921358	19.883592	8	0.1	1	G	1	8	2	New Site Infrastructure	6	339.154147	0.651437	4	-0.23	1	24	3	6
959	320552.528	646745.8744	334.626724	19.883236	8	0.1	1	G	1	8	2	New Site Infrastructure	6	334.681351	0.30065	4	-0.05	1	24	3	6
960	320485.811	646716.6738	330.76819	20.719285	8	0.1	1	G	1	8	2	New Site Infrastructure	6	330.564044	1.063711	4	0.20	1	24	3	6
961	320488.777	646709.4378	328.196977	19.485186	8	0.1	1	G	1	8	2	New Site Infrastructure	6	328.435496	0.676178	4	-0.24	1	24	3	6
962	320432.375	646708.8992	330.809274	19.036273	8	0.1	1	G	1	8	2	Tracks or Paths	2	330.503607	0.858153	4	0.31	1	8	2	4
963	320426.452	646698.4243	328.182531	13.325376	6	0.1	1	G	1	6	2	New Site Infrastructure	6	328.963122	3.696943	4	-0.78	1	24	3	6
964	320362.488	646726.0711	336.851562	15.79198	8	0.1	1	G	1	8	2	New Site Infrastructure	6	336.868644	0.228943	4	-0.02	1	24	3	6
965	320362.119	646711.216	332.18153	14.772754	6	0.1	1	G	1	6	2	New Site Infrastructure	6	332.39426	1.074634	4	-0.21	1	24	3	6
966	320322.776	646714.5643	329.762976	8.301132	6	0.1	1	G	1	6	2	New Site Infrastructure	6	330.072685	3.548193	4	-0.31	1	24	3	6
967	320313.434	646722.3522	330.668958	9.830243	6	0.1	1	G	1	6	2	New Site Infrastructure	6	330.590868	0.760203	4	0.08	1	24	3	6
968	320237.431	646696.9565	330.187828	7.159803	4	0.1	1	G	1	4	1	New Site Infrastructure	6	330.125787	1.109675	4	0.06	1	24	3	3
969	320138.145	646682.8746	338.956243	17.966806	8	0.1	1	G	1	8	2	New Site Infrastructure	6	338.656994	0.952213	4	0.30	1	24	3	6
970	320136.223	646661.8555	332.382633	18.231247	8	0.1	1	G	1	8	2	New Site Infrastructure	6	332.411338	0.553052	4	-0.03	1	24	3	6
971	320103.385	646702.9231	347.774	15.67258	8	0.1	1	G	1	8	2	New Site Infrastructure	6	347.61258	1.054129	4	0.16	1	24	3	6
972	320103.61	646689.5685	344.036081	16.315663	8	0.1	1	G	1	8	2	New Site Infrastructure	6	344.266815	1.047925	4	-0.23	1	24	3	6
973	319988.216	646716.5063	356.000845	13.199761	6	0.1	1	G	1	6	2	New Site Infrastructure	6	355.914646	0.635599	4	0.09	1	24	3	6
974	319943.945	646763.9449	362.345655	7.458552	4	0.1	1	G	1	4	1	New Site Infrastructure	6	362.31486	0.786944	4	0.03	1	24	3	3
975	319939.298	646756.3177	362.242764	8.38321	6	0.1	1	G	1	6	2	New Site Infrastructure	6	362.254185	0.619766	4	-0.01	1	24	3	6
976	319887.462	646769.346	366.571256	14.131123	6	0.01	1	G	1	6	2	New Site Infrastructure	6	368.374149	8.56648	4	-1.80	1	24	3	6
977	319872.899	646807.5819	374.418341	12.624801	6	0.1	1	G	1	6	2	New Site Infrastructure	6	374.514919	0.560766	4	-0.10	1	24	3	6
978	319868.451	646805.5496	373.644605	12.591989	6	0.1	1	G	1	6	2	New Site Infrastructure	6	373.782925	0.619714	4	-0.14	1	24	3	6
979	319848.531	646864.6073	381.542127	9.836776	6	0.1	1	G	1	6	2	New Site Infrastructure	6	381.486309	0.529079	4	0.06	1	24	3	6
980	319841.542	646862.5378	380.519898	10.080059	6	0.1	1	G	1	6	2	New Site Infrastructure	6	380.361024	0.932006	4	0.16	1	24	3	6
981	319833.001	646861.4564	379.3009	10.167372	6	0.1	1	G	1	6	2	New Site Infrastructure	6	379.341727	0.715159	4	-0.04	1	24	3	6
982	319830.708	646909.9143	383.898019	10.861059	6	0.01	1	G	1	6	2	New Site Infrastructure	6	383.92063	0.196654	4	-0.02	1	24	3	6
983	319837.503	646908.9415	384.911877	11.136799	6	0.01	1	G	1	6	2	New Site Infrastructure	6	384.68923	1.146116	4	0.22	1	24	3	6
984	319844.497	646914.5366	386.696445	11.888551	6	0.01	1	G	1	6	2	New Site Infrastructure	6	386.69253	0.477787	4	0.00	1	24	3	6
985	319828.504	646947.7475	385.606298	17.293517	8	0.01	1	G	1	8	2	New Site Infrastructure	6	385.685532	0.419411	4	-0.08	1	24	3	6
986	319841.412	646945.7072	388.742441	14.843902	6	0.01	1	G	1	6	2	New Site Infrastructure	6	388.585641	0.806544	4	0.16	1	24	3	6
987	319869.041	647000.6148	397.492645	10.403293	6	0.01	1	G	1	6	2	New Site Infrastructure	6	397.418013	0.600979	4	0.07	1	24	3	6
988	319859.874	647007.5552	396.049151	10.522263	6	0.01	1	G	1	6	2	New Site Infrastructure	6	396.217967	1.006692	4	-0.17	1	24	3	6
989	319928.647	647069.7742	409.113242	8.813366	6	0.01	1	G	1	6	2	New Site Infrastructure	6	407.985753	9.044098	4	1.13	1	24	3	6
990	319926.103	647079.8722	408.991307	9.605144	6	0.01	1	G	1	6	2	New Site Infrastructure	6	408.760582	1.410584	4	0.23	1	24	3	6
991	319921.13	647084.4138	408.123262	10.786044	6	0.01	1	G	1	6	2	New Site Infrastructure	6	408.427659	2.795535	4	-0.30	1	24	3	6
992	319977.314	647120.8345	417.599225	7.952763	4	0.01	1	G	1	4	1	New Site Infrastructure	6	417.392191	4.184375	4	0.21	1	24	3	3
993	319975.779	647129.0342	417.727603	7.893697	4	0.01	1	G	1	4	1	New Site Infrastructure	6	417.812196	1.314391	4	-0.08	1	24	3	3
994	320014.822	647157.1863	424.165769	7.469662	4	0.1	1	G	1	4	1	New Site Infrastructure	6	424.182948	0.931085	4	-0.02	1	24	3	3
995	321190.38	647344.4314	348.433847	26.31465	8	0.1	1	G	1	8	2	New Site Infrastructure	6	348.662084	0.463118	4	-0.23	1	24	3	6
996	321212.547	647275.9357	368.454473	18.279123	8	0.1	1	G	1	8	2	New Site Infrastructure	6	368.489284	0.241633	4	-0.03	1	24	3	6
997	321197.02	647407.9031	338.145078	15.892343	8	0.1	1	G	1	8	2	New Site Infrastructure	6	338.096987	0.370696	4	0.05	1	24	3	6
998	321090.79	647297.2515	332.892888	14.322175	6	0.1	1	R	1.5	9	2	Tracks or Paths	2	332.743309	0.863012	4	0.15	1	8	2	4
999	321116.774	647273.5801	343.591923	18.153568	8	0.1	1	R	1.5	12	2	New Site Infrastructure	6	343.900045	1.471003	4	-0.31	1	24	3	6
1000	321317.412	648334.881	345.195849	3.68078	2	2.2	3	G	1	6	2	Minor Water Feature	6	345.148121	71.080114	3	0.05	1	18	3	6
1001	321317.412	648384.881	347.14986	1.529927	1	3.3	8	G	1	8	2	Tracks or Paths	2	354.409865	83.705188	3	-7.26	1	6	1	2
1002	321267.412	648384.881	348.542249	9.464278	6	2.2	3	G	1	18	3	Tracks or Paths	2	354.409865	35.114566	3	-5.87	1	6	1	3
1003	321317.412	648434.881	345.806942	2.605178	2	4	8	G	1	16	3	Tracks or Paths	2	354.290225	86.460633	3	-8.48	1	6	1	3
1004	321317.412	648484.881	345.557834	2.316035	2	4.6	8	R	1.5	24	3	Tracks or Paths	2	352.386212	76.684105	3	-6.83	1	6	1	3
1005	321267.412	648484.881	348.093185	7.034007	4	3.1	8	G	1	32	4	Tracks or Paths	2	352.877438	27.668523	3	-4.78	1	6	1	4
1006	321317.412	648534.881	344.831576	2.509085	2	2	3	G	1	6	2	Tracks or Paths	2	351.117296	68.909749	3	-6.29	1	6	1	2
1007	321317.412	648584.881	345.016799	2.657295	2	1	2	G	1	4	1	Tracks or Paths	2	350.431364	60.942553	3	-5.41	1	6	1	1
1008	321317.412	648634.8811	346.509049	2.243551	2	0.8	2	R	1.5	6	2	Minor Water Feature	6	347.219854	23.051324	3	-0.71	1	18	3	6
1009	321317.412	648684.881	347.573514	6.215735	4	0.1	1	G	1	4	1	Minor Water Feature	6	346.058942	15.616973	3	1.51	1	18	3	3
1010	321273.307	648665.1652	350.877867	6.433126	4	0.1	1	G	1	4	1	Tracks or Paths	2	351.186404	2.761587	4	-0.31	1	8	2	2
1011	321267.412	648584.8811	349.052266	6.799333	4	0.1	1	R	1.5	6	2	Tracks or Paths	2	350.431364	11.911697	3	-1.38	1	6	1	2
1012	321247.426	648483.7661	351.468379	12.163399	6	0.2	1	G	1	6	2	Tracks or Paths	2	353.312281	8.72213	4	-1.84	1	8	2	4
1013	321233.755	648433.3789	353.891699	11.760452	6	0	1	G	1	6	2	Tracks or Paths	2	354.966837	5.736047	4	-1.08	1	8	2	4
1014	321237.234	648384.8002	353.720603	11.449716	6	0	1	G	1	6	2	Tracks or Paths	2	355.146933	7.055907	4	-1.43	1	8	2	4
1015	321247.559	648334.3562	352.756892	13.261315	6	0	1	G	1	6	2	Tracks or Paths	2	354.38967	6.852008	4	-1.63	1	8	2	4
1016	321256.804	648286.0004	352.280912	10.475367	6	0	1	G	1	6	2	Tracks or Paths	2	353.878578	8.979642	4	-1.60	1	8	2	4
1017	320697.739	648304.7514	430.053615	15.41048	8	0	1	G	1	8	2	New Site Infrastructure	6	427.316463	13.001882	3	2.74	1	18	3	6
1018	320713.674	648294.4955	432.879165	14.685881	6	0.1	1	G	1	6	2	New Site Infrastructure	6	430.811845	8.894966	4	2.07	1	24	3	6
1019	320767.411	648284.8811	440.493607	6.851337	4	0.1	1	G	1	4	1	New Site Infrastructure	6	440.157461	2.805943	4	0.34	1	24	3	3
1020	320739.936	648288.1352	436.918848	9.95751	6	0	1	G	1	6	2	New Site Infrastructure	6	438.884335	18.603803	3	-1.97	1	18	3	6
1021	320772.136	648307.6028	442.002104	5.934177	4	0.1	1	G	1	4	1	New Site Infrastructure	6	441.900372	1.510784	4	0.10	1	24	3	3
1022	320776.958	648347.8458	444.856423	6.834003	4	0.1	1	G	1	4	1	New Site Infrastructure	6	444.866341	0.360339	4	-0.01	1	24	3	3
1023	320769.665	648374.8764	446.781028	4.8553	4	0.1	1	G	1	4	1	New Site Infrastructure	6	446.687679	1.221739	4	0.09	1	24	3	3
1024	320750.529	648369.847	445.423485	6.841482	4	0.1	1	G	1	4	1	New Site Infrastructure	6	446.267005	9.231958	4	-0.84	1	24	3	3
1025	320778.83	648377.0352	447.256543	4.854312	4	0.1	1	G	1	4	1	New Site Infrastructure	6	446.66846	7.854764	4	0.59	1	24	3	3
1026	320721.509	648390.8908	445.539831	5.888943	4	0.1	1	G	1	4	1	New Site Infrastructure	6	445.436325	1.114173	4	0.10	1	24	3	3
1027	320732.742	648407.1334	447.588252	5.204722	4	0.1	1	G	1	4	1	New Site Infrastructure	6	447.669516	0.978139	4	-0.08	1	24	3	3
1028	320732.697	648431.0724	449.385548	4.431398	4	0.3	1	G	1	4	1	New Site Infrastructure	6	448.259473	15.22799	3	1.13	1	18	3	3
1029	320801.391	648384.6075	448.265298	4.616426	4	0.1	1	G	1	4	1	New Site Infrastructure	6	446.66846	31.291658	3	1.60	1	18	3	3
1030	320784.659	648391.5709	448.609829	4.813398	4	0.1	1	G	1	4	1	New Site Infrastructure	6	447.310131	19.440515	3	1.30	1	18	3	3
1031	320793.896	648371.1703	447.133806	4.23605	4	0.1	1	G	1	4	1	New Site Infrastructure	6	446.292459	19.845098	3	0.84	1	18	3	3
1032	320707.5	648425.6392	448.484857	5.93688	4	0.01	1	G	1	4	1	New Site Infrastructure	6	448.54838	0.917349	4	-0.06	1	24	3	3
1033	320692.5	648396.165	444.729655	12.27553	6	0.01	1	G	1	6	2	New Site Infrastructure	6	444.740049	0.220343	4	-0.01	1	24	3	6
1034	320688.634	648456.5702	453.264487	7.423683	4	0.1	1	G	1	4	1	New Site Infrastructure	6	453.202387	0.466361	4	0.06	1	24	3	3
1035	320641.795	648397.1858	443.296334	11.750381	6	0.1	1	G	1	6	2	New Site Infrastructure	6	443.532943	1.30419	4	-0.24	1	24	3	6
1036	320801.258	648345.3482	445.305859	4.260578	4	0.1	1	G	1	4	1	New Site Infrastructure	6	444.657311	24.563848	3	0.65	1	18	3	3
1037	320749.679	648191.5209	438.307121	10.614561	6	0.1	1	G	1	6	2	New Site Infrastructure	6	438.100218	1.132153	4	0.21	1	24	3	6
1038	320734.136	648198.2003	435.151029	10.544546	6	0.1	1	G	1	6	2	New Site Infrastructure	6	435.259117	0.584681	4	-0.11	1	24	3	6
1039	320501.794	649169.6714	378.446087	8.141006	6	0.01	1	G	1	6	2	New Site Infrastructure	6	378.382501	1.019421	4	0.06	1	24	3	6
1040	320547.065	649200.7351	374.637514	5.205094	4	0.1	1	G	1	4	1	New Site Infrastructure	6	374.687658	0.716878	4	-0.05	1	24	3	3
1041	320539.314	649256.8009	369.897039	4.475526	4	0.1	1	G	1	4	1	New Site Infrastructure	6	369.984243	1.561257	4	-0.09	1	24	3	3
1042	320592	649232	371.952603	4.418119	4	0.01	1	G	1	4	1	New Site Infrastructure	6	371.903494	0.722284	4	0.05	1	24	3	3
1043	320539.366	649147.5	379.605807	7.661605	4	0.01	1	G	1	4	1	New Site Infrastructure	6	379.567928	0.893843	4	0.04	1	24	3	3
1044	320640.868	649264.9544	367.424471	4.875392	4	0.2	1	G	1	4	1	Tracks or Paths	2	367.788897	10.85321	3	-0.36	1	6	1	1
1045	320753.598	649508.1795	353.626278	4.80625	4	0.1	1	G	1	4	1	Upgraded Site Infrastructure	6	354.15065	20.755322	3	-0.52	1	18	3	3
1046	320781.293	649480.8034	354.550056	2.358852	2	0.1	1	G	1	2	1	Tracks or Paths	2	354.630396	9.197421	4	-0.08	1	8	2	2
1047	320947.065	649700.1583	345.970354	7.654467	4	0.01	1	G	1	4	1	Upgraded Site Infrastructure	6	346.44376	5.880187	4	-0.47	1	24	3	3
1048	320927.756	649709.3229	345.93138	6.006658	4	0.01	1	G	1	4	1	Tracks or Paths	2	346.664922	7.797382	4	-0.73	1	8	2	2
1049	321059.417	649918.4859	336.095355	6.415608	4	0.01	1	G	1	4	1	Upgraded Site Infrastructure	6	336.956801	8.753693	4	-0.86	1	24	3	3
1050	321043.012	649928.8441	338.123065	5.965615	4	0.01	1	G	1	4	1	Tracks or Paths	2	337.693945	4.602469	4	0.43	1	8	2	2
1051	321210.137	650101.6734	328.63788	5.003836	4	0.3	1	G	1	4	1	Upgraded Site Infrastructure	6	328.748697	8.420419	4	-0.11	1	24	3	3
1052	321193.817	650119.2637	328.516666	3.286447	2	0.2	1	G	1	2	1	Upgraded Site Infrastructure	6	328.648857	11.419098	3	-0.13	1	18	3	3
1053	321326.654	650207.3825	320.828354	3.803249	2	0.01	1	G	1	2	1	Upgraded Site Infrastructure	6	320.059272	14.711344	3	0.77	1	18	3	3
1054	321349.126	650228.0361	319.8484	2.520531	2	0.01	1	G	1	2	1	Upgraded Site Infrastructure	6	319.640119	7.390228	4	0.21	1	24	3	3
1055	321630.464	650128.8175	302.732926	9.803047	6	0.1	1	R	1.5	9	2	Upgraded Site Infrastructure	6	304.213696	10.222221	3	-1.48	1	18	3	6
1056	321636.705	650153.5698	305.729789	6.06814	4	0.2	1	G	1	4	1	Upgraded Site Infrastructure	6	304.713359	10.270042	3	1.02	1	18	3	3
1057	321854.954	650086.5994	299.703406	7.210613	4	0.01	1	G	1	4	1	Upgraded Site Infrastructure	6	300.657617	7.753664	4	-0.95	1	24	3	3
1058	321839.726	650071.6675	301.964241	5.752215	4	0.1	1	G	1	4	1	Tracks or Paths	2	302.200723	4.646552	4	-0.24	1	8	2	2
1059	322077.876	650009.8969	304.062385	4.401212	4	0.1	1	G	1	4	1	Upgraded Site Infrastructure	6	304.984697	12.0279	3	-0.92	1	18	3	3
1060	322067.411	649984.8811	305.702385	3.211517	2	0.1	1	G	1	2	1	Upgraded Site Infrastructure	6	305.109983	10.648031	3	0.59	1	18	3	3

1061	322264.08	649872.1217	301.51878	4.438058	4	0	1	G		1	4	1	New Site Infrastructure	6	301.470435	0.633499	4	0.05	1	24	3	3									
1062	322262.101	649899.5882	301.592195	3.362559	2	0	1	G		1	2	1	Public Road	3	301.626597	3.532007	4	-0.03	1	12	2	2									
1063	322282.836	649864.0612	299.881778	4.474752	4	0.01	1	G		1	4	1	New Site Infrastructure	6	299.892381	0.131925	4	-0.01	1	24	3	3									
1064	322235.724	649882.8801	302.813896	1.856507	1	0.01	1	G		1	1	1	Upgraded Site Infrastructure	6	302.745608	6.904656	4	0.07	1	24	3	3									
1065	322242.722	649858.9514	302.717137	4.044306	4	0.01	1	G		1	4	1	New Site Infrastructure	6	302.692527	0.840913	4	0.02	1	24	3	3									
1066	322067.411	649634.8811	310.405141	1.194449	1	0.01	1	G		1	1	1	Minor Water Feature	6	310.199023	13.000116	3	0.21	1	18	3	3									
1067	322090.292	649616.025	309.722621	2.038699	2	0.01	1	G		1	2	1	Upgraded Site Infrastructure	6	310.009751	7.86294	4	-0.29	1	24	3	3									
1068	321960.245	649428.1003	315.849349	3.721378	2	0.01	1	G		1	2	1	Upgraded Site Infrastructure	6	315.81759	0.46887	4	0.03	1	24	3	3									
1069	321952.516	649435.8665	316.28594	1.68108	1	0.01	1	G		1	1	1	Minor Water Feature	6	316.124441	4.550994	4	0.16	1	24	3	3									
1070	321966.511	649424.8427	315.402951	3.739369	2	0.3	1	G		1	2	1	Tracks or Paths	2	315.797595	5.936686	4	-0.39	1	8	2	2									
1071	321829.441	649212.6442	323.139457	3.11162	2	0.01	1	G		1	2	1	Tracks or Paths	2	323.076887	1.637564	4	0.06	1	8	2	2									
1072	321817.803	649219.9485	322.946453	4.945706	4	0.01	1	G		1	4	1	Tracks or Paths	2	323.176053	4.817847	4	-0.23	1	8	2	2									
1073	321694.713	649066.4057	328.490167	4.30177	4	0.01	1	G		1	4	1	Tracks or Paths	2	328.498371	0.294997	4	-0.01	1	8	2	2									
1074	321693.706	649054.5287	328.863158	3.804878	2	0.01	1	G		1	2	1	Tracks or Paths	2	328.849606	3.718258	4	0.01	1	8	2	2									
1075	321612.507	648929.7577	332.171159	5.38545	4	0.01	1	G		1	4	1	Tracks or Paths	2	332.476007	2.959747	4	-0.30	1	8	2	2									
1076	321602.476	648937.1661	333.416305	5.63714	4	0.01	1	G		1	4	1	Tracks or Paths	2	333.401515	0.974387	4	0.01	1	8	2	2									
1077	321406.43	648789.0603	341.184493	10.918153	6	0.01	1	G		1	6	2	Upgraded Site Infrastructure	6	341.041778	0.991183	4	0.14	1	24	3	6									
1078	321407.558	648786.046	340.701644	10.192295	6	0.01	1	G		1	6	2	Tracks or Paths	2	340.863361	0.847256	4	-0.16	1	8	2	4									
1079	321402.144	648793.257	342.376493	11.995584	6	0.01	1	G		1	6	2	Tracks or Paths	2	342.15379	1.280209	4	0.22	1	8	2	4									
1080	321309.603	648723.5633	351.283886	7.06238	4	0.1	1	G		1	4	1	Tracks or Paths	2	350.710438	4.648539	4	0.57	1	8	2	2									
1081	321318.561	648708.0026	348.914173	8.634322	6	0.01	1	G		1	6	2	Tracks or Paths	2	348.906643	0.187127	4	0.01	1	8	2	4									

Slope Angles

		Co-eff.
0	2.0	1.0
2.0001	4.0	2.0
4.0001	8.0	4.0
8.0001	15.0	6.0
15.0001	50.0	8.0

Peat depths

		Co-eff.
0	0.5	1.0
0.5001	1.0	2.0
1.0001	3.0	3.0
3.0001	6.0	8.0

Substrate

	Co-eff.
G	1.0
R	1.5
C	2.0
not proven	2.0
slip material	5.0

Receptor

	Co-eff
Tracks or Paths	2.0
Public Road	3.0
Minor Water Feature	6.0
Dwelling	8.0
Major Water Feature	8.0
New Site Infrastructure	6.0
Upgraded Site Infrastructure	6.0

Receptor Dist.

		Co-eff.
0	10.0	4
10	100.0	3
100	1000.0	2
1000	2000.0	1

Receptor Elev.

		Co-eff.
0	10.0	1
10	50.0	2
50	100.0	3
100	200.0	4

Hazard Ranking normalisation

0	5.0	1
5	15.0	2
15.01	30.0	3
30.01	50.0	4
50.01	100.0	5

Exposure rating normalisation

0	6.0	1
6	12.0	2
13	24.0	3
25	30.0	4
30	100.0	5

CLOICH FOREST WIND FARM

VOLUME 3: TECHNICAL APPENDICIES

TECHNICAL APPENDIX A9.2: OUTLINE PEAT MANAGEMENT PLAN

JUNE 2021

Prepared By:

Arcus Consultancy Services

7th Floor
144 West George Street
Glasgow
G2 2HG

T +44 (0)141 221 9997 l **E** info@arcusconsulting.co.uk
w www.arcusconsulting.co.uk

Registered in England & Wales No. 5644976

TABLE OF CONTENTS

1 INTRODUCTION

1.1 Background

Arcus Consultancy Services Ltd (Arcus) were commissioned by Cloich Windfarm Partnership LLP, wholly owned by EDF Energy Renewables Limited, ('the Applicant') to carry out an outline Peat Management Plan (oPMP) to support an Environmental Impact Assessment Report (EIA Report) for the proposed Cloich Forest Wind Farm ('the Development') located within the Cloich Forest, approximately 5.5 kilometres (km) north-west of Peebles ('the Site').

This oPMP will provide estimated peat excavation and re-use potential, and the proposed peat and soils management methodologies to be employed during construction of the Development.

This oPMP has been prepared to be a Technical Appendix to the Environmental Impact Assessment (EIA) Report for the Development. This oPMP will ensure the Development complies with good practice in accordance with Scottish Renewables (SR) and Scottish Environment Protection Agency (SEPA) guidance.

The purpose of the oPMP is to:

- Define the materials that will be excavated as a result of the Development, focusing specifically on the excavation of peat;
- Report on detailed investigations into peat depths within the Development;
- Detail proposals for the management of excavated peat and other soils;
- Consider the potential effect of the Development on Ground Water Dependent Ecosystems (GWDTEs);
- Determine volumes of excavated arisings, the cut/fill balance of the Development and proposals for re-use or reinstatement using excavated materials; and
- Detail management techniques for handling, storing and depositing peat for reinstatement.

The oPMP has been produced in accordance with best practice guidance and legislation as detailed in Section 2.1 of this oPMP. This oPMP is intended to be a document that will evolve during the different phases of the Development and as such, will be subject to continued review to address:

- Requirements to discharge future Planning Conditions;
- Detailed ground investigations and design of the Development;
- Unforeseen conditions encountered during construction;
- Changes in best practice during the operational lifetime of the Development; and
- Changes resulting from the construction methods used by the Contractor(s).

Whilst this oPMP provides a base standard for good practice, where avoidance or further minimisation of risks to the environment can be demonstrated through use of alternative methods or improvements to current practices, the Contractor (once appointed) will implement these wherever possible and will correspond with SEPA and Scottish Borders Council ('the Council').

This oPMP is accompanied by the following appendices:

- Appendix A – Figures; and
- Appendix B – Calculations.

1.2 The Site

The land within the site boundary ('the Site') which contains the turbines and associated infrastructure covers an area of 1,080 hectares (ha), centred on National Grid Reference

(NGR) 320648, 647881. The Site is located approximately 5.5 km north-west of Peebles. The Site is located wholly within the administrative boundary of the Council and lies adjacent to the A703 on the east side of the Site.

The topography of the Site and the immediate vicinity is complex, with elevations ranging from approximately 280 m Above Ordnance Datum (AOD) in the north-east part of the Site to approximately 476 m AOD at the peak of Crailzie Hill in the south. The site encompasses the rolling Cloich Hills, including Peat Hill (466m AOD), Ewe Hill (462m AOD), White Rig (325m AOD), and Crailzie Hill (476m AOD). The hills are dissected by a number of watercourses, including Middle Burn, Flemington Burn, Martyr's Dean, Courhope Burn and Harehope Burn. All watercourses eventually feed into the River Tweed. There are no waterbodies within the Site.

Coniferous plantation, at various stages of the planting, growing and felling cycle, is the primary land use within the Site; however the area around Courhope in the south of the Site consists of improved upland pasture, utilised for sheep grazing, and improved grassland which remains clear of forestry.

In addition to the operational commercial forest of Cloich Forest, the Site and immediate vicinity consists of further areas of forestry and rural farmland, primarily used for grazing and other farmland activities.

The Site contains two public roads which form the Site access from the A703; these public roads are as follows:

- D17 Whim – Shiplaw; and
- D18 Cloich.

There are no residential properties within the Site; however, Cloich Farm is located adjacent to the Site, at approximate NGR 321655, 649105, approximately 1.2 km north-west from the closest turbine (T10).

1.3 The Development

The Development will consist of the following key infrastructure:

- Up to 12 wind turbines with a maximum tip height of 149.9m;
- Associated foundations, blade laydown areas, crane hardstandings and external transformers at each wind turbine location;
- Access tracks linking the turbine locations comprising of a combination of new and upgraded tracks;
- Temporary construction compound;
- Up to two borrow pits for aggregate extraction;
- Network of underground cabling;
- Substation building, containing control elements;
- A Battery Energy Storage System (BESS) facility; and
- Site access.

The Site Layout is shown on Figure 9.2.1 in Appendix A.

1.4 Consultation

Peat management within the Site, both excavation/disturbance and the reinstatement /restoration, was considered throughout the EIA for the Development and the outcomes of studies are reported in the EIA Report. The EIA Report forms part of the planning application submitted to the Scottish government's Energy Consent Unit (ECU) and made available to all consultees, including SEPA.

Further consultation beyond scoping took place between Arcus and SEPA regarding the methodology for investigating the peat depths during the Phase 2 Peat Probing. SEPA

acknowledged the approach proposed and highlighted the need for the Development to avoid the deepest peat areas where possible and the requirement for detailed peat probing. This oPMP considers assessments included in the EIA Report while responding to the consultees scoping responses.

2 OBJECTIVES

2.1 Introduction

Desk-based assessments, detailed peat survey work, and completion of technical assessments such as the Peat Slide Risk Assessment (PSRA) for the EIA Report allows a consistent approach for managing peat.

The preparation of an oPMP responds to the 2019 Scoping Responses (Oct 2019 – Dec 2019) and the intent to deliver a construction project that complies with good practice in accordance with SR and SEPA guidance.

In addition to the assessments, an outline civil design of the Site has been undertaken. The overall objective of the design of the Development has been to minimise the excavation of peat where possible. Due to the nature of the underlying ground conditions on the Site, tracks were designed to be as close as possible to existing levels. This is considered to provide the best opportunity for a design which achieves reinstatement or restoration in accordance with good practice and the methods set out in the outline Habitat Management Plan (HMP), while removing the need for off-site waste management controls.

This objective of the oPMP is achieved through:

- Ensuring the characteristics of the Site are understood through extensive peat probing and assessing the Site topography;
- Understanding the extent of the Site layout and how excavations will take place;
- Modelling the peat depth profile based on probing and a digital terrain modelling in 3D;
- Considering the best practice advice for peat reinstatement; and
- Developing practical peat restoration opportunities for improvement of habitats and peatlands.

This oPMP has been compiled in accordance with the following best practice guidance:

- Guidance on Developments on Peatland: Peatland Survey[1];
- Guidance on Developments on Peatland: Guidance on the Assessment of Peat Volumes, Re-use of Excavated Peat and Minimisation of Waste[2];
- Floating Roads on Peat Guidance[3];
- Good Practice During Wind Farm Construction[4]; and

[1]SNH (2017) Guidance on Developments on Peatland: Peatland Survey (2017) [Online] Available at: https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2018/12/peatland-survey-guidance/documents/peatland-survey-guidance-2017/peatland-survey-guidance-2017/govscot%3Adocument/Guidance%2Bon%2Bdevelopments%2Bon%2Bpeatland%2B-%2Bpeatland%2Bsurvey%2B-%2B2017.pdf (Accessed 05/05/21)

[2] Scottish Government (2014) Assessment of Peat Volumes, Reuse of Excavated Peat and Minimisation of Waste [Online] Available at: https://www.gov.scot/publications/assessment-of-peat-volumes-reuse-of-excavated-peat-and-minimisation-of-waste-guidance/ (Accessed 05/05/21)

[3] SNH (2010) Floating Roads on Peat [Online] Available at: http://www.roadex.org/wp-content/uploads/2014/01/FCE-SNH-Floating-Roads-on-Peat-report.pdf (Accessed 05/05/21)

[4] Scottish Renewables et al. (2019) Good Practice during Wind Farm Construction [Online] Available at: https://www.nature.scot/sites/default/files/2020-12/Good%20Practice%20during%20wind%20farm%20construction%20-%204th%20Ed.pdf (Accessed 05/05/21)

- SEPA Regulatory Position Statement – Developments on Peat[5].

2.2 Approach to Minimising Peat Excavation

The following steps have been taken during the outline design stage of the Development to minimise the effect on peat:

- The development of an access track design which avoids any deeper peat where practicable; and
- The design and orientation of turbines and crane hardstandings considering local topographical, peat and other environmental constraints.

These steps will be further supplemented by taking the following measures to minimise disturbance:

- Maximisation of batter angles in cuttings;
- Utilisation of existing tracks; and
- The use of appropriate construction plant to avoid unnecessary disturbance of the ground surface.

The fundamental principle upon which this oPMP is based is that achieving a successful materials strategy is contingent on gaining a thorough understanding of the Site through investigation and developing a design that achieves the materials management objectives. For the Development, this principle is achieved by undertaking significant peat probe investigations prior to preparing and the outline civil engineering design layout in 3D and the Development of this oPMP based on the available information.

2.3 Aims and Objectives

2.3.1 Need for a Peat Management Plan

The significance of peatlands is most evident in their protection by various legislation, policy and local, national or international initiatives including but not limited to;

- United Kingdom Biodiversity Action Plan (UKBAP)[6];
- Scotland's National Peatland Plan (SNH, 2015)[7];
- European Council Habitats Directive 92/43/EEC (Council of the European Communities, 1992)[8];
- Scottish Biodiversity List (SBL) (Scottish Government, 2013)[9];
- Scottish Government discussion paper on the Management of Carbon-Rich Soils (Scottish Government, 2010)[10];
- Scottish Soil Framework (Scottish Government, 2009)[11]; and
- Climate Change Plan (2017-2032) (Scottish Government et al., 2017)[12].

SEPA has a statutory and legislative duty to ensure that where peat spoil is generated during construction, it is stored, re-used, treated or disposed of correctly, which may require authorisation or permits.

SEPA's policy on the management of peat is set out within SEPA Regulatory Position Statement – Developments on Peat. This highlights that the best management option for

[5] SEPA (2010) SEPA Regulatory Position Statement – Developments on Peat [Online] Available at: https://www.sepa.org.uk/media/143822/peat_position_statement.pdf (Accessed 05/05/21)
[6] https://jncc.gov.uk/our-work/uk-bap/
[7] https://www.nature.scot/scotlands-national-peatland-plan-working-our-future
[8] https://www.legislation.gov.uk/eudr/1992/43/contents
[9] https://www.nature.scot/scotlands-biodiversity/scottish-biodiversity-strategy/scottish-biodiversity-list
[10] https://www.gov.scot/publications/low-carbon-scotland-meeting-emissions-reduction-targets-2010-2022-report/pages/10/
[11] https://www.gov.scot/publications/scottish-soil-framework/
[12] https://www.gov.scot/publications/draft-climate-change-plan-draft-third-report-policies-proposals-2017/

peat spoil is the prevention of its production, by seeking to minimise peat excavation and disturbance. Where this is unavoidable, developers should attempt to re-use as much of the peat produced on-site as is possible, in justifiable and environmentally beneficial ways.

This oPMP is prepared to demonstrate to the Council, SEPA, and other consultees that the construction of the Development will progress in a manner that is planned, in accordance with good practice, and achieves the aim of being environmentally sustainable.

This oPMP is therefore prepared in accordance with the SR and SEPA guidance. It details how:

- The Development has been structured and designed so far as practicably possible to reduce the volumes of peat excavated;
- Volumes of peat excavated during the course of the works have been considered in the design; and
- Excavated peat will be managed.

2.3.2 Objectives of the oPMP

The main objective of the oPMP is to outline how peat and peaty soils proposed to be excavated will be managed and re-used during the construction of the Development and proposed restoration plans.

This is achieved through responding of the following objectives:

- Providing details of the extent and depth of the peat on Site and how this was determined;
- Estimation of peat volumes to be excavated and re-used;
- Classification of excavated materials;
- Consideration of the use of appropriate construction methods;
- Describing how excavated peat will be handled to ensure suitability for re-use;
- Determining if temporary storage of peat will be required during construction and how this will be done to ensure suitability for re-use; and
- Considering the potential volume of peat which may not be suitable for re-use and any requirement for a Waste Management Plan for the Development.

The response to these objectives is provided in the following sections.

3 PEAT INVESTIGATIONS, EXCAVATION, RE-USE AND MANAGEMENT

3.1 Peat Classification and Published Geology

3.1.1 General Peat Classification

Acrotelmic peat is the upper layer of peat consisting of living and partially decayed materials with a higher hydraulic conductivity and a variable water table. These deposits are generally found to exist in the upper 0.5 m of peat deposits and are typically suitable for reinstatement because they contain viable plant life to assist in the regeneration of peatland vegetation and carbon sequestration.

Catotelmic peat is variable in characteristics, with decomposition of fibres generally increasing with depth. Water content can be highly variable and affects the structural strength of the material. Suitability for re-use generally depends on fibre and water content. The upper catotelm is commonly deemed as being appropriate for re-use in restoration due to its relatively high fibre content.

Generally, excavated semi fibrous catotelmic peat from the Site will have sufficient structural strength to be able to be used in the lower layers of verge restoration as it will not be 'fluid'.

The catotelmic peat would be capped with a surface layer of actrotelm to re-establish the peat vegetation. If any fluid like wet catotelmic peat is encountered then it would be placed in more appropriate locations such as low-lying section of the borrow pits or concave deposition areas.

The following assumptions have been made in classifying peat excavated during the construction work:

- Where the total peat depth was found to be less than 0.5 m, this peat material is assumed to be 100% acrotelmic;
- Where the total peat depth is between 0.5 m and 1.0 m, the upper acrotelmic peat is at least 0.5 m deep; and
- Where the total peat depth is found to be greater than 1.0 m, acrotelmic peat is assumed to account for at least 30% of total depth but generally applying minimum of 0.5 m thick.

Existing topography and permitted track gradients drive the design of the infrastructure with due consideration given to potential construction risk and effects on environmentally sensitive receptors including deep peat, watercourse buffers and any GWDTEs. Further micro-siting post-consent would take place in such a way as to avoid where possible the excavation of deep peat.

3.1.2 Published Geology

Available British Geological Survey (BGS) mapping indicates a large proportion of the site to be vacant of superficial soils while the remainder of site is underlain almost entirely by Devensian Till, with two small localised pockets of peat in the centre of site and to the east in areas which are topographically flatter than their surrounds.

Published bedrock geology mapping indicates the entire site to be underlain by Wacke of the Kirkcolm Formation. No faulting exists on the Site.

3.1.3 Investigations

The existing peat depths across the Site have been determined through a phased survey approach. The survey was initiated to inform the EIA and Site design work while supporting the PSRA. The survey comprised a total of 1,081 probes.

Peat depths ranged from 0 m to 4.6 m thickness across the Site. Areas of deeper peat were shown as localised and isolated zones, with the deepest peat encountered in a pocket situated in the eastern area of the site. The remainder of deeper pockets of peat were located in the central site area and generally had a depth below 3 m.

Initial Phase 1 peat depth surveys were undertaken in March 2020 comprising a 100 m grid throughout the developable site area, with the exception of areas inaccessible due to dense forestry. This rationale of probing is in accordance with the phase 1 approach as detailed in the Scottish Government guidance for investigating peat.

Further peat depth surveys (phase 2a and b) were undertaken across a series of visits between November 2020 and April 2021.The probe positions for this visit were focussed on the proposed turbine, access tracks, and other key infrastructure. Peat depths were measured along the proposed access tracks at 50 m centres with offsets of 25 m on either side of the centre line, and 10 m cross-hair at turbines across the Site. Slight variations to this methodology were necessary due to dense forestry.

The peat depths are illustrated in Figure 9.2.2 - Recorded Peat Depths within Appendix A of this oPMP.

3.1.4 Summary of Peat Depths

Throughout the peat surveys to date, a total of 1,081 probes were progressed. 97% of these probes recorded no peat or peat less than 1.0 m. Thick peat (where the depth was greater than >1.0 m) was recorded at 3% of locations. The majority of thick peat was recorded at depths between 1.0 m – 2.0 m with around 1% of all probes recording depths in excess of 2.0 m. Whilst deep peat was recorded in the 3% of the total probes, the design of the site layout has avoided impact on these areas.

The maximum peat depth recorded was 4.6 m in the eastern site area. Generally, deeper peat was encountered in small isolated pockets in areas of flat topography and proposed roads and infrastructure have been avoided in these areas as far as possible.

Peat over the remainder of the Site was typically measured as being less than 0.5m with the average peat depth across the Site being <0.3 m.

Figure 9.2.3 - Interpolated Peat Depths included in Appendix A.

Prior to commencing works on Site, the Contractor (once appointed), will undertake further ground investigation to establish peat characteristics and surcharging strategies if required.

3.2 Excavation and Re-use Calculation

Excavated peat volumes have been estimated through the production of a peat levels 3D surface derived from the peat depth data recorded during peat probing. This is compared with a 3D surface developed from the outline civil design of site infrastructure whilst some assumptions have been adopted.

The estimated peat excavation volumes are included in Table 1 using the anticipated construction activities that will generate excavated soils.

Table 1: Peat Excavation Volumes Based on Construction Activity

Development Component	Estimated Volume of Excavated Peat (m^3)	Estimated Volume of Acrotelmic Peat (m^3)	Estimated Volume of Catotelmic Peat (m^3)
Turbines and associated earthworks	23,478	23,478	0
New windfarm tracks, turning heads, passing places, existing rack upgrades and associated earthworks	18,239	18,239	0
Construction Compound	453	453	0
Substation	889	889	0
Borrow Pits	5,234	5,234	0
SUB-TOTAL	**48,293**	**48,293**	**0**
+10% Bulk Factor Contingency	4,829	4,829	0
TOTAL	**53,122**	**53,122**	**0**

A detailed assessment of excavated volumes by location within the Site is provided in Appendix B of this oPMP.

3.2.1 Estimation of Peat Re-use Requirements

The principles of reinstating peat and peat soils should be adhered to for all elements of the infrastructure, comprising of the below:

- Peat and peaty soils will be reinstated on track and infrastructure verges with turves placed on the upper horizons encouraging revegetation;
- All peat, soil and turves excavated from beneath infrastructure will be reinstated in the vicinity of its original location; and
- Restoration activities will be overseen by the Ecological Clerk of Works (ECoW) to ensure methods are properly adhered to.

3.2.2 Peatland Restoration Potential

The outline objectives in proposing utilisation of those presently identified is to:

- Ensure residual volumes of excavated peat from the Development are re-used in areas where ecological benefits and maintained or increased carbon sequestration can be delivered;
- Promote the re-use of excavated peat materials and avoid their disposal to landfill;
- Promote use of best practices and guidance to ensure that benefit is made from reusing peat and peaty soils for ecological enhancement; and
- Complement planned mitigation identified in the oHMP.

Table 2 shows the opportunities for re-use of peat with the Site including the demand for peat re-use, while Table 3 summarises the total peat balance estimated during construction of the Development.

Table 2: Peat Re-use Volumes Based on Construction Activity

Development Area	Total Demand Estimate (m^3)	Acrotelm Demand (m^3)	Catotelm Demand (m^3)	Reinstatement Thickness (max) (m)	Assumptions
Turbines and associated earthworks	19,798	19,798	0	0.3	Turbines and associated earthworks will be dressed off with up to 0.3m of peat and peaty soils, with catotelm placed in the lower regions and acrotelm and turves placed nearer surface.
New windfarm tracks, turning heads, passing places, existing rack upgrades and associated earthworks	21,911	21,911	0	0.3	Where new windfarm tracks are proposed, peat will be reinstated along verges and associated earthwork banking with peat up to 0.6m thick with verges not expected to exceed 2.5m on either side.
Construction Compound	1,419	1,419	0	Up to 0.3	It is assumed that the construction compound will be completely reinstated across the entire disturbed area with peat up to depths of that encountered during any excavations to re-establish the conditions existed previously.
Substation	75	75	0	Up to 0.3	It is assumed that the substation will be reinstated in areas of earthworks banking and verges with peat up to depths of 0.5m, similar to that encountered during any excavations to re-establish the

Development Area	Total Demand Estimate (m³)	Acrotelm Demand (m³)	Catotelm Demand (m³)	Reinstatement Thickness (max) (m)	Assumptions
					conditions existed previously.
Borrow Pits	9,902	9,902	0	Up to 0.3	Peat reinstatement thicknesses will be up to 0.30m
Total	**53,105**	**53,105**	**0**		

Table 2 is presented as a summary of the assessment of peat reinstatement volumes. A detailed assessment is provided in Appendix B of this oPMP.

The following assumptions have been made in assessing peat re-use:

- New access track sections assume verges and earthworks on both sides of track with widths of approximately 2.5 m based on topography. As the access track edges will have graded slopes, peat depths will vary across the profile to tie into existing ground levels but are generally assumed not to exceed 0.6 m thick;
- Verges along the access tracks could consist of up to 0.6 m thick peat;
- No peat will be placed on access track verges where the local topography is steep and/or a watercourse is in close proximity;
- Peat will be laid only to a thickness that maintains hydrological conditions to avoid drying out. Peat will not be used as a thin layer or on steeper non-peat slopes. Low verges and landscaping will be formed to permit surface water to drain off the access tracks; and
- Reinstatement at substation and construction compound assumes a maximum peat depth thickness of 0.25 m. This will include the re-use of acrotelmic peat soils and turves;

Excavated peat will be temporarily placed adjacent to where it is excavated. However, where this is not possible, temporary peat storage areas have been identified. These are areas of previous disturbance area where peat was less than 0.5 m, areas out with 50 m buffer of watercourses and where topography permits.

Table 3: Peat Balance Calculations

Peat Description	Total Peat Demand Estimate for Reinstatement (m³)	Total Peat Supply from Excavation (m³)	Surplus (+) or Deficit (-) (m³)
Acrotelm	53,122	53,105	-17
Catotelm	0	0	0
Total	**53,122**	**53,105**	**-17**

Table 3 demonstrates that there will be a deficit of peat of approximately 17 m^3 when adopting the outline approach as detailed above. These volumes should be considered in the context of the total excavated peat during construction. It is likely that balance would be achieved once total excavated peat is established by the appointed Contractor and reinstatement depths are adjusted accordingly.

3.2.3 Handling and Storage of Peat

It will be necessary for the Contractor to prescribe methods and timing involved in excavating, handling and storing peat for use in reinstatement. The Contractor will be responsible for appointing a chartered geotechnical engineer who will monitor any

potential stability risks. Construction methods will be based on the following principles, although it should be noted that no catotelmic peat is anticipated to be excavated during the construction of this project, however best practice has been retained should the material arise on site:

- The surface layer of peat (acrotelm) and vegetation will be stripped separately from the catotelmic peat. This will typically be an excavation depth of up to 0.5 m;
- Acrotelmic material will be stored separately from catotelmic material;
- Careful handling is essential to retain any existing structure and integrity of the excavated materials and thereby maximise the potential for excavated material to be re-used;
- Less humified catotelmic peat which maintains its structure upon excavation should be kept separate from any highly humified amorphous or wet catotelmic peat;
- Acrotelmic material will be replaced as intact as possible once construction progresses / as it is complete;
- To minimise handling and transportation of peat, acrotelmic and catotelmic will be replaced, as far as is reasonably practicable, in the locality from which it was removed. Acrotelmic material is to be placed on the surface of reinstatement areas;
- Temporary storage of peat will be minimised, with restoration occurring in parallel with other works;
- Suitable areas should be sited in locations with lower ecological value, low stability risk and at a suitable distance from water courses;
- Reinstatement will, in all instances, be undertaken at the earliest opportunity to minimise storage of turves and other materials;
- Managing the construction work as much as possible to avoid periods when peat materials are likely to be wetter i.e. high rainfall events;
- Temporary storage and replacement of any peat excavated from the borrow pit should occur adjacent to and within the source pit; and
- Transport of peat on Site from excavation to temporary storage and restoration Site should be minimised.

3.2.4 Waste Management Plan Requirements

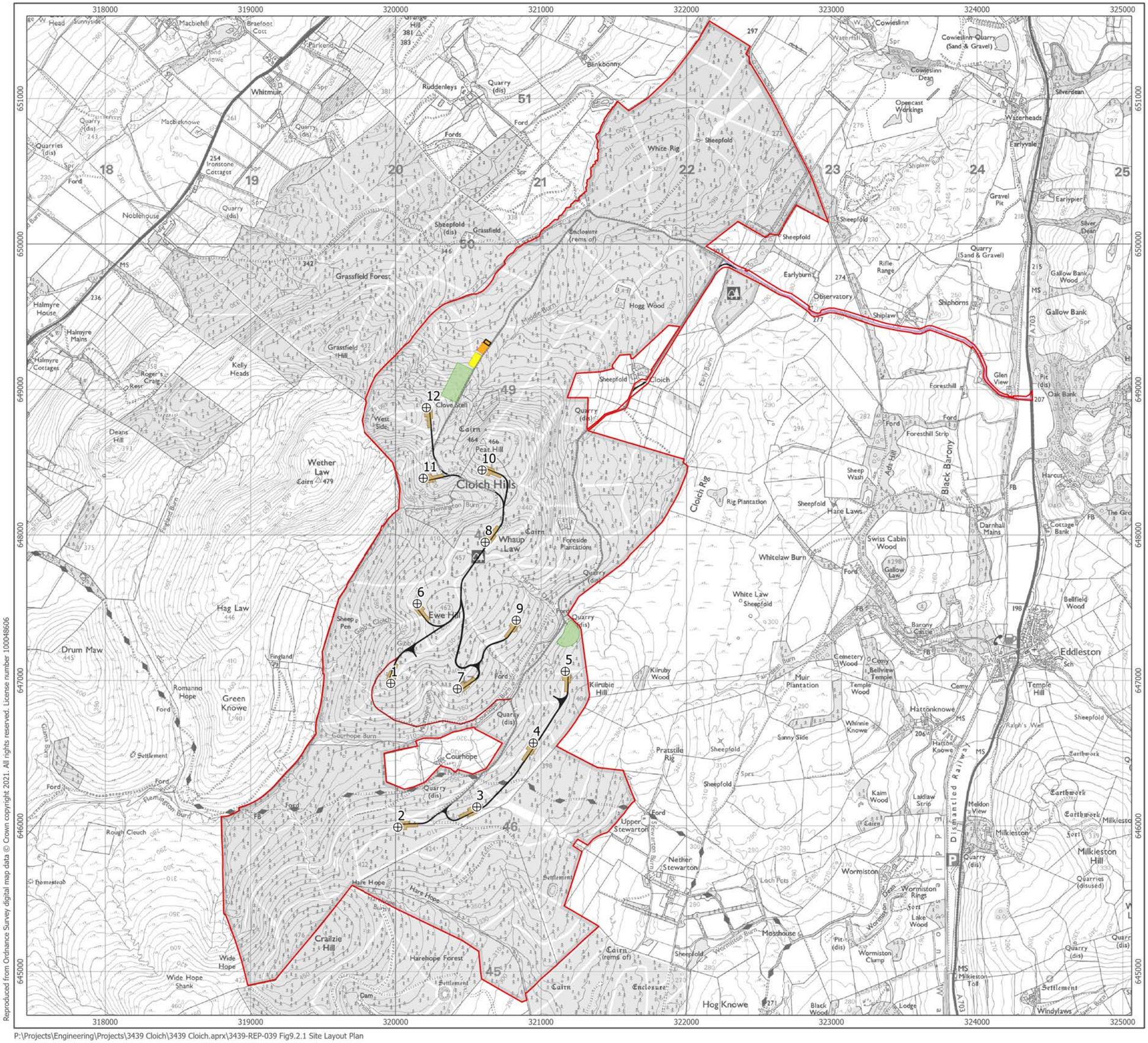
Based on the calculations carried out, the total peat volumes excavated will be fully incorporated in to the reinstatement proposed. However, further consultation should take place with SEPA on the details of proposals to remove soils from the site to ascertain if a waste management licence is required.

4 CONCLUSION

The following conclusions are drawn regarding the management of peat and excavated materials within the:

- As a result of the peat excavation and re-use estimates, it is demonstrated that all excavated peat can be suitably re-used on Site;
- Excavated peat will be used for the reinstatement of access track verges, cut and fill embankment slopes, reinstatement of turbine hardstandings, reinstatement of substation and compound areas, and in borrow pits following extraction;
- The estimates of excavated peat provided in this report are likely to be higher than actually occur, as micro-siting during construction will allow for the avoidance of localised pockets of deeper peat; and
- Sufficient methods have been defined to ensure that peat can be sensitively handled and stored on Site to allow for effective re-use.

APPENDIX A - FIGURES

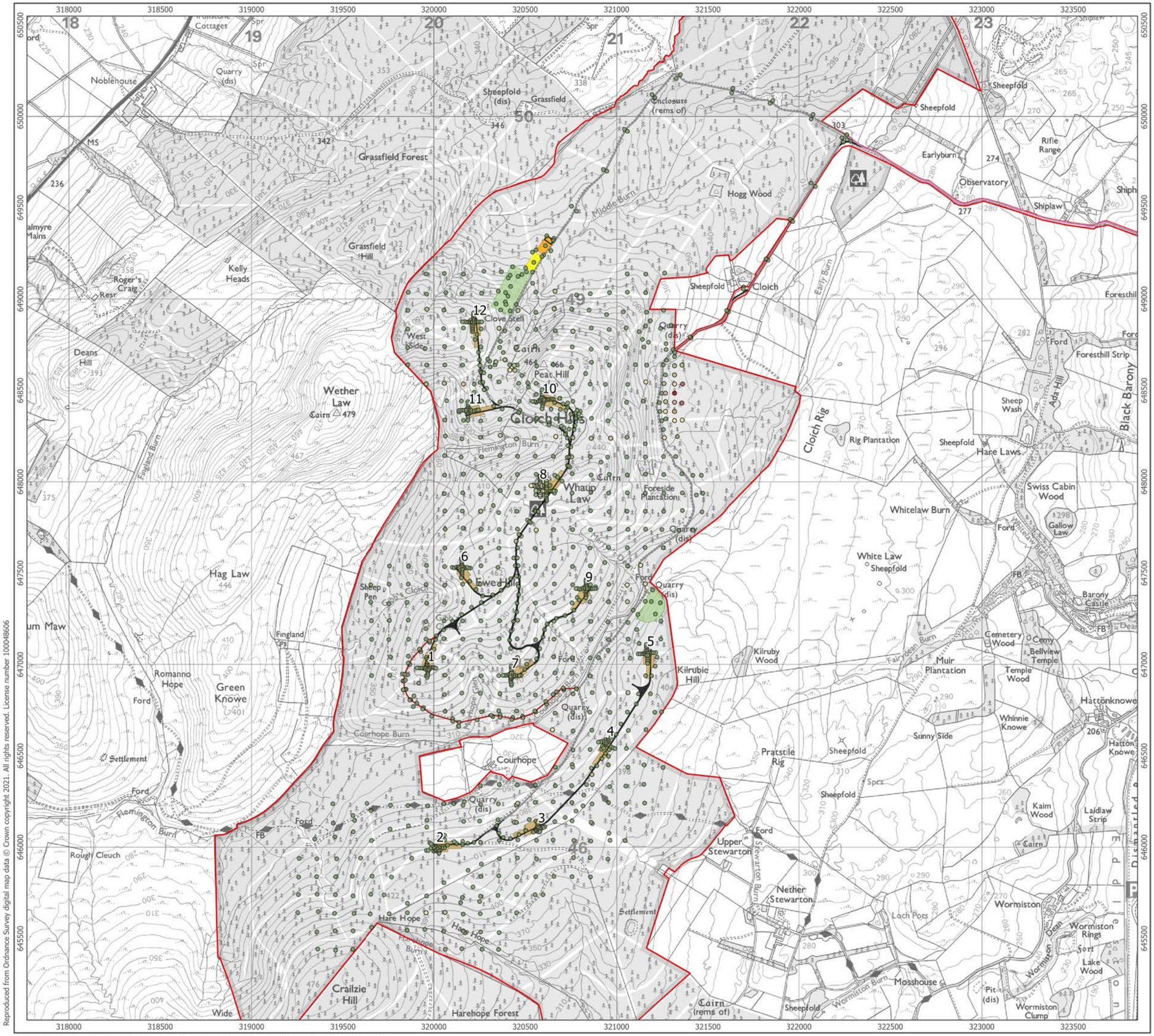


P:\Projects\Engineering\Projects\3439 Cloich\3439 Cloich.aprx\3439-REP-039 Fig9.2.1 Site Layout Plan

Produced By: BM	Ref: 3439-REP-039
Checked By: DB	Date: 10/06/2021

Site Layout Plan
Figure 9.2.1

Cloich Forest Wind Farm
outline Peat Management Plan



P:\Projects\Engineering\Projects\3439 Cloich\3439 Cloich.aprx\3439-REP-040 Fig9.2.2 Recorded Peat Depths

eDF renewables

ARCUS

- Site Boundary
- Proposed Turbine Location

Proposed Site Infrastructure

- Borrow Pit
- Construction Compound
- Crane Hardstanding
- Substation Compound
- BESS Location
- New Access Track
- New Track Used by Construction Traffic Only
- Existing Track (Subject to Localised Upgrades)
- Public Road (Subject to Widening Works)

Recorded Peat Depths (m)

- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 1.50
- 1.51 - 2.00
- 2.01 - 2.50
- 2.51 - 3.00
- 3.01 - 3.50
- 3.51 - 4.00
- 4.01 - 4.50
- 4.51 - 5.00

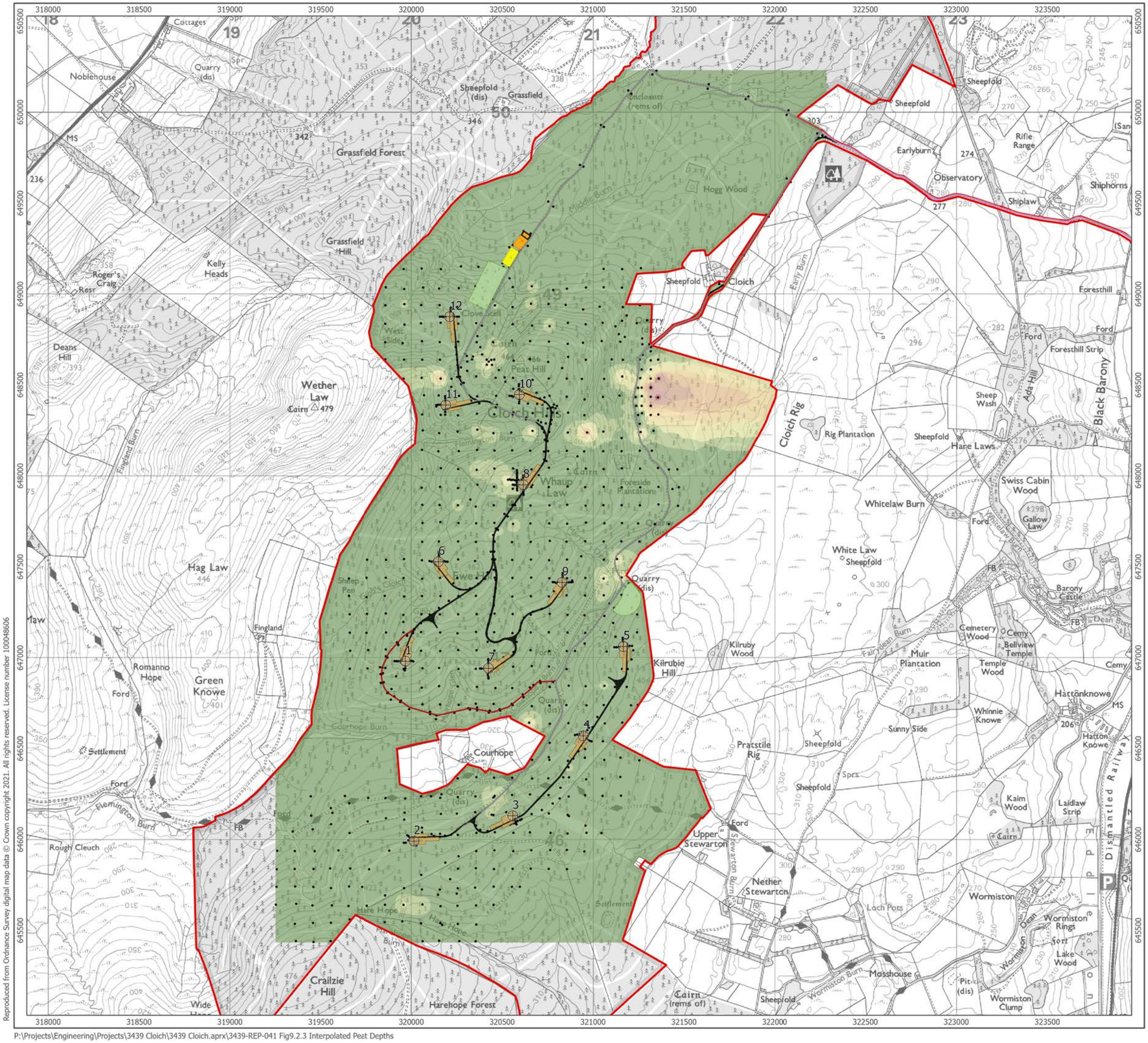
1:20,000 Scale @ A3

0 0.5 1 Km NORTH

Produced By: BM	Ref: 3439-REP-040
Checked By: DB	Date: 10/06/2021

Recorded Peat Depths
Figure 9.2.2

Cloich Forest Wind Farm outline Peat Management Plan


Site Boundary
Proposed Turbine Location
Peat Probe Locations
Proposed Site Infrastructure
Borrow Pit
Construction Compound
Crane Hardstanding
Substation Compound
BESS Location
New Access Track
New Track Used by Construction Traffic Only
Existing Track (Subject to Localised Upgrades)
Public Road (Subject to Widening Works)
Interpolated Peat Depths (m)
0.00 - 0.50
0.51 - 1.00
1.01 - 1.50
1.51 - 2.00
2.01 - 2.50
2.51 - 3.00
3.01 - 3.50
3.51 - 4.00
4.01 - 4.50
4.51 - 5.00
1:20,000 Scale @ A3
0
0.5
1 Km
NORTH
Produced By: BM
Ref: 3439-REP-041
Checked By: DB
Date: 10/06/2021
Interpolated Peat Depths
Figure 9.2.3
Cloich Forest Wind Farm
outline Peat Management Plan
Reproduced from Ordnance Survey digital map data © Crown copyright 2021. All rights reserved. License number 100048606
P:\Projects\Engineering\Projects\3439 Cloich\3439 Cloich.aprx\3439-REP-041 Fig9.2.3 Interpolated Peat Depths

APPENDIX B – CALCULATIONS

3439 -Cloich - Peat Excavation and Re-Use Calculations

Infrastructure	Total Area of Infrastructure inc EW.	Peat Cut Volume	Total Acrotelm Excavation Est.	Total Catotelm Excavation Est.	Areas of Reinstament	Total Peat Re-use Est.	Total Acrotelm Re-use Est.	Total Catotelm Re-use Est.
Turbines								
T1	12580	1773	1773	0	7122	2136.6	2136.6	0
T2	10855	1768	1768	0	5397	1619.1	1619.1	0
T3	9052	2441	2441	0	3594	1078.2	1078.2	0
T4	10534	1755	1755	0	5076	1522.8	1522.8	0
T5	10226	2671	2671	0	4768	1430.4	1430.4	0
T6	13440	1828	1828	0	7982	2394.6	2394.6	0
T7	8477	822	822	0	3019	905.7	905.7	0
T8	9919	3200	3200	0	4461	1338.3	1338.3	0
T9	12484	1535	1535	0	7026	2107.8	2107.8	0
T10	10054	1694	1694	0	4596	1378.8	1378.8	0
T11	13976	1792	1792	0	8518	2555.4	2555.4	0
T12	9892	2199	2199	0	4434	1330.2	1330.2	0
SUB-TOTAL	**131489**	**23478**	**23478**	**0**	**65993**	**19797.9**	**19797.9**	**0**
Tracks								
New Tracks/PPs	89022	14028	14028	0	63022	18906.6	18906.6	0
Turning Heads	9799	2981	2981	0	6599	1979.7	1979.7	0
Tracks - Upgrade	24600	1230	1230	0	4100	1025	1025	0
SUB-TOTAL	**123421**	**18239**	**18239**	**0**	**73721**	**21911**	**21911**	**0**
Construction Compound								
Construction Compound	5674	453	453	0	5674	1418.5	1418.5	0
SUB-TOTAL	**5674**	**453**	**453**	**0**	**5674**	**1418.5**	**1418.5**	**0**
Substation								
Substation Compound	5249	889	889	0	249	74.7	74.7	0
SUB-TOTAL	**5249**	**889**	**889**	**0**	**249**	**74.7**	**74.7**	**0**
Borrow Pits								
Borrow Pit 1	18610	2876	2876	**0**	18610	5583	5583	0
Borrow Pit 2	14399	2358	2358	**0**	14399	4319.7	4319.7	0
SUB-TOTAL	**33009**	**5234**	**5234**	**0**	**33009**	**9902.7**	**9902.7**	**0**
TOTAL Excavation /Re-use Volume		**48293**	**48293**	**0**	**178646**	**53105**	**53105**	**0**
. +10% contingency for Bullking		**4829**	**4829**	**0**				
TOTAL Habitat Management - Peat Restoration and Ditch Blocking						**0**	**0**	**0**
Deduction For floating Tracks						0	0	0
SUB-TOTAL After Deduction						**0**	**0**	**0**
TOTAL PEAT EXCAVATION and REUSE		**53122**	**53122**	**0**		**53105**	**53105**	**0**

ARCUS

CLOICH FOREST WIND FARM

VOLUME 3: TECHNICAL APPENDICES

TECHNICAL APPENDIX A10.1: OUTLINE WATER CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

JUNE 2021

Prepared By:

Arcus Consultancy Services

7th Floor
144 West George Street
Glasgow
G2 2HG

T +44 (0)141 221 9997 l **E** info@arcusconsulting.co.uk
w www.arcusconsulting.co.uk

Registered in England & Wales No. 5644976

TABLE OF CONTENTS

1 INTRODUCTION

This outline Water and Construction Environmental Management Plan (WCEMP) forms as a Technical Appendix to the Environmental Impact Assessment Report (EIA Report) Chapter 10: Hydrology and Hydrogeology for Cloich Forest Wind Farm ('the Development').

1.1 Guidance and Legislation

The following legislation and guidance documents have been used to inform this outline WCEMP:

- The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR)[1];
- The Water Quality (Scotland) Regulations 2010[2];
- Good practice during wind farm construction[3];
- Groundwater Protection Policy for Scotland Version 3 (2009)[4];
- SEPA Planning guidance on on-shore windfarm developments (LUPS-GU4)[5];
- The Construction Industry Research and Information Association (CIRIA) (2015), Environmental Good Practice on Site (C741)[6]; and
- Guidance for Pollution Prevention (GPP / PPG) 1: Understanding your environmental responsibilities[7];
- Planning Advice Note (PAN) 61 – Planning and Sustainable Urban Drainage Systems[8];
- Forestry Commission (2011). Forests and Water. UK Forestry Standard Guidelines[9];
- Forestry Commission (2017). The UK Forestry Standard[10]; and
- Forestry Commission (2019). Managing forest operations to protect the water environment[11].

Relevant guidance and best practice document are subsequently provided in the relevant sections of this Technical Appendix.

[1] UK Government (2011) The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) [Online] Available at: http://www.legislation.gov.uk/ssi/2011/209/contents/made (Accessed 21/04/2021)
[2] The Scottish Government (2010) *The Water Quality (Scotland) Regulations 2010* [Online] Available at: http://www.legislation.gov.uk/ssi/2010/95/contents/made (Accessed: 21/04/2021)
[3] Scottish Renewables, Scottish Natural Heritage, SEPA, Forestry Commission Scotland, Historic Environment Scotland, Marine Science Scotland (2019) *Good Practice during Wind Farm Construction 4th Edition* [Online] Available at: https://www.nature.scot/guidance-good-practice-during-wind-farm-construction (Accessed: 21/04/2021)
[4] SEPA (2009) *Groundwater protection policy for Scotland Version 3* [Online] Available at: https://www.sepa.org.uk/media/34371/groundwater-protection-policy-for-scotland-v3-november-2009.pdf (Accessed: 21/04/2021)
[5] SEPA (2017) *Land Use Planning System SEPA Guidance Note 4: Planning guidance on on-shore windfarm developments* [Online] Available at: https://www.sepa.org.uk/media/136117/planning-guidance-on-on-shore-windfarms-developments.pdf (Accessed: 21/04/2021)
[6] CIRIA (2015) *Environmental good practice on site guide* (fourth edition) (C741)
[7] NetRegs (2013) PPG1: Understanding your environmental responsibilities – good environmental practices [Online] Available at: https://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/ (Accessed: 21/04/2021)
[8] Scottish Government (2001) Planning Advice Note 61: Planning and Sustainable Urban Drainage Systems [Online] Available at: https://www2.gov.scot/Publications/2001/07/pan61 (Accessed: 21/04/2021)
[9] Forestry Commission (2011). Forests and Water. UK Forestry Standard Guidelines. [Online] Available at: https://www.forestresearch.gov.uk/documents/7668/The_UK_Forestry_Standard.pdf [Accessed 24/03/2021].
[10] Forestry Commission (2017). The UK Forestry Standard. [Online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/687147/The_UK_Forestry_Standard.pdf [Accessed 24/03/2021].
[11] Forestry Commission (2019). Managing forest operations to protect the water environment. [Online] Available at: https://www.forestresearch.gov.uk/documents/7113/FCPG025_u9Dw0bV.pdf [Accessed 24/03/2021].

2 DEVELOPMENT REQUIREMENTS

The WCEMP takes into account specific activities during the construction, operational and decommissioning phases of the Development, including:

- Access roads;
- Borrow pit workings;
- Watercourse crossings (new and upgrades);
- Felling;
- Turbine foundations; and
- Hardstanding areas and buildings (including crane hardstanding, construction compounds and associated infrastructure).

2.1 Potential Sources of Pollution

The identified potential sources of pollution as a result of the construction, operational and decommissioning phases of the Development, based on the findings of Chapter 10: Hydrology and Hydrogeology of the EIA Report, are as follows:

- Direct disturbance of banks and bed of river and lochs;
- De-watering of excavations;
- Run-off from exposed ground and material stockpiles;
- Run-off from roads and haul routes and river crossings;
- Plant washings / washing areas;
- Fuel and chemical storage/ refuelling areas; and
- Leaking / vandalised equipment.

2.2 Schedule of Mitigation

Measures are incorporated into the assessment of significance of effects for hydrology and hydrogeology. A summary of the measures referenced within the EIA Report, including the potential receptors and further detail on these mitigation measures outlined within this WCEMP, are outlined in Table 2.1.

Table 2.1: Schedule of Mitigation

Section of ES	Receptor	Potential Effect	Mitigation specified within EIA Report
Construction Phase			
Section 10.6.1.2	Surface hydrology (watercourses) Hydrogeology (groundwater and near-surface water)	Chemical pollution as a result of chemical handling and storage and onsite vehicle fuelling and maintenance. Pollution from concrete use and washout.	Refer to Section 3.3. Chemical pollution prevention and appropriate measures for chemical storage outlined in Section 3.3.1. Details of mitigation of spillage incidents and best practice in the event of a spill outlined in Section 3.3.2. Mitigation relating to concrete use on site is provided in Section 3.3.3, and washing of vehicles on site, including concrete washout areas, detailed in Section 3.3.4. Concrete use in watercourse crossing design and construction is outlined in Section 3.4.2. It is required that a surface water quality monitoring programme is conducted as good practice, in accordance with Section 3.7.

Section of ES	Receptor	Potential Effect	Mitigation specified within EIA Report
Section 10.5.1.2	Surface hydrology (watercourses)	Erosion and sedimentation as a result of excavation works and track construction and upgrades.	Refer to Section 3.2. Any works to be conducted within or near watercourse refer to Section 3.2.4 including appropriate measures for construction of watercourse crossings and culverts to prevent erosion of stream beds.
	Hydrogeology (groundwater and near-surface water)		
Section 10.5.1.3	Surface hydrology (watercourses)	Impediments to surface water flows as a result of installation of watercourse crossings.	Watercourse crossing construction and culverting best practice guidance outlined in Section 3.4.2 and 3.4.3. Any works to be conducted within or near watercourse refer to Section 3.4. It is required that a surface water quality monitoring programme is conducted as good practice, in accordance with Section 3.7.
	Hydrogeology (groundwater and near-surface water)	Diversion of near-surface flow as a result of track construction and the installation of turbine foundations / hardstanding.	
Section 10.5.1.4	Surface hydrology (watercourses)	Increase in volume of run-off and potential flood risk as a result of increased hardstanding.	Site drainage measures and Sustainable Drainage Systems (SuDS) to prevent an increase in flood risk and to maintain natural site drainage as much as possible, are detailed in Section 3.1
Section 10.5.1.5	Groundwater Dependent Terrestrial Ecosystems (GWDTE)	Pollution as a result of track construction and uncontained spills from chemical handling / storage. Drying out or changes to groundwater interflow patterns as a result of construction.	Specific measures relating to the protection of GWDTE are provided in Section 3.5. Measures relating to chemical pollution, sedimentation and site drainage should all be considered as part of GWDTE protection.

Section of ES	Receptor	Potential Effect	Mitigation specified within EIA Report
Section 10.5.1.6	Private Water Supplies (PWS)	Pollution as a result of track upgrades and uncontained spills from vehicles, and chemical handing/ storage. Drying out or changes to quantity / groundwater flow as a result of upgrades to access track.	Specific measures relating to the protection of water supplies and groundwater abstractions are provided in Section 3.6. Monitoring of PWS water quality would be incorporated into a water quality monitoring programme as outlined in Section 3.7. Further information on the location of PWS and potential effects are outlined in the ES chapter Section 10.4.7.2 and Technical Appendix 10.2. Earlier measures relating to chemical pollution, sedimentation and site drainage should all be considered as part of PWS protection.

2.3 Regulation and Authorisation

All construction and engineering activities within or hydrologically connected to the water environment require authorisation under Controlled Activities Regulations (CAR). There are three levels of authorisation and the level required is site-specific and based on the level of risk of the activity to the water environment. The levels of authorisation are:

1. General Binding Rules (GBR): low risk activities. All development activities must comply with these rules. No application to SEPA is required.
2. Registration: medium risk activities. Application to SEPA is required to register an activity.
3. Licence: high risk activity. Simple or complex licences exist depending on the activity. Application to SEPA is required to obtain a licence for the activity.

Further guidance on the requirement for authorisation are outlined in the following documents:

- CAR – A Practical Guide (Controlled Activities Regulations)[12];
- Introduction to Controlled Activities Regulation[13]; and
- SEPA LUPS-GU-15: Planning guidance in relation to SEPA regulated sites and processes[14].

The requirements for authorisation of specific activities are outlined in the relevant sections of this document.

[12] SEPA (2019) *The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) A Practical Guide* [Online] Available at: https://www.sepa.org.uk/media/34761/car_a_practical_guide.pdf (Accessed: 22/03/2021)
[13] SEPA (n.d.) *Introduction to the Controlled Activates Regulations* [Online] Available at: https://www.sepa.org.uk/media/34800/introduction-to-the-controlled-activities-regulations.pdf (Accessed: 22/03/2021)
[14] SEPA (2013) *Land Use Planning System SEPA Guidance Note 15: Planning Guidance in Relation to SEPA Regulated Sites and Processes (LUPS-GU15)* [Online] Available at: https://www.sepa.org.uk/media/136091/planning-guidance-in-relation-to-sepa-regulated-sites-and-processes.pdf (Accessed: 22/03/2021)

2.4 Environmental Clerk of Works (ECoW)

An Environmental (or Ecological) Clerk of Works (ECoW) will be appointed for the construction period (commencement of development to final commissioning or end of construction period) and during decommissioning. The ECoW will hold an advisory role.

In relation to the water environment, the scope of the ECoW role will include:

- Monitoring compliance with the mitigation outlined in the EIA Report, WCEMP and other relevant documentation relating to the deemed planning permission conditions and Construction Site Licence (CSL), such as the Pollution Prevention Plan (PPP);
- Routine monitoring of water pollution prevention measures, such as silt management measures, and inspection following storm events; and
- Routine visual inspection and observation of watercourses for the presence of silt, discolouration and hydrocarbons.

3 OUTLINE MITIGATION FOR THE WATER ENVIRONMENT

3.1 Site Drainage

Drainage from the site will include elements of Sustainable Drainage Systems (SuDS) design, where appropriate. SuDS is a method of controlling surface water run-off in a manner that replicates natural drainage patterns and has a number of benefits, including:

- SuDS will attenuate run-off, thus reducing peak flow and any flooding issues that might arise downstream;
- SuDS will treat run-off to a certain degree, which can reduce sediment and pollutant volumes in run-off before discharging back into natural drainage network; and
- SuDS measures, such as lagoons or retention ponds, correctly implemented will produce suitable environments for wildlife.

The following best practice guidance should be used:

- CIRIA C648 – Control of water pollution from linear construction projects[15];
- CIRIA C352 – Control of water pollution from construction sites [16];
- CIRIA SuDS Manual (C753)[17];
- CIRIA Guidance on the construction of SuDS (C768)[18]; and
- SEPA WAT-RM-08 Regulatory Method: Sustainable Urban Drainage Systems (SuDS)[19];
- SEPA WAT-SG-75 Sector-specific Guidance – Construction Sites[20]; and
- Water Assessment and Drainage Guide (WADAG)[21];
- GPP5: Works and maintenance in or near water[22]; and
- GPP4: Treatment and disposal of wastewater where there is no connection to the public foul sewer[23].

3.1.1 Authorisation

SuDS are a legal requirement for all developments draining to the water environment (other than a single dwelling or discharges to coastal water). All developments must comply with all conditions of the CAR Regulations General Binding Rules (GBR) including the requirement for SuDS.

Developments require authorisation for surface water run-off discharges under CAR regulations by a SEPA licence (Construction Site Licence (CSL)) for construction sites which:

- Exceed 4 ha area;
- Contain a road or track length in excess of 5 km; and / or
- Include any area with a slope gradient of more than 250 m over 1 ha or 500 m length.

[15] CIRIA (2006) *C648: Control of water pollution from linear construction projects: Technical Guidance* [Online] Available at: https://www.ciria.org/Search?SearchTerms=c648 (Accessed: 22/03/2021)
[16] CIRIA (2001) *C532: Control of water pollution from construction sites: Guidance for consultants and contractors* [Online] Available at: https://www.ciria.org/ProductExcerpts/C532.aspx (Accessed: 22/03/2021))
[17] CIRIA (2015) *C753: The SuDS Manual.*
[18] CIRIA (2017) *C768: Guidance on the construction of SuDS.*
[19] SEPA (2019) *WAT-RM-08: Regulatory Method Sustainable Drainage Systems (SUDS or SUD Systems) v6.4* [Online] Available at: https://www.sepa.org.uk/regulations/water/pollution-control/pollution-control-guidance/ (Accessed: 22/03/2021)
[20] SEPA (2018) *WAT-SG-75 Supporting Guidance Sector Specific Guidance: Construction Sites* [Online] Available at: https://www.sepa.org.uk/regulations/water/pollution-control/pollution-control-guidance/ (Accessed: 22/03/2021)
[21] SUDSWP (n.d.) *Water Assessment and Drainage Assessment Guide* [Online] Available at: https://www.sepa.org.uk/regulations/water/pollution-control/pollution-control-guidance/ (Accessed: 22/03/2021)
[22] NetRegs (2017) *GPP5: Works and maintenance in or near water* [Online] Available at: https://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/ (Accessed: 22/03/2021)
[23] NetRegs (2017) *GPP4: Treatment and disposal of wastewater where there is no connection to the public foul sewer* [Online] Available at: https://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/ (Accessed: 22/03/2021)

If the development is below the threshold criteria, a licence is not required and the development can be authorised under GBR10 and no direct consultation with SEPA is required.

SEPA WAT-RM-08 Regulatory Method: SuDS provides further details on the licence requirements, which are likely to conclude that a CSL is required for the Development.

3.1.2 Pre-Earthworks Drainage

Pre-earthworks drainage relates to the required drainage measures to be installed prior to earthwork activities such as access track construction and borrow pit workings.

Best practice pre-earthworks drainage measures include:

- Cut-off/ diversion ditches;
- Temporary interception bunds;
- Swales; and
- Retention ponds.

Purpose/ Aim

The aim of pre-earthworks drainage is to:

- Divert 'clean' surface water run-off and stormwater away from exposed soils of earthworks preventing further erosion; and
- Prevent 'clean' water from mixing with potentially silt-laden water generated from construction works.

Installation

Pre-earthwork drainage should be installed immediately prior to earthworks and construction works commencing.

Temporary interception bunds and cut-off drainage ditches ('clean water drains') will be constructed on the 'high-side' boundary of the earthwork operations to prevent surface water run-off entering excavations. Run-off collected in the drainage ditches will be diverted along a channel which follows the natural gradient of the ground, avoiding steep gradients.

The profile of the ditch can vary from a 'v' shape to a 'u' shape but should have a constant uniform depth. The profile of the ditch will depend on the soil type and stability.

The use of 'u'-shaped vegetated ditches is preferential, these are also known as swales. The dimensions and gradient of swales will be kept to a minimum to prevent rapid flow of water. Swales to collect runoff will be placed on the downslope of earthworks and stockpiles and will be designed to treat potentially silty runoff before discharging back into the drainage system. This may include constructing check dams within the channel and employing silt management measures. The use of retention ponds allows for additional storage capacity during heavier rainfall events.

Reinstatement

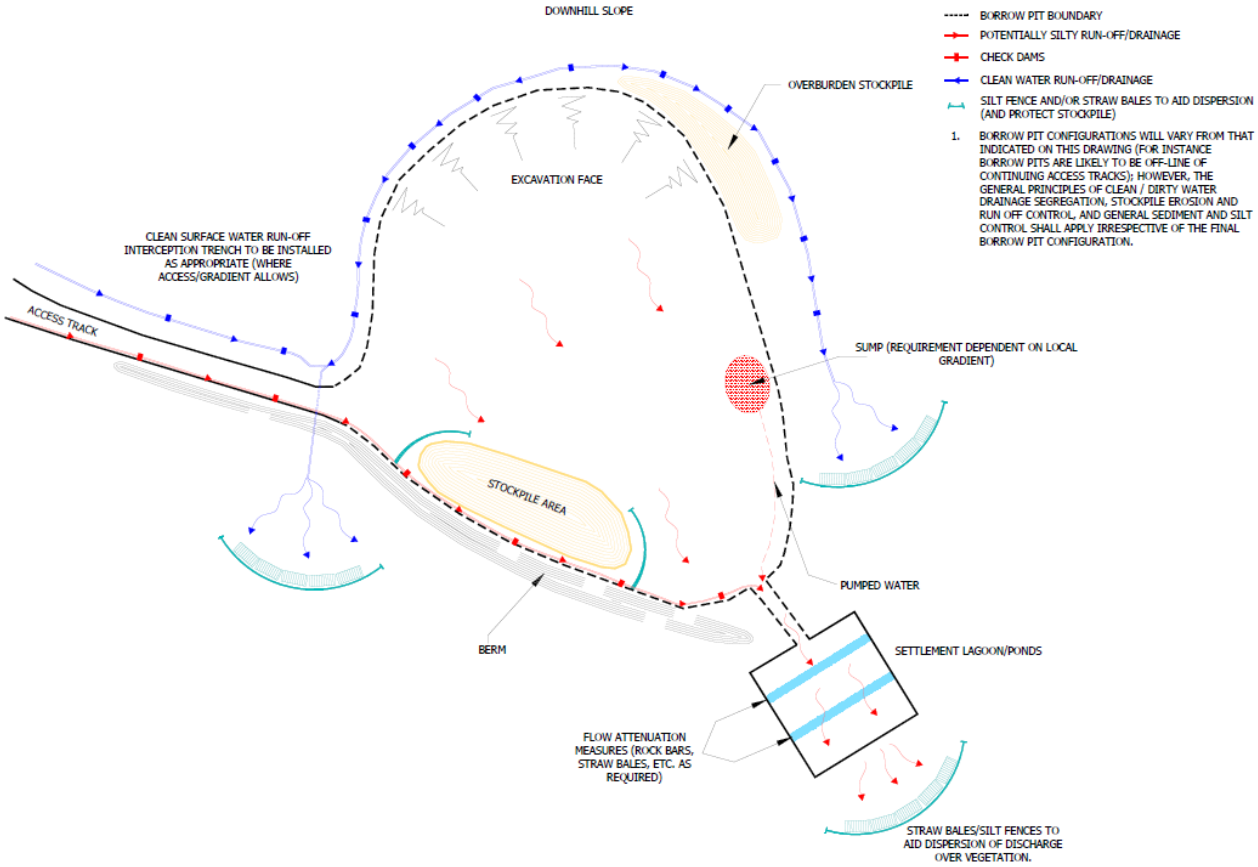
All pre-earthworks drainage channels should be re-instated unless required for long-term drainage on the site, following inspection by the ECoW prior to the operational phase. No exposed soils should remain, and turves should be emplaced to prevent erosion.

Where exposed soil is to be left for a long period before reinstatement or re-seeding, other measure to prevent erosion may be required:

- Geotextiles (biodegradable and non-biodegradable);
- Mulching/ binders/ hydro-seeding;
- Turf cut from other areas on site; and
- Surface roughening.

A schematic of the borrow pit drainage is shown in Plate 3.1.

Plate 3.1: Schematic of the Borrow Pit Drainage



3.1.3 Earthworks Drainage

Drainage for permanent or semi-permanent earthworks such as access tracks is required to control surface water run-off and discharge to appropriate outlets.

Best practice pre-earthworks drainage measures include:

- Drainage ditches;
- Sumps; and
- Culverts.

Purpose/ Aim

To manage surface water run-off from earthworks e.g. access tracks, and manage and allow for continuity of the natural drainage of surface water and groundwater from higher elevations to lower.

Pre-installation

Prior to access track and earthwork construction, site operatives will identify flush areas, depressions or zones which may concentrate water flow so that site drainage design will maintain hydrological connectivity. Site drainage design will be produced in advance of construction.

Installation

All earthworks will have a gravity drainage system and all water will drain to an adequately sized sump. If dewatering of borrow pits or excavations is necessary, waste water will be treated by designed settlement lagoons and retention ponds, further details are provided in Section 3.2.5.

Trackside drainage ditches are to be constructed parallel to the access tracks and follow the same gradient as the access tracks. To allow for continuity of surface and ground water flow from the high-side of the track to low-side, culverts are required to be built crossing the track at appropriate intervals, as shown in Plate 3.2 to peak river flow plus a climate change allowance of 33 % in the River Tweed catchment in accordance with SEPA climate change allowances for flood risk guidance[24]. Further details of culvert design are provided in Section 3.4.4.

Plate 3:2: Trackside drainage ditch and cross-drainage culvert

Permanent check dams can also be installed to slow the flow of water in ditches with steeper gradients and straightened channels to prevent erosion of channels. Water within channels should be allowed to flow and should not be stagnant, and tracks should be free from standing water through inclusion of camber or cross-fall. Track surface cross-drains can be installed on tracks with long gradients and limited camber, and should be kept free of sediment.

Sustainable drainage systems such as swales with vegetated channels are preferential and will be designed to intercept, filtrate and convey run-off. Permanent swales and drainage ditches adjacent to access tracks will have outlets at specified intervals to reduce the volume of water collected in a single channel and, therefore, reduce the potential for erosion.

Settlement lagoons should be installed at drainage ditch outlets, prior to discharge to watercourse. They should be constructed to allow for adequate attenuation of water and settlement of sediments to peak river flow plus a climate change allowance of 33% in the

[24] SEPA (2019) *Land Use Planning System SEPA Guidance: Climate change allowances for flood risk assessment in land use planning* (LUPS-CC1). Available at: https://www.sepa.org.uk/media/426913/lups_cc1.pdf (Accessed: 22/03/2021)

River Tweed catchment in accordance with SEPA climate change allowances for flood risk guidance. Silt mats may be used at the outfalls of settlement lagoons and retention ponds to further aid the settlement of sediment from earthworks drainage. Further details on sediment management are provided in Section 3.2.

The use of retention ponds should be used to allow for additional storage capacity during heavier rainfall and storm events.

3.1.4 Management of Drainage from Surplus and Loose Materials

Careful consideration will be given to the location of topsoil and subsoil storage areas for all areas of the Development during construction. Storage areas will be either in a flat dry area away from watercourses, or be protected by the addition of cut off drains above the storage areas to minimise the ingress of water.

The use of peat and soil stockpiles will be minimised by earthworks planning. However, where stockpiles are used, silt fences and silt mats will be employed to minimise sediment levels in run-off.

All stockpiled material will be stored at least 50 m from watercourses in order to reduce the potential from sediment to be transferred into the wider surface water system and will be regularly inspected to ensure that erosion of the material is not taking place.

An example of a stockpile / overburden and the installation of drainage ditch to divert run-off from the stockpile material is shown in Plate 3:3.

Plate 3:3: Stockpile and drainage ditch (under construction)

In accordance with BS 3882:2015 'Specification for Topsoil and Requirements for Use', any long-term stockpiling of topsoil should not exceed 2.0 m in height with a maximum side slope of 1 in 2. In its dry non plastic state, topsoil can be stockpiled in a 'loose tipped' manner and tracked in a compactive method reducing water ingress. Wetter soils can be stored in windrows for drying and later stockpiled for re-use. The re-wetting of peat will be carried out, if there is a potential risk of the peat drying out. Mineral and peat soil stockpiles will not be allowed to dry out.

Loose materials such as crushed rock and stone will be prevented from entering watercourses through the employment of sediment pollution prevention measures in areas of loose material storage or generation, as outlined in Section 3.2.

3.1.5 Discharge of Water

Discharge of water from the site will depend on the water environment on site and the quality of the final discharge. This section considers the discharge of surface water drainage to the water environment and does not consider foul drainage from substation and temporary construction compound welfare facilities.

3.1.5.1 Discharge to Sewer

Discharge to foul sewer require permission from Scottish Water. Scottish Water's default position is that no new surface water connections to combined / foul sewer will be accepted.

Scottish Water prefer that surface water is re-used on site where practicable, drained into a SuDS, drained to ground through soakaway (which may require SEPA approval) or to an existing watercourse and notes that pumping of water to one of these outlets may be required.

Where it is not practicable to discharge to SUDS, ground or watercourse, surface water may be drained to a combined/ surface water sewer and requires enquiry and an application to Scottish Water.

Further details are provided in Scottish Water Surface Water Policy advice note and guidance[25] and GPP4.

3.1.5.2 Soakaway

Water contaminated with fine silt only can be discharged to vegetated surfaces and required permission from SEPA and landowner.

Irrigation techniques, which may include the use of perforated discharge hoses or similar, will be employed to rapidly distribute discharge across a vegetated slope. This will be carried out in consultation with the ECoW.

Details on typical infiltration rates of soil types are provided in GPP5.

3.1.5.3 Drain to watercourse or SUDS system

Treated water can be discharged to watercourse, loch or SuDS systems. The discharge water must be in line with the baseline water quality and flood risk capacity of the receiving water.

Methods of on-site sediment and chemical pollution prevention and water treatment are outlined in Section 3.2 and Section 3.3.

Authorisation from SEPA is required for discharge of water from the Development to the water environment, as detailed in Section 3.1.5.2.

3.1.5.4 Tanker off site

Water which cannot be treated on site and is not of a quality which can be released to water environment, will need to be tankered off site for appropriate treatment and disposal.

[25] Scottish Water (2018) Surface Water Policy: Standard advice note and process guidance [Online] Available at: https://www.scottishwater.co.uk/help-and-resources/document-hub/business-and-developers/connecting-to-our-network (Accessed: 22/07/2020)

3.1.6 Provision for Storm Events

The site features areas of medium to high risk areas of flooding, restricted to the areas immediately adjacent to the watercourses. In extreme storm events, there would be elevated levels of run-off from the hardstanding elements of the Development relative to greenfield flow rates, which has the potential to contribute to down-stream, off-site, flood risk.

In the baseline scenario, the water table is not at the ground surface, and hence some infiltration would be expected. Measures are proposed in this document that would limit run-off rates in Section 3.2.

Temporary storage volume for storm run-off from the turbine foundations and crane hardstanding areas would be provided via settlement lagoons, further details of which are provided in Section 3.2.5.

Along the access tracks, drainage channels on the down-slope would shed track run-off to adjacent rough ground approximately every 30 m, to attenuate flow and allow natural filtration to remove sediments. In areas within 50 m of a watercourse marked on an Ordnance Survey 1:50,000 scale map or where cross-slopes exceed 1 in 20, drainage channels will be bunded and outflow will be monitored daily in areas with on-going construction activity.

3.2 Sediment Pollution Prevention

Sediment pollution and release of excess sediments can result in detrimental effects to fish spawning habitats by covering the stream bed. Mitigation measures should minimise mobilisation and release of sediments to the water environment. Water polluted by sediments are not allowed to leave the site untreated and the final discharge from the site must have acceptable levels of sediment (in line with baseline levels).

Major construction works will be minimised during heavy precipitation events.

Sediment pollution prevention is to be employed in line with the following best practice guidance:

- SEPA WAT-SG-26: Good Practice Guide – Sediment Management[26];
- SEPA WAT-SG-78 Sediment Management Authorisation[27]; and
- CIRIA C648 – Control of water pollution from linear construction projects[28];
- CIRIA C352 – Control of water pollution from construction sites [29]; and
- GPP5: Works and maintenance in or near water[30].

Best practice methods of sediment management and pollution prevention, and required authorisation are outlined in the following sections.

[26] SEPA (2010) *WAT-SG-26: Engineering in the water environment: good practice guide – Sediment management* [Online] Available at: https://www.sepa.org.uk/regulations/water/pollution-control/pollution-control-guidance/ (Accessed: 22/03/2021)
[27] SEPA (2012) *Supporting Guidance (WAT-SG-78) Sediment Management Authorisation v1* [Online] Available at: https://www.sepa.org.uk/regulations/water/pollution-control/pollution-control-guidance/ (Accessed: 22/03/2021)
[28] CIRIA (2006) *C648: Control of water pollution from linear construction projects: Technical Guidance* [Online] Available at: https://www.ciria.org/Search?SearchTerms=c648 (Accessed: 22/03/2021)
[29] CIRIA (2001) *C532: Control of water pollution from construction sites: Guidance for consultants and contractors* [Online] Available at: https://www.ciria.org/ProductExcerpts/C532.aspx (Accessed: 22/03/2021)
[30] NetRegs (2017) *GPP5: Works and maintenance in or near water* [Online] Available at: https://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/ (Accessed: 21/04/2021)

3.2.1 Authorisation

Under CAR Regulations authorisation is required for all sediment management works within inland surface water and surface water dependent wetlands.

The levels of authorisation are GBR, Registration or Licence and the required level is based on the environmental risk at the Site. More details are provided in SEPA guidance documents WAT-SG-78 Sediment Management Authorisation and WAT-RM-02 Regulation of Licence level Engineering Activities[31].

3.2.2 Silt Traps and Silt Matting

Purpose

Silt traps may be utilised to trap, temporarily store and filter sediment-laden run-off from excavation works at the Development, including turbine bases and access roads. This is to prevent discharge of silt-laden waters to watercourses or ground.

Installation

Silt traps and matting have a limited effective flow capacity and must be installed with the peak river flow plus a climate change allowance of an increase capacity of 33 % in the River Tweed catchment in consideration.

Silt traps and matting are to be installed at the following locations:

- Within drainage ditches but will be sited to avoid slopes with a gradient greater than 1 in 20;
- At the inlet (sump) or outlet side of culverts; and
- At the outfall of settlement lagoons to filter sediment during times of heavy rainfall as shown in Plate 3:4.

Plate 3:4: Silt matting (combined with silt fencing)

Maintenance

The silt traps and silt matting will be monitored by the ECoW and should be cleared regularly and replaced when necessary.

[31] SEPA (2019) *WAT-RM-02 Regulation of Licence Level Engineering Activities* [Online] Available at: https://www.sepa.org.uk/regulations/water/engineering/engineering-guidance/ (Accessed: 21/04/2021)

3.2.3 Silt Fencing

Purpose

Silt fencing is a widely used form of silt trapping and provides a linear barrier for installation upstream of watercourses and lochs. Silt fences are cost-effective and practical methods of attenuating storm water run-off and intercepting sediment and silt.

Installation

Silt fences are a semi-permeable geotextile fabric arranged in the form of a fence (attached to timber posts) as shown in Plate 3:5.

Silt fences are to be used as perimeter controls on the site at the downslope end of earthworks or disturbed soils, and at watercourse crossings as shown in Plate 3:. They should be used in conjunction with other sediment and water treatment solutions where required.

To comply with best practice, they should be installed as follows:

- Installed perpendicular to the gradient of the slope;
- Construct a trench on the up-gradient side;
- Install stakes on the down-gradient side; and
- Position with a curve to the end of the fence in the up-gradient direction to help capture surface run-off as shown in Plate 3:5.

Silt fences should not be installed in the following:

- Within drainage ditches or channels; and / or
- Running parallel to the direction of slope.

Plate 3:5: Typical silt fencing[32]

[32] Siltbuster

Plate 3:6: Silt fencing at watercourse crossing

Maintenance

Silt fencing will be monitored by the ECoW and should be cleared regularly of sediment and silt build-up, and after heavy rainfall and storm events. Silt fencing should be replaced when necessary.

3.2.4 Check Dams

Purpose

Check dams will facilitate the settlement of suspended solids by slowing the flow of water within the drainage ditches. An example of a typical check dam is shown in Plate 3:7.

Installation

Check dams will be installed within drainage ditches at regular intervals, where appropriate. Appropriately sized stone pitching will be used within the dam in order to provide a rough surface for water within the drainage ditch to pass over.

Plate 3:7: Check dam example

3.2.5 Settlement Lagoons

Purpose

Retention of contaminated water to allow for the settlement of silt and sediments to an acceptable level (in line with baseline level) prior to discharge to the water environment.

Installation

Settlement lagoons will be implemented where appropriate across the Site and at all turbine excavations. They take the form of large trenches dug into the ground and are often bunded.

Settlement lagoons should be installed so as to retain water long enough for silt to settle out. The length of time required will depend on the type of silt with finer silts and clays taking longer to settle.

Further measures may include the use of flocculent to further facilitate the settlement of suspended solids. The appropriateness of flocculent use must be discussed with SEPA prior to its introduction into settlement lagoons. Flocculants can be pollutants if the incorrect dosage is used. Further guidance on the required dimension of settlement lagoon are provided in GPP5.

To comply with best practice, they should be installed as follows:

- Install energy dissipation methods (e.g. rip-rap) at the inlet to minimise flow;
- Install inlet pipe work vertically to dissipate energy of flow in;
- Install a lined inlet chamber and outlet weir with materials such as geotextiles;
- Install a long outlet weir; and
- Install two or three lagoons in a series to increase silt retention and storage as shown in Plate 3:1.

Plate 3:1: Settlement lagoon series

Maintenance and Operation

Settlement lagoons should be inspected regularly by the ECoW to ascertain the functionality of the system. To comply with best practice, the following maintenance measures are to be conducted:

- All settlement lagoons will be actively managed to control water levels and ensure that any run-off is contained, especially during times of rainfall;
- A constant pumped inlet rate should be maintained;
- Inlet chamber should be emptied of silt regularly; and
- Discharge quality to be monitored frequently.

Settlement lagoon outflow discharge may be pumped, when required, for maintenance purposes. A 'Siltbuster' is a method of pumping excess silt-laden water and treated prior to discharge, as shown in Plate 3:2.

Plate 3:2: Settlement lagoon and Siltbuster pumping out water for treatment

Any pumping activities will be supervised and authorised by the Construction Contractor's Project Manager.

Methods for discharge of outflow water from a settlement lagoon are detailed in the following section.

3.3 Chemical Pollution Prevention

Pollution from fuels and other chemicals can cause a variety of detrimental effects to freshwater ecology and can lead to loss of aquatic flora and fauna. Cement pollution and concrete wash-out can lead to increases in alkalinity and raise the pH of watercourses, which can be toxic to aquatic flora and fauna.

Chemical pollution prevention is to be employed on site in line with best practice guidance, including the following:

- SEPA Groundwater protection policy for Scotland (Section F);
- SEPA WAT-SG-31: Special Requirements for Civil Engineering Contracts for the Prevention of Pollution[33];
- SEPA WAT-SG-32: SEPA Guidance on the Special Requirements for Civil Engineering Contracts[34];
- CIRIA Control of Water Pollution form Construction Sites (C532)[35];
- GPP5: Works and maintenance in or near water[36];

[33] SEPA (2006) *WAT-SG-31: Prevention of pollution from Civil Engineering Contracts: Special Requirements Version 2* [Online] Available at: https://www.sepa.org.uk/regulations/water/pollution-control/pollution-control-guidance/ (Accessed: 22/03/2021).

[34] SEPA (2006) *WAT-SG-32: Prevention of pollution from Civil Engineering Contracts: Guidelines for the Special Requirements Version 2* [Online] Available at: https://www.sepa.org.uk/regulations/water/pollution-control/pollution-control-guidance/ (Accessed:22/03/2021)

[35] CIRIA (2001) *C532: Control of water pollution from construction sites – Guidance for consultants and contractors*

[36] NetRegs (2017) *GPP5: Works and maintenance in or near water* [Online] Available at: https://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/ (Accessed: 22/03/2021)

- GPP8: Safe storage and disposal of used oils[37];
- GPP13: Vehicle washing and cleaning[38];
- PPG18: Managing fire water and major spillages[39];
- GPP21: Pollution incident response planning[40];
- GPP22: Dealing with spills[41]; and
- GPP26: Safe storage – drums and intermediate bulk containers[42].

To reduce the potential for a chemical pollution incident, areas of high-risk activities are to be located at least 10 m away from watercourses and drainage paths. Areas of high risk include:

- Fuel and chemical storage;
- Refuelling areas;
- Material stockpiles;
- Vehicle and equipment washing areas; and
- Site compounds / parking areas.

3.3.1 Storage of Chemicals and Oil

Potentially contaminating chemicals stored on site will be kept within a secure bunded area to prevent any accidental spills from affecting hydrological resources. The bunded area will be within the construction compound and will be underlain by an impermeable ground membrane layer to reduce the potential pathways for contaminants to enter watercourses and groundwater.

Oil storage areas will be covered in order to prevent rainwater collecting within the bunded area.

The chemicals storage area would be kept secure to prevent theft of vandalism. A safe system for accessing the storage area would be implemented by the Construction Contractor.

The following measures should be employed under best practice guidance for storage of chemicals and oils:

- Storage tanks (above or below ground) should have sufficient strength and structural integrity to hold without leak or burst and bunded in accordance with SEPA guidance, and double-skinned tanks should be used for list l substances;
- Storage containers should have a minimum design life of 20 years; and
- All storage containers are closed and locked when not in use.

Chemical storage areas are to be removed from Site as part of decommissioning, any remnant in-situ storage facilities must be appropriately maintained and monitored for degradation and release of oils or chemicals.

[37] NetRegs (2017) *GPP8: Safe storage and disposal of used oils* [Online] Available at: https://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/ (Accessed: 21/04/2021)
[38] NetRegs (2017) *GPP13: Vehicle washing and cleaning* [Online] Available at: https://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/ (Accessed: 21/04/2021)
[39] NetRegs (2000) *PPG18: Managing water and major spillages* [Online] Available at: https://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/ (Accessed: 21/04/2021)
[40] NetRegs (2017) *GPP21: Pollution Incident Response Planning* [Online] Available at: https://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/ (Accessed: 21/04/2021)
[41] NetRegs (2017) *GPP22: Dealing with spills* [Online] Available at: https://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/ (Accessed: 21/04/2021)
[42] NetRegs (2017) *GPP26: Safe Storage – drums and immediate bulk containers* [Online] Available at: https://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/ (Accessed: 21/04/2021)

3.3.2 Spillage of Chemicals and Oil

The construction compound will have a bunded area and this area will be underlain by an impermeable ground membrane layer. The bund will have a capacity of 110 % of the stored liquid containers (including fresh concrete). This will reduce the potential for accidental spillages to contaminate surface water or groundwater.

Best practice guidance on the prevention of spillages of chemical outlines the following measures:

- Areas where transfer and handling of chemicals is to occur should have impermeable surface;
- Drainage systems onsite should be designed to enable the containment of spillages and appropriate disposal and treatment; and
- Emergency procedures are implemented for a spillage incident and leak detection measures (if appropriate);
- Regular maintenance and inspection of chemical storage facilities to be conducted (may be carried out by onsite ECoW); and
- Provision and training in the use of spill kits, as outlined below.

An appropriately sized spill kit(s) will be provided, maintained and located at strategic points across the site, as shown in Plate 3:3. This will contain materials, such as absorbent granules and pads, absorbent booms and collection bags. These are designed to halt the spread of spillages and will deployed, as necessary, should a spillage occur elsewhere within the construction compound.

Plate 3:3: Spill kit provision on site

Speed limits for vehicles transporting concrete will be set at a maximum of 15 miles per hour (mph) and will be monitored. Maximum vehicle load capacities will not be exceeded. Although tracks will be maintained in good condition, vehicle loads will be reduced when a rougher surface is identified prior to track maintenance.

All maintenance and operation of machinery, and use of chemicals and oils on site, will be conducted on suitable absorbent spill pads to minimise the potential for groundwater and

surface water pollution. All machinery will be equipped with drip pans to contain minor fuel spillage or equipment leakages.

Appointed refuelling personnel will be trained in the correct methods of refuelling on site to ensure that pollution incidents are prevented and a quick response plan is implemented, should a spill occur, to minimise the impact of spills. Toolbox talks will also be carried out by the Site Manager and/or ECoW in line with PPGs to provide training on pollution prevention on site.

Regular vehicle and machinery maintenance will be conducted by the contractor to ensure that there is minimal potential for fuel or oil leaks / spillages to occur.

Plate 3:4 and Plate 3:5: Drip trays and bunds to prevent chemical spillages show examples of drip trays and bunds.

Plate 3:4 and Plate 3:5: Drip trays and bunds to prevent chemical spillages

3.3.3 Concrete, Cement and Grout

Concrete, cement and grouts which are batched and transported on site will be subject to the same requirements as outlined in Section 3.3.1.

To comply with best practice, concrete, cement and grout mixing and washing areas should:

- Be sited in an impermeable hardstanding or geotextile within a designated area;
- Be sited at least 10 m from any watercourse or surface water drain, rock outcrop or sinkhole;
- Install settlement and re-circulation systems for water re-use in the batching process to minimise water use, treatment requirements and risk of pollution;
- Designated and contained washing areas for batching plant and vehicles (further details of vehicle washing provided in Section 3.3.4); and
- Collect contaminated wash waters which cannot be reused and discharge to foul sewer or tanker off-site (further details of discharge of water is provided in Section 3.1.5). Contaminated water should never be released to the water environment.

To prevent pollution, it is important that all concrete pours are planned and that specific procedures are adopted where there may be a risk of surface water or groundwater contamination, in accordance with CIRIA C532. These procedures will include:

- Ensuring that all excavations are sufficiently dewatered before concrete pours begin and that dewatering continues while the concrete cures. However, construction good practice will be followed to ensure that fresh concrete is isolated from the dewatering system;
- Using blinding concrete layer to ensure a quick curing process;
- Ensuring that covers are available for freshly placed concrete to avoid the surface of the concrete washing away during heavy precipitation.

- Using an impermeable geotextile wrapping layer around the foundation - i.e. line the shuttering with the geotextile layer, therefore limiting the contact between acidic groundwater / near-surface water and the foundation;
- Treating the outer concrete with a protective layer; and
- Choosing the right concrete composition to make it as impermeable as possible (using limestone as the aggregate makes the concrete more resistant to acids e.g. Portland cement).

Typical foundation shuttering is shown in Plate 3:6.

Plate 3:6: Examples of shuttering for concrete foundation (wind turbine base)

3.3.4 Vehicle Washing

There will be a wash-out facility within the construction area consisting of a sump overlain with an impermeable geosynthetic membrane. The geosynthetic membrane will filter out the concrete fines leaving clean water to pass through to the sump. The sump water will be pumped to a licenced carrier and taken off-site for approved disposal.

No washing of concrete-associated vehicles will be undertaken outside the wash out facilities. These areas will be signposted, with all site contractors informed of the locations.

The frequency of concrete plant washout may also be reduced through the use of retarders.

Plate 3:7 displays a typical concrete wash-out facility.

Plate 3:7: Concrete wash-out facility

In the event that plant and wheel washing is required, dry wheel wash facilities and road sweepers will be provided to prevent (as far as is practicable) mud and debris being carried from within the site onto the public road.

Signage will be put in place to direct all plant vehicles to use wheel wash facilities. The track section between the wash facility and the public road will be surfaced with tarmac or clean hardcore and the area surrounding the facilities will be kept clean and in good condition.

The wheel wash facility, which will work on a closed cycle, shall be operated throughout the construction period. Wheel wash facilities will be located within a designated area of hardstanding at least 50 m from the nearest watercourse or 20 m from the nearest surface drain. It is expected that these facilities shall be sited adjacent to the site entrance. An example of a dry-ramp wheel wash facility is shown in Plate 3:8.

Should debris be spread onto the site access or public road adjacent to the wind farm, then road sweepers will be quickly utilised to clean affected areas. Loose debris will also be periodically removed from on-site tracks. All HGVs taking construction materials to and from the site will be sheeted to prevent the spillage or deposit of material on the highway.

Plate 3:8: Vehicle wheel wash facility

3.4 Activities in the Water Environment

Temporary activities related to construction phase works within the water environment include construction of temporary and permanent watercourse crossings.

3.4.1 Authorisation

Engineering activities within the water environment, including construction of watercourse crossings, culverting, diversions and dewatering requires authorisation under the Controlled Activities Regulations (CAR).

3.4.2 Watercourse Diversions

Temporary watercourse diversions may be required to allow for construction works to be conducted on the banks of a watercourse, within wetlands or a watercourse channel for any new watercourse crossings. The requirement for this should be avoided and designed out where possible, by the Construction Contractor.

Where required, watercourse diversions are to be installed in line with the following best practice guidance:

- SEPA WAT-SG-29: Temporary Construction Methods[43];

Isolation of a watercourse to allow works may be in the following good practice methods:

- Partial isolation (cofferdam);
- Partial isolation (cassion);
- Full isolation (temporary diversion);
- Full isolation (gravity / flume pipe); or
- Full isolation (over-pumping / siphon).

[43] SEPA (2009) WAT-SG-29: *Engineering in the Water Environment Good Practice Guide: Temporary Construction Methods First Edition* [Online] Available at: https://www.sepa.org.uk/media/150997/wat_sg_29.pdf (Accessed: 20/04/2021)

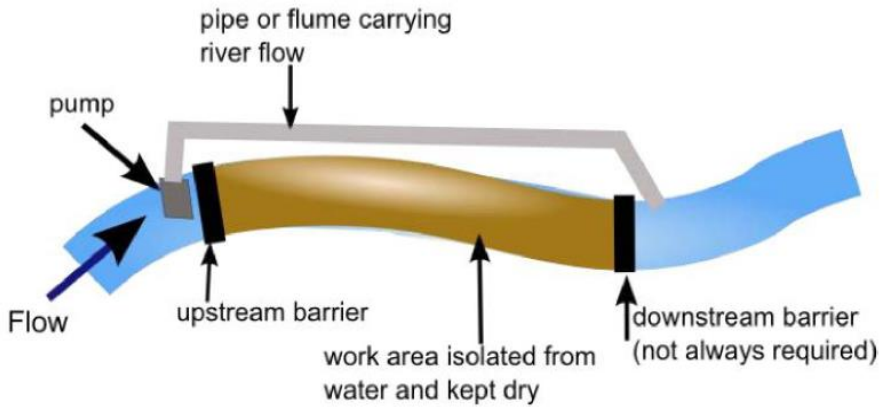
Full isolation: over-pumping / siphon

Allows for a whole section of the channel to be isolated, and water is diverted downstream using a pump or siphon in order to retain hydrological continuity. This temporary diversion may be utilised prior to establishing a long-term watercourse diversion for permanent infrastructure within watercourses.

The section of the watercourse requiring diversion will be isolated using barriers that span the full width of the existing watercourse. This keeps a stretch of the watercourse dry and the water is transferred downstream of the works area by mechanical assistance (pumping), until a long-term diversion is operational.

The pump and associated pipework need not be located in the isolated area, as shown in Plate 3:9.

Plate 3:9: Typical over pumping arrangement



SEPA (2009) WAT-SG-29: *Engineering in the Water Environment Good Practice Guide: Temporary Construction Methods First Edition*

It may be necessary to pump water from upstream of the barrier to downstream of the works area, i.e., maintain 'normal' flow in the watercourse either side of the isolated reach. Depending on the gradient of the watercourse, it may also be necessary to install a full width barrier downstream of the work area to prevent ingress of water, as shown in Plate 3:10.

Plate 3:10: Watercourse Diversion (Full isolation – over pumping)

SEPA (2009) WAT-SG-29: *Engineering in the Water Environment Good Practice Guide: Temporary Construction Methods First Edition*

Pumps will be kept at least 10 m from the edge of the channel and on drip trays or within bunds that have a capacity 110 % of that of the fuel tank.

3.4.3 Watercourse Crossings

The crossing of watercourses has been avoided in the design, where possible. Existing culverts and watercourse crossings, if any, may be upgraded and anticipated to be replaced with suitable pre-cast culvert designs.

Where required to be installed, watercourse crossings should be designed in order to minimise effects of developments on the natural integrity and continuity of watercourses. The following best practice guidance should be used:

- Forest and Water Guidelines[44];
- SEPA WAT-SG-25 River Crossing – Good Practice Guide[45];
- SEPA WAT-PS-06-02: Culverting watercourses[46]; and
- CIRIA C689: Culvert design and operation guide[47].

Pre-installation

Identification of ecological requirements and limiting factors (e.g. breeding birds and fish spawning) should be conducted prior to installation of a watercourse crossing. The ECoW should be consulted before watercourse crossing construction can commence.

The hydraulic capacity of the crossing is to be assessed and constructed peak river flow plus a climate change allowance of 33 % in the River Tweed catchment. Further information on the hydraulic capacity of a watercourse crossing or culvert is outlined in SEPA River Crossing – Good Practice Guide (WAT-SG-25).

Watercourse crossings should not be installed in 'active' areas of a watercourse e.g. meandering bends and depositional areas.

Consideration should be given to the type of watercourse crossing acknowledging that hard engineering structures, such as concrete culverts, can make it more difficult to restore a site or decommission temporary structures e.g. access tracks. Single span bridges or bridges with an in-stream support should be used for large watercourse crossings and culverts for smaller scale crossings. Further details on the type of culvert to use is provided in Section 3.4.4.

Installation

The use of in-situ fresh concrete in the construction of watercourse crossings will be avoided where possible by the use of pre-cast elements. Watercourse crossings will be installed perpendicular to the direction of flow.

In total two existing watercourse crossings will be updated and five new watercourse crossings are required for the Development. It is anticipated the following type of watercourse crossings are to be installed on site:

- Ready-made concrete 'box style' or bottomless arched concrete or plastic culverts.

However, in accordance with best practice guidance, each watercourse crossing shall be designed on a case by case basis to be appropriate for the width of watercourse being crossed, and the prevailing ecological and hydrological situation (i.e. the sensitivity of the watercourse). A number of factors, both environmental and engineering will influence the selection of structure type and the design of the crossing.

[44] Forestry Commission (2011) *Forest and Water Guidelines, 5th Edition,* Forestry Commission [Online] Available at: https://www.confor.org.uk/media/246145/forest-and-water-guidelines.pdf (Accessed: 22/03/2021).
[45] SEPA (2010) *WAT-SG-25 Engineering in the water environment: good practice guide. River Crossings.* [Online] Available at: https://www.sepa.org.uk/regulations/water/pollution-control/pollution-control-guidance/f (Accessed: 22/03/2021).
[46] SEPA (2015) *WAT-PS-06-02: Culverting of Water courses - Position Statement and Supporting Guidance* [online] Available at: https://www.sepa.org.uk/regulations/water/engineering/engineering-guidance/ (Accessed: 22/03/2021).
[47] CIRIA (2010) *C689: Culvert design and operation guide* [Online] Available at: https://www.ciria.org/Resources/Free_publications/C689.aspx?WebsiteKey=3f18c87a-d62b-4eca-8ef4-9b09309c1c91 (Accessed: 22/03/2021)

All watercourse crossings should be installed in line with SEPA WAT-SG-25 'River Crossing good practice guide'. General good practice in watercourse crossing design and construction will ensure that site conditions are taken into account and the objectives of the CAR are achieved. These include:

- The use of appropriate structures to carry access tracks across watercourses taking into account the scale of the watercourse, ecological value, sensitivity to construction activities, topography and construction methodology;
- There is a preference to avoid construction in watercourses altogether through the use of arch culverts appropriately designed not to impede the flow of water and allow safe passage for wildlife, such as fish, water voles, otters etc. However, short- and long-term impact of designs should be considered, and there can be a case for using pipe or box culverts;
- When installing culverts, care will be taken to ensure that the construction does not pose a permanent obstruction to migrating species of fish, or riparian mammals (i.e. the crossings will make provision for fish and wildlife migration);
- Culverts should be sized so that they do not interfere with the bed of the stream post construction, (i.e. the crossings will leave the watercourse in as natural condition as possible or permit re-establishment of substrate post construction);
- Single culverts will be used in preference to a series of smaller culverts that may be more likely to become blocked with flotsam and create erosion (i.e. the crossings will not constrict the channel);
- Based on the Fish Monitoring Report (Technical Appendix TA 7.4) whilst no SAC protected fish species have been recorded within the tributaries within the boundary of the site, a tiny number of salmon migrants will be found on the south-west edge of the boundary in the Flemington Burn. If any fish are found during the construction of any culverts, they will be removed from the immediate construction site to a place of safety if deemed necessary after consultation with the relevant fisheries interest;
- To minimise impacts on the breeding of any fish found, any in-stream works in these areas will be conducted during months which have less impact on their breeding and development, where possible;
- Ease and speed of construction are important to minimise disruption to the watercourse and surrounding habitat;
- Culverts and headwalls should be designed to last the operational life of the Development;
- Designs should be low maintenance and where possible self-cleansing; and
- Structures should be visually in keeping with the surroundings.

Maintenance

Erosion to the bed and banks at a watercourse crossing as a result of scouring during high rainfall and storm events. Erosion can expose span structure foundations and/ or cause a drop forming at the outlet of the watercourse crossing.

If this occurs, the inclusion of erosion protection measures may be required, such as baffles. The crossing should be reinstated and reinforced to allow for scour during higher flows. The crossing should be reinstated to allow for fish passage and continuity of the watercourse bed. If this is not possible, inclusion of a fish pass may be required.

If maintenance works are required within the watercourse bed then isolation of the watercourse is required, as detailed in Section 3.4.2, and authorisation from SEPA may be required.

Culverts are prone to blockage by debris and may require routine clearing.

3.4.4 Culverts

Culverts are used to create artificial channels and allow for the continuity of water drainage and balance upstream and downstream of infrastructure associated with the Development e.g. access tracks.

Closed culverts for river crossings would only be justified for single track roads over small watercourses (<2 m wide). Closed culverts are sufficient for cross-drainage under an onsite access track, as outlined in Section 0.

Bottomless arch culverts and box culverts should be used for all culverts over watercourses of 2 m or greater in width.

Culverts will be installed and designed in line with best practice guidance, including CIRIA C689, and incorporate the following criteria:

- Culverts will be well bedded to avoid settlement and protected by an adequate cover of road material;
- The substrate and side/ head walls will be reinforced in order to prevent erosion;
- The culverts will be designed such that it does not cause a barrier to movement of fish or other aquatic fauna;
- Culvert floors will have the same gradient (not exceeding a slope of 3 %) and level, and carry similar bed material and flow, as the original stream;
- There shall be no hydraulic drop at the culvert inlet or outlet;
- The width of the culvert will be greater than the active channel width of the watercourse;
- The culvert must not exacerbate or create flooding;
- Culverts will be used to conduct water under the wind farm tracks;
- Any fences or screens fitted on the inlet or outlet of the culvert will be designed to allow at least 230 mm of space between the bars of the screen of fence, up to the high-water level;
- A natural stone headwall will be provided upstream and downstream of culverts to protect the road embankment. Further protection will be provided to the banks using soft engineering techniques as much as possible; and
- Where there is risk of bed erosion upstream or downstream of culverts, natural stone rip-rap will be provided.

3.4.5 Bridge Crossing

A bailey bridge will be installed at a level sufficient to avoid constituting a blockage to f flow. The bridge will be constructed away from the river banks and put into position by cantilever or craning.

The construction of bridge wall head will be sufficiently set back from Courhope Burn to allow measures to be implemented to limit the potential for silty / contaminated run-off to enter the water. The use of in-situ concrete in bridge wall head construction will be avoided where possible by the use of pre-cast elements or by using precast elements as permanent shuttering.

Temporary barriers will be installed on both watercourse banks, closing off to north and south to include the zone of influence of the construction works. If water levels during the works do not present an increased risk then only debris fencing and netting may be required along each river bank. The decision of whether water levels increase the risk associated with the works, and the mitigation for this, would be undertaken by the construction manager responsible for the bridge in consultation with the Contractor's Environment Manager and the ECoW.

The access tracks either side of the bridge will be level with the existing ground, where possible, ramping up to the bridge if/where necessary. The track will be excavated to a

suitable base, filled with stone and finished with a Type 1 material to provide a hard-wearing, semi-permeable surface that produces little sediment in run-off. The access tracks will be designed to have adequate cross-camber maintained to prevent the formation of wheel ruts and to avoid ponding of rainwater and surface run-off. If and where access track ramps are required, these will include culverts, as far as is practicable, to allow through-flow of flood water.

3.4.6 Dewatering

Dewatering may be required for excavations, construction of foundations or borrow pits. Dewatering is regulated under CAR GBR15 if less than 10 m^3 per day.

Dewatering should be employed in line with the following best practice guidance:

- SEPA WAT-SG-29: Temporary Construction Methods;
- SEPA Good Practice Guide WAT-SG-28: Intakes and Outfalls[48]; and
- SEPA Regulatory Method WAT-RM-11: Licensing Groundwater Abstractions including Dewatering[49].

If the dewatering volume is greater than 10 m^3 / day, a CAR licence is required and SEPA WAT-RM-11 is to be referred to. Discharge of water as a result of dewatering must not cause further erosion and energy dissipation measures should be put in place as outlined in SEPA WAT-SG-28 guidance.

Dewatering must consider the impact on other groundwater abstractions and groundwater dependent terrestrial ecosystems (GWDTE). Further information on the protection of GWDTE and groundwater abstractions are provided in Section 3.5 and 3.6.

3.5 Measures to Protect Groundwater Dependent Terrestrial Ecosystems (GWDTE)

Foundations, borrow pits and linear infrastructure such as roads, tracks and trenches can disrupt groundwater flow. If carried out in close proximity to GWDTE, construction activities can have adverse effects on these receptors.

Measures to protect GWDTE are based on mitigation and good practice, similar to those outlined already in this document, as well as avoidance of GWDTE habitats during design. The following guidance document(s) are used to inform protection of GWDTE habitats:

- SEPA LUPS-GU-31: Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems[50].

The following measures will ensure that water quality and the flow supply of groundwater and near-surface water are maintained during the construction and operational phase of the Development.

Key measures include:

- Silt traps may be deployed to trap and filter sediment-laden run-off throughout the construction phase of the Development;
- Settlement lagoons may be constructed and actively managed to control water levels and ensure that any runoff is contained, especially during times of rainfall. The location and management of the settlement lagoons is essential and will not be sited

[48] SEPA (2019) *WAT-SG-28: Engineering in the Water Environment Good Practice Guide: Intakes and outfalls Second Edition* [Online] Available at: https://www.sepa.org.uk/media/150984/wat_sg_28.pdf (Accessed: 21/04/2021)
[49] SEPA (2017) *WAT-RM-11: Regulatory Method: Licensing Groundwater Abstractions including Dewatering* [Online] Available at: https://www.sepa.org.uk/media/151997/wat-rm-11.pdf (Accessed: 11/09/2020)
[50] SEPA (2017) Land Use Planning System SEPA Guidance Note 31: Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems (LUPS-GU-31) [Online] Available at: https://www.sepa.org.uk/media/144266/lups-gu31-guidance-on-assessing-the-impacts-of-development-proposals-on-groundwater-abstractions-and-groundwater-dependent-terrestrial-ecosystems.pdf (Accessed: 11/09/2020)

within vulnerable wetland areas where they may cause drying out and direct loss of habitat;
- Flush areas, depressions or zones which may concentrate water flow, will be identified in advance of construction and a suitable drainage design shall be developed to address each location, to ensure hydraulic connectivity;
- Site drainage design will avoid any severance of saturated areas to ensure hydrological connectivity is maintained. Site drainage design will be produced in advance of construction;
- The length of time excavations are kept open and the duration of any dewatering will be minimised;
- All excavations will be sufficiently dewatered before concrete pours begin and that dewatering continues while the concrete cures. However, construction good practice will be followed to ensure that fresh concrete is isolated from the dewatering system; and
- Water from dewatering activities are generally treated by settlement lagoons and will be discharged onto vegetated surfaces, ensuring no net loss of water from the hydrological system. If ponding of water is observed during the discharge onto vegetated surfaces, additional measures may be employed.

While several NVC communities were noted during the NVC survey, they were considered to be ombrotrophic in nature, meaning that they are rain-fed as opposed to being supported by groundwater. This was due to them either being found in lower lying topography where surface water and near-surface water drain and pool or the area has recently been felled and the habitats have been heavily modified and are now largely brash.

3.6 Measures to Protect Water Environment from Tree Felling and Removal

The following measures will be implemented during tree felling as part of the Development to ensure that harvesting methods are in accordance with good practice:

- Timber will be stacked on drier slopes at least 50 m from watercourses and not blocking roadside drains;
- Brash will not be stockpiled within 50 m of a watercourse;
- The area within 50 m of watercourses shall be regarded as a "sensitive area";
- During felling operations within "sensitive areas", silt traps or temporary dams will be used in local ditches to prevent sediment entering watercourses, and silt fences will be constructed locally between working areas and watercourses;
- Any work in "sensitive areas" to be approved by the Infrastructure Contractor's Project Manager and the ECoW;
- If felling is to occur in the riparian zone (the interface between land and a flowing surface water body) of a watercourse, trees will be felled away from the watercourse;
- Brash mats will be used for vehicle trafficking to protect bare soils;
- Silt traps will be installed in existing and new drainage ditches downstream of felling areas and construction activities but will be sited to avoid slopes with a gradient greater than 1 in 20;
- Silt fences and traps will be cleaned out on a regular basis and following heavy precipitation; and
- Silt matting if used to be checked on a daily basis and replaced as required.

The following measures will be implemented to ensure surface water is managed during and following felling:

- Assess the condition of the existing drainage system;
- Cut off any existing open drains that do not adhere to the UKFS Guidelines on Forests and Water and ensure that diverted flows are appropriately managed and do not bypass buffer areas;

- Design the length and spacing of cross-drains to control the volume of run-off so that it does not exceed the capacity of the drainage system;
- Design drains to discharge water to flatter areas to enable flows to fan out and slow down;
- Reduce the drain gradient on highly erodible soils to less than <2º and increase the recommended widths of buffer areas;
- Avoid drains discharging directly into watercourses;
- Never divert significant volumes of water from one catchment to another;
- Avoid drains discharging onto neighbouring land, unless by agreement;
- Keep forest drains and road drains separate: do not discharge water into road drains;
- Plan to install drains at the same time or as soon as possible after cultivation operations, especially where run-off could reach and overload road drains;
- Plan ahead for changes in the weather that could affect site conditions;
- Only infill drains to create a buffer area where drain flows are manageable and unlikely to washout the fill;
- Otherwise redesign the drainage system; and
- Where a drain has become a main watercourse and is not subject to erosion problems, treat it as a natural watercourse and create a buffer area along its length

3.7 Water Quality Monitoring Programme

A surface water and groundwater monitoring programme will be established prior to the construction phase of the Development. An indicative monitoring programme is set out below.

Surface water monitoring would be undertaken at locations on the principal watercourses downstream of the Development infrastructure and upstream of other non-natural influences, where possible.

Regular visual inspections of surface watercourses are proposed, especially during major excavation works, as these allow rapid identification of changes in levels of suspended solids that could indicate construction related effects are occurring upstream. Potential effects can then be investigated and remedial action taken to prevent further effects, if necessary.

To supplement the visual inspections, it is anticipated that there would be a number of surface water monitoring points for extractive sampling and hydro-chemical analysis. Details will be agreed with SEPA in advance of construction.

The following sampling frequency is proposed (in line with SEPA guidance) in order to establish baseline hydro-chemical conditions of surface water constituents:

- Once every month for twelve months prior to the construction phase.

The following sampling frequencies are proposed in order to monitor surface water conditions against baseline conditions:

- Once a week during ground breaking works and concrete works, e.g., compound construction, turbine foundations;
- Twice a month during minor construction works e.g. access track construction; and
- Twice a month for three months then once a month for a further 3 months during the post construction phase.

Establishing baseline conditions for surface waters will enable any trends in levels of critical parameters to be assessed and deviations from the norm identified and rectified through water management measures.

CLOICH FOREST WIND FARM

VOLUME 3: TECHNICAL APPENDICES

TECHNICAL APPENDIX A10.2: PRIVATE WATER SUPPLY RISK ASSESSMENT

JUNE 2021

Prepared By:

Arcus Consultancy Services

7th Floor
144 West George Street
Glasgow
G2 2HG

T +44 (0)141 221 9997 l **E** info@arcusconsulting.co.uk
w www.arcusconsulting.co.uk

Registered in England & Wales No. 5644976

TABLE OF CONTENTS

1 INTRODUCTION

This Technical Appendix provides a risk assessment of private water supplies (PWS) identified within the hydrologically connected catchments of the Cloich Forest Wind Farm ('the Development').

This Technical Appendix supplements **Chapter 10: Hydrology and Hydrogeology** of the Cloich Forest Wind Farm Environmental Impact Assessment ('the EIA Report'), which outlines the assessment of potential effects of the Development on the hydrological environment, including PWS.

Chapter 3: Project Description of the EIA Report sets out the proposed new infrastructure as part of the Development. The location of the Development and the PWS Study Area is provided in Figure 10.1 of the EIA Report, and outlines of the hydrological catchment provided in Figure 10.2 of the EIA Report.

2 BACKGROUND

2.1 Private Water Supplies

PWS are supplies of water not provided by the regulated water supply authority (Scottish Water), and often abstract water from the local water environment through one or a combination of sources. Sources often include direct surface water body abstraction, shallow sub-surface flow, groundwater springs, boreholes and to a lesser extent rainwater collection.

For the purposes of this risk assessment, a PWS is considered to consist of the following components, all of which are required to be assessed in terms of risk from the Development:

- Source catchment (the geographical zone of contribution of water to the source point);
- Source point (the point where water is collected/ sourced);
- Distribution network (infrastructure which distributes water from the source to the point of supply, including header tanks); and
- Supply points (the points at which water is used for human use and consumption).

2.2 Regulation and Protection

PWS are water supplies which are not provided, maintained or regulated by Scottish Water. They are the responsibility of property owners and / or PWS users with regulation enforced by local authorities and the Drinking Water Quality Regulator (DWQR)[1].

PWS which abstract >10 m^3 per day (on average) and/ or supply commercially are defined as Regulated supplies, and are regulated by local authorities for water quality in line with E.C Drinking Water Directive (98/83/EC). Smaller domestic supplies are known as Exempt supplies (or 2006 Type B) and do not require regulation.

It is the responsibility of the local authority to maintain a register of PWS, and to provide publicly available information to Developers.

It is the Applicant's legal duty of care to ensure the quantity, quality and continuity of the water environment including PWS. This is a requirement of the Water Environment and Water Services (Scotland) Act 2003[2].

[1] DWQR (2017) Drinking Water Quality in Scotland 2017 Private Water Supplies [Online] Available at: https://dwqr.scot/media/39966/dwqr-pws-annual-report-2017-compiled-report-final-24-september-2018.pdf (Accessed 23/03/2021)
[2] The Scottish Government (2003) Water Environment and Water Services (Scotland) Act 2003 [Online] Available at: https://www.legislation.gov.uk/asp/2003/3/section/21 (Accessed 11/11/2020)

In line with LUPS Guidance Note 31[3], for projects such as the Development, Scottish Environment Protection Agency (SEPA) requires all groundwater abstractions (source points) within the following distances of Development infrastructure to be identified and assessed for potential risks:

- Within 100 metre (m) radius of all excavations less than 1 m in depth; and
- Within 250 m of all excavations deeper than 1 m.

SEPA also requires the location of all groundwater abstractions for drinking water supplies to be obtained by consultation with local authorities, local residents and a site walkover, as outlined in Appendix 3 of the SEPA LUPS Guidance Note 31. SEPA also considers all and any impacts of the Development on surface waters and near-surface flows.

2.3 The Development

Information relating to the hydrological and hydrogeological conditions of the Site is provided in the EIA Report, Section 10.4 *Baseline Conditions,* and are summarised below.

The groundwater units underlying the Development are identified by Scotland's Environment mapping service as the Peebles, Galashiels and Hawick groundwater unit[4]. These units have an overall SEPA classification of 'Good'.

BGS 1:625,000 digital mapping and the BGS GeoIndex shows the Development is underlain primarily by low permeability Devensian Till deposits, small isolated areas of peat deposits with no superficial deposits mapped over higher ground, as shown in Figure 10.3 of the EIA Report. The bedrock aquifer underlying the majority of the Core Study Area to consist of greywackes (sedimentary rocks) of the Kirkcolm Formation, Moffat Shale Group, and Portpatrick Formations. These rocks are classified by the BGS as a "low productivity aquifer" with small amounts of groundwater in the near-surface weathered zone and secondary fractures[5]. Digital mapping also shows three faults (at rockhead) trending north-east to south-west through the site, with a fourth fault in the south-east trending north to south.

The BGS groundwater vulnerability[6] ranges across the site between classes 4a to 5. Class 4a defining the underlying rocks as vulnerable to pollutants not readily adsorbed, with class 5 defined as vulnerable to most pollutants, with rapid impact in many scenarios.

The previous BGS report for Cloich Hill[7] which covers the wider Cloich Hill area, confirms that the site features relatively thin (<3 m) drift deposits, primarily consisting of glacial till with limited groundwater storage, fed by rainfall, with some rainfall infiltrating into the underlying bedrock with the presence of springs further downhill. The bedrock features low productivity bedrock primarily via feature flow. The BGS describes that borehole records report low yield supplies, with a mean value of 0.6 l/s. Groundwater flow is described generally from higher ground down to lower valleys, with generally shallow flow paths controlled by fracture patterns. The fractures are also described primarily as short and localised (over a few hundred metres) but may flow for several kilometres from higher ground to valleys. The BGS also state the watershed for groundwater flow is likely to fall at the same location as the surface watershed along ridges but may vary locally depending on lithology of fracturing. Groundwater levels are likely to be deep beneath higher ground

[3] SEPA (2019). Land Use Planning System Guidance Note 31. Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems. [Online] Available at: https://www.sepa.org.uk/media/144266/lups-gu31-guidance-on-assessing-the-impacts-of-development-proposals-on-groundwater-abstractions-and-groundwater-dependent-terrestrial-ecosystems.pdf (Accessed 23/03/2021).
[4] SEPA (undated) Groundwater classification [Online] Available at: https://map.environment.gov.scot/sewebmap/ (Accessed 25/03/2020).
[5] BGS (2019) Hydrogeology 1:625000 scale map [Online] Available at: http://mapapps2.bgs.ac.uk/geoindex/home.html
[6] BGS (2015) Groundwater Vulnerability (Scotland) GIS dataset, Version 2 [Online] Available at: http://nora.nerc.ac.uk/id/eprint/509618/1/OR15002.pdf (Accessed 23/03/2021).
[7] British Geological Survey. Georeport: Cloich Hill. Dated March 2015 (Ref GR_210800/1)

and shallow towards the base of the valley, and locally confined where superficial deposits are thick or impermeable.

2.3.1 Previous Private Water Supply Risk Assessments and Supporting Information

Several assessment information sources and reports have been produced relating to PWS including documents submitted as part of the Public Inquiry which took place on the 26th, 29th May and the 2nd June 2015:

- Clarification letter regarding PWS information requested by SEPA (AMEC 17th June 2014 ref dgla064i6);
- Report on Site Visit to Cloich Forest on 02 April 2012 (Dr T R Nisbet);
- WIN-140-1 Cloich Forest proposed Wind Farm: Statement of Agreed Matters on
- Policy[8];
- SEPA consultation response to application: 32185/D040/036 (SEPA Ref: PCS/134149) – 4th July 2014;
- British Geological Survey. Georeport: Cloich Hill. Dated March 2015 (Ref GR_210800/1);
- Cloich Forest Wind Farm Private Water Supply Risk Assessment (WHS April 2015) – review of Environmental Statement (ES) and SEI;
- Report and Response to: Hearing Statement on behalf of PfR on Consideration of Issues Relating to Private Water Supply by Dr Shaun Salmon, BSc (25th April 2015)[9]; and
- Report to the Scottish Ministers - Section 36 Of the Electricity Act 1989 And Section 57 Of Town and Country Planning (Scotland) Act 1997.

The 2015 PWSRA by WHS assessed several PWS and suggests that the developer commits to an appropriate water quality monitoring plan.

SEPA noted that "*in our most recent response it is our opinion that a hydraulic linkage between the closest turbines and the Stewarton spring (regardless of its precise location) is unlikely*"[10].

2.3.2 Public Inquiry Information

Noting the Reporters' conclusions on PWS (paragraphs 5.26 to 5.31)[11] regarding the previous applicant's approach to consultation on PWS, Arcus sought early engagement to agree the assessment methodology and to consult third parties regarding their supplies.

It should be noted that while consultation in 2020 with local residents suggested that mitigation should not be relied upon[12] and that Development design avoids risk to PWS, Section 7 of the Report and Response to: *Hearing Statement on behalf of PfR on Consideration of Issues Relating to Private Water Supply by Dr Shaun Salmon*[9] clearly outlines four mitigation measures (a to d) to protect the quality and quantity of PWS in hydrological connectivity to the Development.

The *WIN-140-1 Cloich Forest proposed Wind Farm: Statement of Agreed Matters on Policy* also appends a letter from Turcan Connell outlining local residents' desire to be involved in discussions with regulatory bodies and the previous wind farm developer in discharging Condition 20 of the deemed planning permission.

[8] Statement of Agreement on Policy Matters between: Cloich Wind Farm LLP and Scottish Borders Council 21st April 2015
[9] James Taylor, resident, Stewarton House on behalf of The Eddleston Objectors' Group
[10] SEPA response to Planning application: 32185/D040/036 (SEPA Ref: PCS/134149) – 4th July 2014
[11] Report by Stephen Hall and Karen Heywood, reporters appointed by the Scottish Ministers (17th February 2016)
[12] Email. C. Burke 20th May 2020.

3 METHODOLOGY

A review of Arcus' Cloich Forest Wind Farm PWSRA Method Statement (Version 1) was sought from relevant statutory consultees of SEPA and Scottish Borders Council (the Council) on 27th April 2020 and 29th April 2020, respectively.

The Arcus methodology for Private Water Supplies Risk Assessment Version 2 is outlined in a PWSRA Method Statement, provided as Appendix E. This risk assessment has been conducted in line with Version 2 of the Method Statement, which incorporates statutory consultee review comments.

3.1 Consultee Review of Methodology

Review comments on the Method Statement were received from a SEPA Planning Officer on the 13th May 2020 and an Environmental Health Officer of the Council on 27th May 2020[13]. Review comments have been incorporated into Version 2 of the document, which is provided as Appendix E.

A resident of Stewarton Toll, which is supplied by a PWS, requested a copy of the proposed methodology and a copy of the Method Statement was provided by the Applicant on 9th March 2020. Comments on the method statement were received from the resident on the 1st April 2020.

It is considered that the majority of comments and concerns raised by the resident on the methodology are addressed within Version 2 of the Method Statement, the EIA Report Chapter and this Technical Appendix.

3.2 Legislation and Guidance

This methodology has been developed in line with the following legislation and guidance:

- The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017 ('the 2017 Regulations')[14];
- Private Water Supplies (Scotland) Regulations 2006 ('the 2006 Regulations');
- The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017 - Guidance for Local Authorities (v4.0)[15];
- Water Environment (Controlled Activities) (Scotland) Regulations 2011[16]; and
- Land Use Planning System (LUPS) Scottish Environment protection Agency (SEPA) Guidance Note 31 2017 v3.0[17].

3.3 Survey Area

The PWS Study Area is defined as 3 km from the Core Study Area (identified on Figure 10.1 of the EIA report). All PWS within this area and within the PWS Study Area are to be identified, where reasonably and feasibly possible, and assessed in terms of their connectivity to the Development and subsequent potential risk from the Development.

[13] PWSRA Methodology reviewed by Anthony Baker – EHO at SBC 27/05/2020.
[14] The Scottish Government (2017) The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017 [Online] Available at: http://www.legislation.gov.uk/ssi/2017/282/contents/made (Accessed 11/11/2020)
[15] DWQR (2019) The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017 Guidance for Local Authorities [Online] Available at: https://dwqr.scot/media/42030/the-water-intended-for-human-consumption-private-supplies-scotland-regulations-2017-guidance-v4-feb-2019-as-issued.pdf (Accessed 11/11/2020)
[16] The Scottish Government (2011) The Water Environment (Controlled Activities) (Scotland) Regulations 2011 [Online] http://www.legislation.gov.uk/ssi/2011/209/contents/made (Accessed 02/03/2020)
[17] SEPA (2017) Land Use Planning System (lups) SEPA Guidance Note 31 2017: Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems Version 2 [Online] Available at: https://www.sepa.org.uk/media/143868/lupsgu31_planning_guidance_on_groundwater_abstractions.pdf (Accessed 03/03/2020)

It is considered at distances greater than 3 km, the hydrological and hydrogeological effects of the Development will be negligible due to the effects of dispersion and attenuation of pollutants within the water environment.

Areas served by Scottish Water Supply Zones[18] are included within the survey area, however consultation letters are not sent to properties within these Scottish Water Supply Zones areas unless they have been identified as being supplied by a PWS through consultation with SEPA and the Council.

3.4 Method

The methodology consists of the following six stages:

- Stage One: Identification of PWS;
- Stage Two: Consultation;
- Stage Three: Initial desk-based review;
- Stage Four: Site-based survey;
- Stage Five: Risk assessment; and
- Stage Six: Approval by consultees.

Further details on the methodology are outlined in Appendix E and in the following sections.

3.4.1 Stage One: Identification of Private Water Supplies

Identification of PWS within the Study Area was conducted through consultation and obtaining information from the following sources:

- Scottish Borders Council Environmental Health Office PWS Register;
- SEPA abstractions authorised through CAR[19];
- Review of the 2015 Private Water Supplies Risk Assessment[20];
- Review of information received at Public Information events; and
- Review of information provided by non-statutory consultee(s)[21].

Mail shot to all properties within the Study Area (unless within a Scottish Water Supply Zone and not otherwise known to be supplied by a private supply).

Each identified property and source was given a reference number which is referred to throughout this assessment. The list of identified sources and the reference numbers are detailed in Appendix A.

3.4.2 Stage 2: Consultation

3.4.2.1 Statutory Consultation

The Council was consulted on 18th November 2019 to obtain information on registered PWS, with information provided by the Council on 29th November 2019.

Eddleston Community Council was also consulted and it was noted that a list of properties supplied by PWS had been compiled by Mr James Taylor of Stewarton House and issued to SEPA in response to the 2012 ES Report in October 2012 and provided in the 2015 Hearing Statement Response[22].

[18] Scottish Government (2020) Water Regulation Zones [Online] Available at: https://data.gov.uk/dataset/5b0673b5-5428-4a9b-8c26-0ff97bda7f3d/water-regulation-zones (Accessed 11/11/2020)
[19] The Scottish Government (2011) The Water Environment (Controlled Activities) (Scotland) Regulations 2011 [Online] Available at: http://www.legislation.gov.uk/ssi/2011/209/contents/made (Accessed 02/03/2020)
[20] Wallingford HydroSolutions Limited (2015) Cloich Forest Wind Farm Private Water Supply Risk Assessment
[21] List of properties supplied by PWS provided by Mr James Taylor.
[22] James Taylor (2015) Report and Response to: Hearing Statement on behalf of PfR on Consideration of Issues Relating to Private Water Supply by Dr Shaun Salmon, BSc

3.4.2.2 Non-statutory Consultation

Letters were distributed to 178 properties within the PWS Study Area over the period 30th January 2020 to 24th February 2020 to identify and confirm PWS and obtain information on the type and source location of supplies, an example of this letter and questionnaire is provided as Appendix D. A total of 64 responses were received.

Follow-up letters were distributed to properties where residents did not respond to the initial consultation round on the 29th July 2020.

Letters were also issued to properties which were identified as having a PWS on the 29th July 2020 to obtain contact information to allow for further consultation.

Further consultation was conducted via telephone or via email where possible, to reduce the need for face-to-face interaction, in light of government-mandated social distancing restrictions as a result of the Covid-19 pandemic. Further consultation was conducted throughout August 2020 and September 2020.

Observations made during a Site walkover in October 2020 indicated a property not registered on OS data or with SBC could be served by a PWS, approximately 520 m west of the Observatory. Consultation with the owners of the holiday property was undertaken in February and March 2021, which confirmed that the property is not served by a PWS. As such, the property has been scoped out of this assessment.

Through consultation with the owners (Forestry and Land Scotland) of the Courhope property, it was confirmed that the property is not occupied, is not in a physical state to be lived in; and owners, FLS, have no intention of returning the building back into use as a dwelling. As such, the supply has been scoped out of this assessment.

Planning consent has been granted (on appeal) for 15 camping huts approximately 90 m north of the Core Study Area[23] The Design Statement makes no reference to the huts being supplied by water (i.e. PWS or mains) and states that no mains drainage is proposed (composting toilets proposed). As such, the huts have been scoped out of this assessment.

Further details on the information obtained during the consultation phase is provided in the Method Statement, Appendix E.

3.4.3 Stage 3: Desk-based Assessment

Desk-based assessment was conducted in conjunction with the consultation process to determine the connectivity of PWS to the Development, and to scope out water supplies which are determined as not having the potential to be at risk from the Development.

The following data sources were used to inform the desk-based assessment:

- The Ordnance Survey (OS) 1:50,000 (Digital);
- OS 1:25,000 Map (Digital);
- LiDAR data[24];
- Scotland's Environment web-based maps[25];
- British Geological Survey (BGS) GeoIndex onshore geology viewer[26];
- British Geological Survey 1:10,000 map (digitised from paper copy);
- National Library of Scotland Historic Maps (1885 – 1913); and

[23] Planning reference 19/01256/FUL
[24] JNCC & Scottish Government (2020) Scottish Remote Sensing Portal [Online] Available at: https://remotesensingdata.gov.scot/data#/list
[25] Scotland's Environment (n.d.) [Online] Available at: https://www.environment.gov.scot/legal/terms-and-conditions/ (Accessed: 11/11/2020)
[26] British Geological Survey (2019) GeoIndex Onshore [Online] Available at: https://mapapps2.bgs.ac.uk/geoindex/home.html (Accessed 24/03/2020)

- Groundwater Vulnerability Maps[27].

3.4.4 Stage Four: Site Visit(s)

Site visits were conducted at properties which were deemed to be in hydrological connectivity with the Development and / or where more information was required to determine the source location and source catchment.

Site visits were conducted between 17th August 2020 and 23rd September 2020 at 9 sources which supply a total of 24 properties. Site visits were conducted at properties following residents and land owner's approval. As such, it was not possible to conduct site visits where access was not granted by the resident or landowner.

A further walkover was undertaken on 21st October 2020 to visually appraise the hydrological regime within the Site.

The source points and source catchments were mapped using ArcGIS during the site visits, and water supplies deemed as not having the potential to be at risk from the Development were scoped-out from the risk assessment.

3.4.5 Stage 5: Assessment of Risk

The PWSRA attributes the vulnerability / sensitivity of the PWS source and the magnitude of effect from works associated with the Development. These will be combined to inform the risk rating.

3.4.5.1 Sensitivity of receptor (PWS)

The sensitivity criteria for the receptor, the PWS source and supply, is outlined in Table 3.1.

Table 3.1: PWS Sensitivity Rating Criteria

Sensitivity	**Criteria**
Very High	Abstractions which supply more than 25 people and / or 100 livestock (at any given point in the year) and / or is used for the mass-production of food and drinks. Large-scale groundwater abstractions >1,000 m^3/ day. BGS 'Highly productive aquifer'; Groundwater Vulnerability Class 5; and / or Source solely supplied by surface water or groundwater.
High	Groundwater abstractions of >500-1,000 m^3/ day; Hydrological receptor supports abstractions for PWS for up to 25 people and / or 100 livestock (at any given point in the year); BGS 'Moderately productive aquifer', with moderate yield from secondary fractures and near-surface weathering. Exploitation of local groundwater is not far-reaching; and / or Groundwater unit Vulnerability Class 4a - 4b.

[27] British Geological Survey (2020) Groundwater Vulnerability (Scotland) [Online] Available at: https://www.bgs.ac.uk/geology-projects/groundwater-research/groundwater-protection/ [Accessed 28/03/2021].

Sensitivity	Criteria
Medium	Hydrological receptor supports abstractions for PWS for limited agricultural use (at any given point in the year), or where mains water supply is available; BGS 'Low productivity aquifer' as water quality does not allow potable or other quality sensitive uses. Exploitation of local groundwater is not far-reaching; and / or Groundwater unit Vulnerability Class 2 - 3.
Low	The hydrological receptor does not support abstractions for public water supply or private water abstractions; and / or Groundwater unit Vulnerability Class 1.
Negligible	Not sensitive due to ability to absorb changes to quantity or quality of supply.

3.4.5.2 Magnitude of effects

The criteria for the magnitude of effects, the level of effect from the Development attributed to each PWS source and supply, is outlined in Table 3.2.

Table 3.2: Magnitude of Effect Criteria

Magnitude of Effect	Criteria
High	A permanent negative change to groundwater and / or surface water quality or available yield (quantity); Severance of PWS distribution infrastructure; Long-term (operational phase) reduction in quantity and / or continuity of existing supplies; and / or Long-term reduction in quality of water supply compared to baseline (pre-construction) conditions.
Medium	Short-term (construction phase) reduction in and / or continuity of existing supplies; Damage to but not severance of distribution infrastructure; and / or Short-term reduction in quality of water supply compared to baseline (pre-construction) conditions.
Low	Any changes to quality, quantity or continuity do not result in a perceptible alteration to baseline conditions.
Negligible	No effect from Development to water quality, quantity or continuity on the basis of non-existent pathway in the 'source-pathway-receptor' model (this may be determined following avoidance and / or mitigation measures).

3.4.5.3 Risk Rating

The overall risk rating is attributed to the PWS and associated supplied properties by combining the sensitivity of the receptor, magnitude of effect criteria and professional judgement, as outlined in Table 3.3. A risk rating of minor significance or lower is considered acceptable and the impacts not significant, based on professional judgement.

Table 3.3: Potential Risk Rating

Magnitude of Effects	**Sensitivity of Private Water Supply**				
	Very High	**High**	**Medium**	**Low**	**Negligible**
High	Major	Major	Moderate	Moderate	Minor
Medium	Major	Moderate	Moderate	Minor	Negligible
Low	Moderate	Moderate	Minor	Minor	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

4 SUMMARY OF FINDINGS

4.1 Stage One: Identification of Private Water Supplies

4.1.1 Identification of Private Water Supplies through Statutory Consultation

The Council Environmental Health Officer (EHO) register was initially contacted for records of private water sources and supplies in the Study Area. Of these sources and supplies, a total of 63 PWS sources supplying 136 properties are registered with the Council, within the PWS Study Area. Three of these supplies are confirmed as being supplied by Scottish Water Mains during the consultation process.

An additional five PWS sources suppling six properties as identified within the 2015 Private Water Supply Risk Assessment[20] and 2015 Hearing Statement Response[22] are listed in Table 8.2 of Appendix A. One of the supplies and its connected property is confirmed as being supplied by Scottish Water mains supply during the consultation process.

4.1.2 Identification of Private Water Supplies through Desk-based Assessment

Properties identified within the 3 km Study Area that were considered to potentially be hydrologically connected to the Development through the desk-based assessment were also contacted as part of the non-statutory consultation.

A further 35 properties were identified prior to the follow up letters that were issued in July 2020 as part of the resident consultation.

4.1.3 Identification of Private Water Supplies through Non-statutory Consultation

Following consultation with statutory consultees and a desk-based assessment, 178 properties within the Study Area with the potential of being PWS were contacted. Letters were issued over the period 30th January 2020 to 24th February 2020 to identify and confirm PWS and obtain information on the type and source location of supplies, an example of this letter and questionnaire is provided as Appendix D. A total of 64 responses were received.

Follow-up letters where there was no response to the initial consultation round and letters to obtain contact information to allow for further consultation were issued on 29th July 2020.

A further five PWS sources identified during the mail shot resident consultation process, conducted in 2020 as part of this risk assessment, are listed in Table 7.3 of Appendix A.

Of the PWS sources identified through the EHO register, it was determined through consultation with residents that a total of 32 sources connecting to 94 properties are PWS. PWS sources as identified through the Council Environmental Health Officer (EHO) register are detailed in Table 8.1 of Appendix A.

Following the statutory and non-statutory consultations and desk-based assessment, a total of 144 properties are identified as being supplied by PWS within the PWS Study Area, with a total of 68 sources. A list of the PWS sources identified within the PWS Study Area is provided in Appendix A.

4.2 Stage Two: Resident Consultation

The resident consultation process sought to obtain information on the PWS to inform the risk assessment. This was conducted through means of a questionnaire, an example of which is provided as Appendix D. Further information on the questionnaire and reasoning behind each of the questions is provided in the Method Statement within Appendix E.

The information obtained from the residents' questionnaires is provided as Appendix B. A total of 64 questionnaire responses were received from the initial mail shot. A further 13 questionnaire responses were received as a response to the follow-up letters.

4.3 Desk-based Assessment

4.3.1 Screening Process

Following completion of consultation and prior to site visits to determine the location of PWS and source points, a desk-based assessment is conducted to determine the hydrological and hydrogeological connectivity of the source point and source catchment to the Development. In essence, all PWS and sources which are screened-out are attributed a magnitude of effect of negligible under a risk assessment on the basis of a non-existent pathway in the 'source-pathway-receptor' model.

The assessment of connectivity for each of the identified sources is provided as Appendix C with details and justification for screening the source in or out of the risk assessment.

Table 10.1 of Appendix C details 11 sources which are determined as requiring a risk assessment serving 9 PWS.

Table 10.2 of Appendix C lists the sources which do not require a risk assessment and provides a justification for screening-out these PWS from further risk assessment.

Table 10.3 of Appendix C details sources where limited information was obtained during the consultation, site visit and desk-based assessment and the source location is unknown. Table 10.3 details the justification and any assumptions made for screening these PWS in or out of the risk assessment process.

PWS which are considered to have the potential to be hydrologically connected to the Development are risk assessed, as documented in Section 5.2 to Section 0. The plates provided in Section 5 for the assessment of each PWS show the location of each PWS in relation to the site boundary and windfarm infrastructure. In line with SEPA guidance note 31[28] to assess potential risk, two sets of buffers are shown surrounding the infrastructure which show areas within 100 m of excavations less than 1m deep (shown as a solid black line), as well as areas within 250 m of excavations deeper than 1 m (shown as a dashed black line).

[28] SEPA (2017) Land Use Planning System (lups) SEPA Guidance Note 31 2017: Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems Version 2 [Online] Available at: https://www.sepa.org.uk/media/143868/lupsgu31_planning_guidance_on_groundwater_abstractions.pdf (Accessed 03/03/2020)

4.4 Site Visits

Site visits were conducted for 9 sources, which supply to a total of 28 properties, as listed in Table 4.1. A number of source catchment areas and abstraction points were also visited and surveyed through public access routes.

Table 4.1: Site Survey Summary

Ref.	Source Name	No. of Properties	Date	Lead Resident / Consultee in Attendance	Applicant Party in Attendance
145	Harehope A & B	5	17-Aug-20	Yes	Arcus
97	Darnhall Mains	5	17-Aug-20	Yes	Arcus
19	Cowieslinn 1 & 2	5	18-Aug-20	Yes	Arcus
45	Little Dean	1	03-Sep-20	Yes	Arcus
7	Flemington Farm	3	03-Sep-20	Yes	Arcus
68	Foresthill (Woodbank)	2	03-Sep-20	Yes	Arcus
44	Earlyvale	2	03-Sep-20	No	Arcus
114	Stewarton & Upper Stewarton	4	23-Sep-20	Yes	Arcus
65	Cloich Farm	1	23-Sep-20	Yes	Arcus

5 RISK RATING

5.1 PWS

5.1.1 Earlyvale House

Earlyvale House PWS supplies two properties at Earlyvale House and Earlyvale Garden Cottage for domestic and livestock uses. The source is located at grid reference NT 23389 50365, approximately 1 km west from the properties, adjacent to the Shiplaw Burn, as shown in Plate 1. The source water is collected into a settlement tank at source and is distributed to the properties (supply point) via a shallow underground pipe.

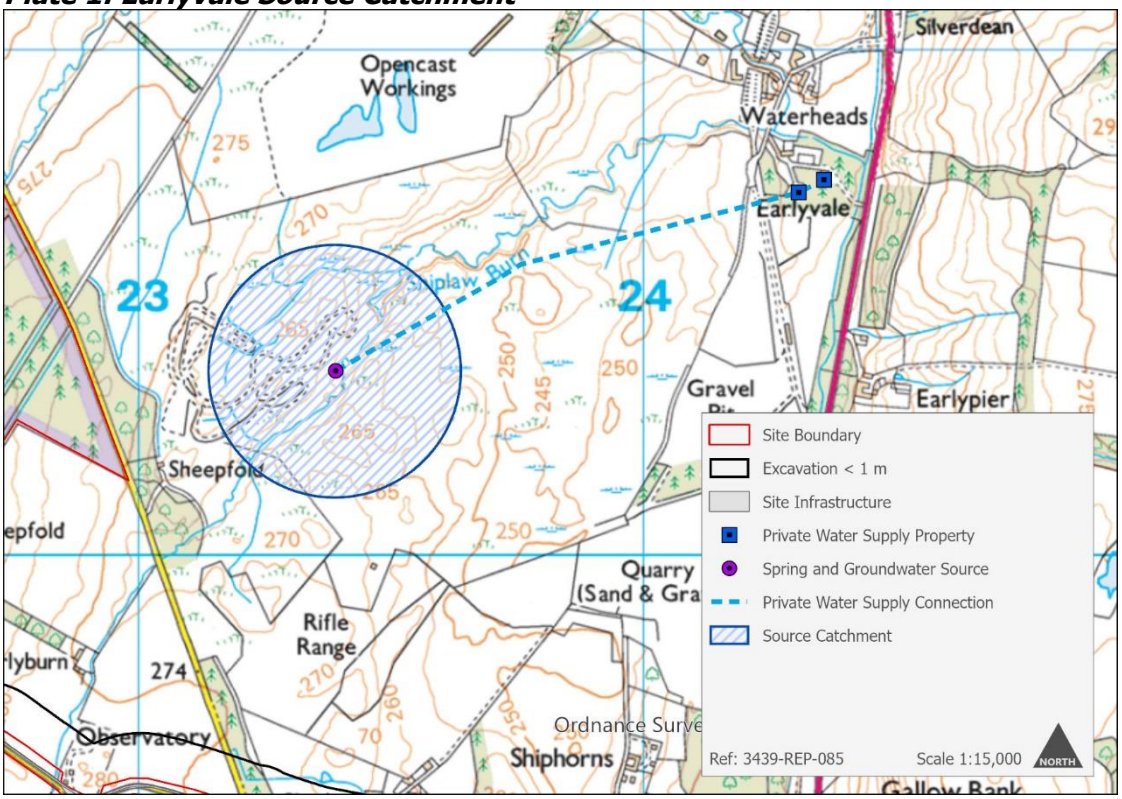
The source is a groundwater spring, although it is not confirmed whether it is associated with the bedrock Kirkcolm Formation (wacke) or the overlying superficial deposits comprising higher permeability glaciofluvial deposits (sands & gravels) and lower permeability Devensian Till. The Kirkcolm Formation is a low productivity aquifer, meaning it is only water-bearing in weathered areas at surface and in fractures or faults. The BGS 1:50,000 map does not map linear faults at this location, which can often be associated with spring sources. The Kirkcolm Formation has a groundwater vulnerability class of 3, meaning it is vulnerable to some pollutants but many significantly attenuated in the bedrock unit resulting in a slower travel time of any pollutants.

The source for the spring supply is likely to be a combination of surface water infiltration, underlying glaciofluvial sands & gravels which are likely to be in hydrological connectivity with the surface waters of the Shiplaw Burn, with potential connectivity to the underlying bedrock deposits. As such, the wider surface water catchment of the Shiplaw Burn will also be assessed in relation to this PWS.

The sensitivity for the supply at Earlyvale House is classified as Medium, based on groundwater vulnerability class.

In terms of the proposed infrastructure, the spring source location and settlement tank are located approximately 890 m downslope of the proposed upgrade to the public road at its closest point. The access track crosses the Shiplaw Burn at NT 22393 49816. If connected to the Shiplaw Burn, there is potential for short term changes to water quality during the construction phase as the supply is located downstream. However, due to the distance from the nearest infrastructure, local topography and lack of hydrogeological connectivity, there is unlikely to be long term changes to water yield at the supply.

Plate 1: Earlyvale Source Catchment



5.1.2 Upper Stewarton

Upper Stewarton private water source supplies one property by the same name. Despite several attempts to confirm the source of Upper Stewarton no response was received from the residents and information on the source has been obtained from neighbouring residents as well as the 2015 Cloich Forest Wind Farm Private Water Supply Risk Assessment[20], which states that the supply is a river abstraction at NT 321681 646139 along the Stewarton Burn, located north of the property.

The source catchment is defined as the upstream surface water catchment of the Stewarton Burn and associated tributaries to the west of Pratstile Rig and south of Kilrubie Hill, as outlined in Plate 2a.

The area is underlain by a combination of low permeability Devensian Till deposits and areas with no superficial deposits, with the Portpatrick Formation wacke deposits underlying these. The groundwater vulnerability within this area is classified as 5 with the bedrock aquifer productivity classified as Low.

The sensitivity for the supply at Upper Stewarton is classified as Very High, based on the supply being solely supplied by surface water.

In terms of proposed infrastructure in relation to the source, the source catchment is within 250 m of excavations >1 m deep associated with T4 foundations, however all works associated with T4 are considered to be hydrologically separated from the Stewarton Burn catchment by the surface water catchment boundary and topographical ridge. This is shown on Plate 2b.

Due to the lack of hydrological connectivity to the catchment and distance between the supply and proposed infrastructure, there is unlikely to be any impact on the supply at Upper Stewarton.

Plate 2a: Upper Stewarton Source Catchment

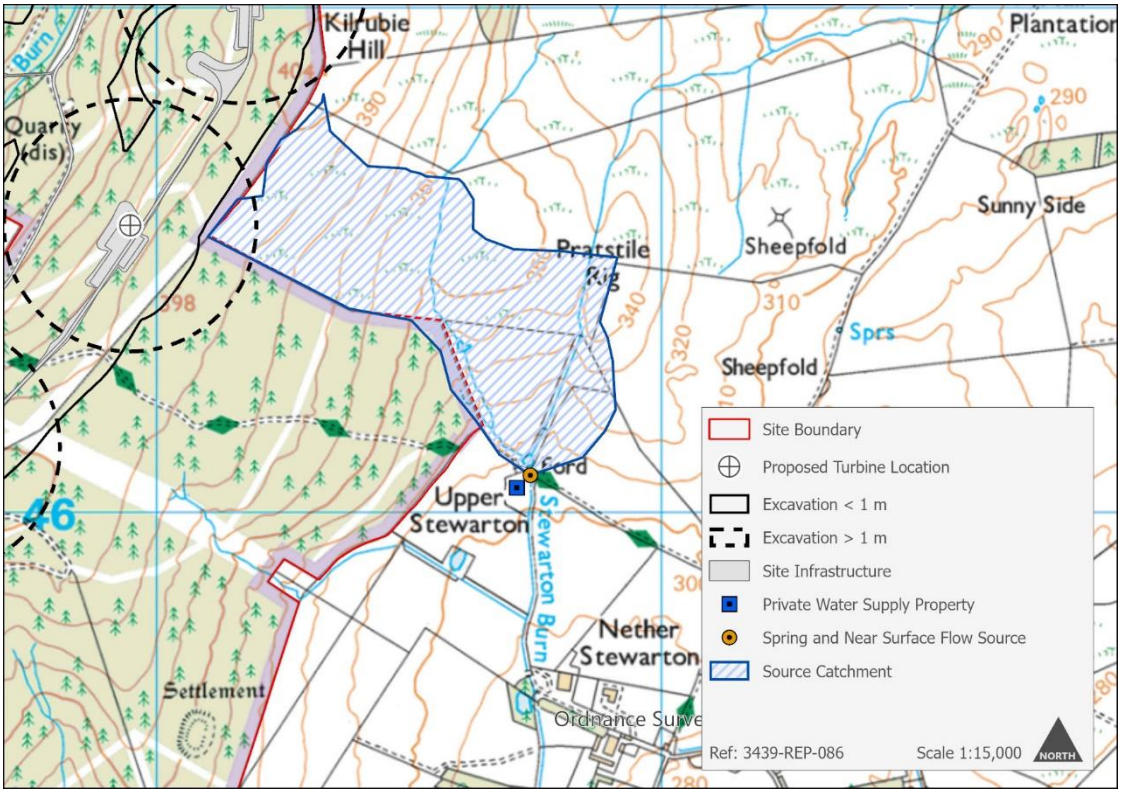
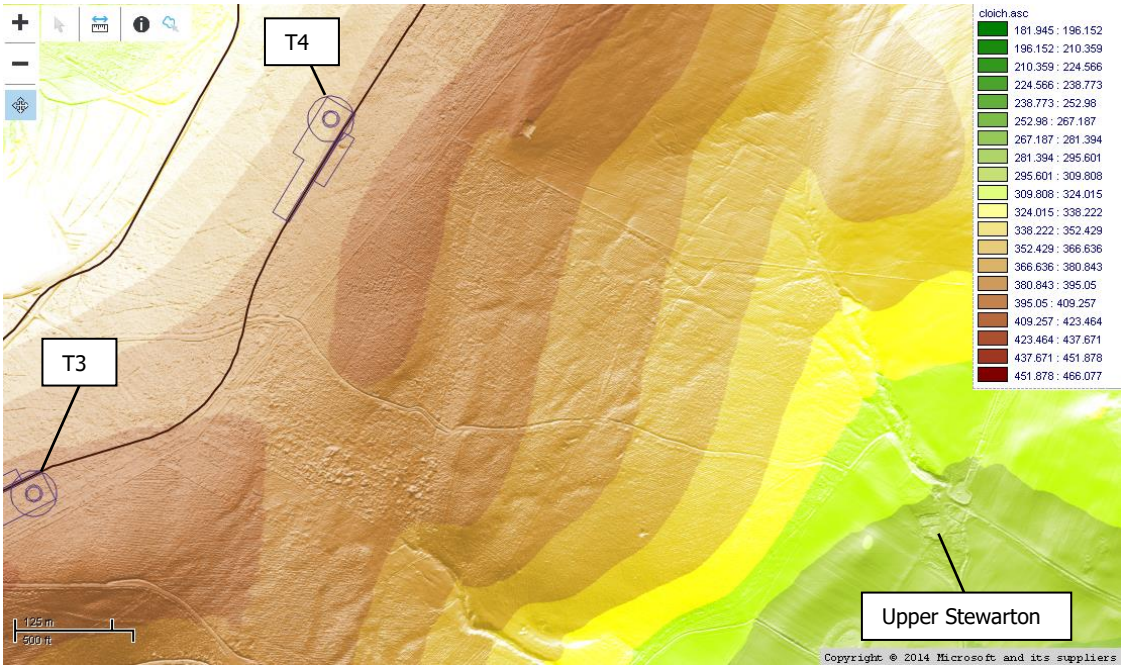


Plate 2b: Upper Stewarton Topography



5.1.3 Cloich Farm

Cloich Farm PWS provides to one property and associated farm buildings for domestic and livestock use. The source is a groundwater spring, located at NT 21298 48743. Another spring source, located at NT 21178 48614, is within the deeds of the property, however is not currently connected to the property. This source point and subsequent source catchment is also assessed.

The water is collected at source in a settlement tank and distributed north-east to the property. From discussions with the supply owner, the distribution infrastructure associated with the PWS (pipes) run parallel to the existing tracks in the field to the north, located at a shallow depth underground.

The area is underlain by a combination of low permeability Devensian Till deposits and areas with no superficial deposits, with the Kirkholme Formation wacke deposits underlying these. The groundwater vulnerability within this area is classified as 4b - 5 with the aquifer productivity classified as Low.

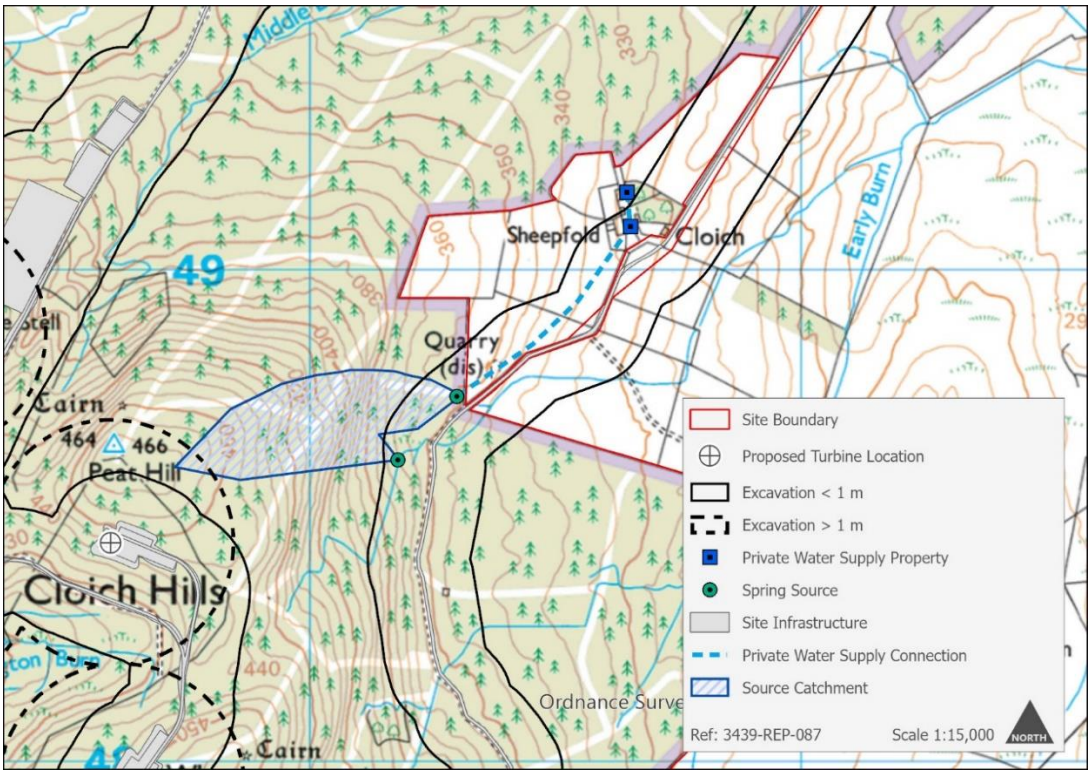
The spring is considered to be supplemented by a combination of near-surface flow, surface water run-off with the potential for the supply to be supported by the underlying fractured bedrock aquifer, particularly as the catchment area upslope is relatively small and primarily used for forestry which will reduce infiltration rates. The source water catchment is outlined in Plate 3.

The sensitivity for the supply at Cloich Farm is classified as High, based on groundwater vulnerability class.

In relation to the proposed infrastructure, the source water catchment is located within a 100 m infrastructure buffer zone associated with excavations <1 m deep, however the source catchment is considered to be located upstream of works associated with the Development.

Upgrades to tracks in this area have the potential to impact the distribution infrastructure of the Cloich Farm PWS.

Plate 3: Cloich Farm Source Catchment



5.1.4 Foresthill (Woodbank)

The Foresthill (Woodbank) supplies two properties of Foresthill and Woodbank for domestic and livestock use. The source is a groundwater spring source, however consultation with the supply owner has confirmed the location of spring is not known. Shallow horizontal pipes collect water in a gravity-fed system from a catchment area to the west of the properties, as shown in Plate. The extent of the gravity-fed piped system is not known, and the catchment is considered to represent the potential catchment which could feasibly be supplied by gravity (i.e. in line with topography).

The water collects in a tank at the Woodbank property at NT 23909 49025, there is evidence of a continuous moderate flow from the pipe into this chamber.

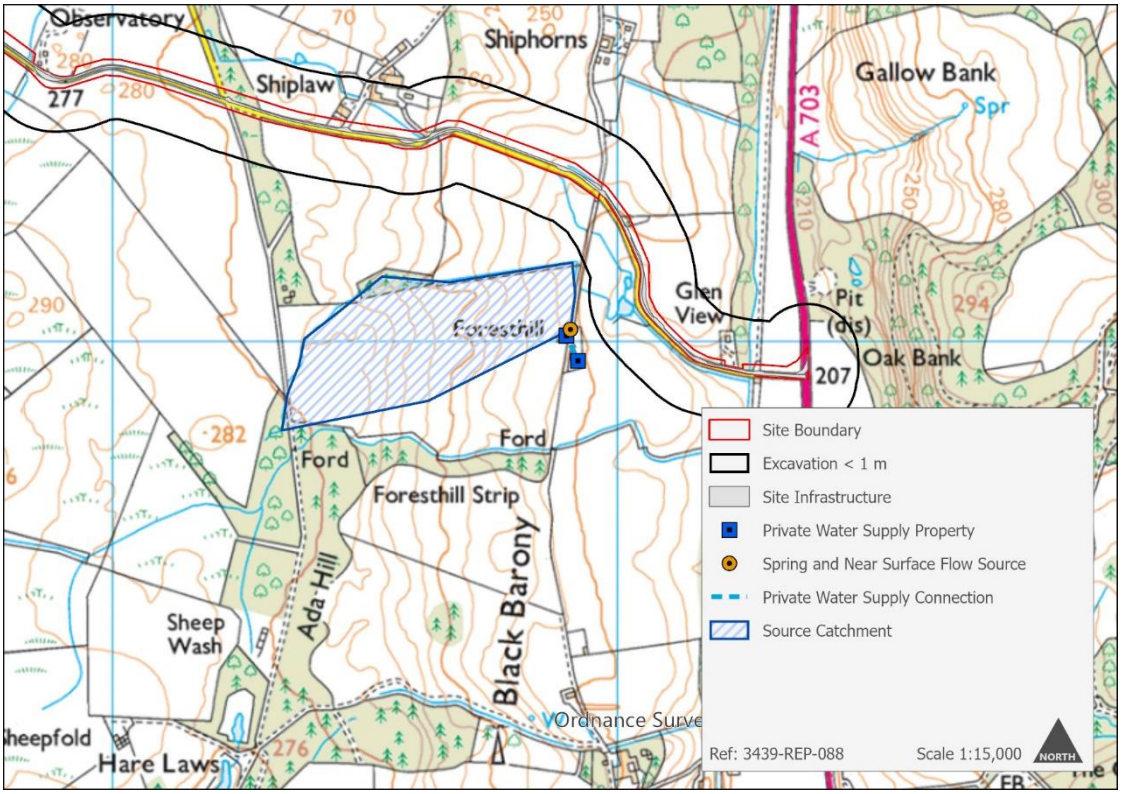
Residents indicated that the supply does not dry up in drought or low rainfall periods, suggesting the supply is fed by a combination of both surface water infiltration and superficial / bedrock aquifer, which are less responsive to rainfall events due to the lag time of groundwater recharge.

The groundwater vulnerability within this area is classified as 4b.

The sensitivity of the supply at Foresthill (Woodbank) is classified as High, based on groundwater vulnerability class.

In relation to the proposed infrastructure, whilst the source location has not been confirmed, the source catchment is not likely to be within an infrastructure buffer zone and is also not considered to be hydrologically connected to the Development i.e. works are down-gradient from the source.

Plate 4: Foresthill (Woodbank) Source Catchment



5.1.5 Darnhall Mains (& Whitelawburn)

The Darnhall Mains (& Whitelawburn) supply provides water to five households for domestic and livestock uses. The source has been identified as groundwater springs and near-surface flow collected in a network of pipes and into a settlement tank.

The exact location of springs was not identified. The supply is a piped gravity-fed system, and the source catchment is defined as the wider surface water catchment of which the springs are considered to be located in. The location of the distribution infrastructure is also not known; however, it is not considered to be in proximity to construction activities.

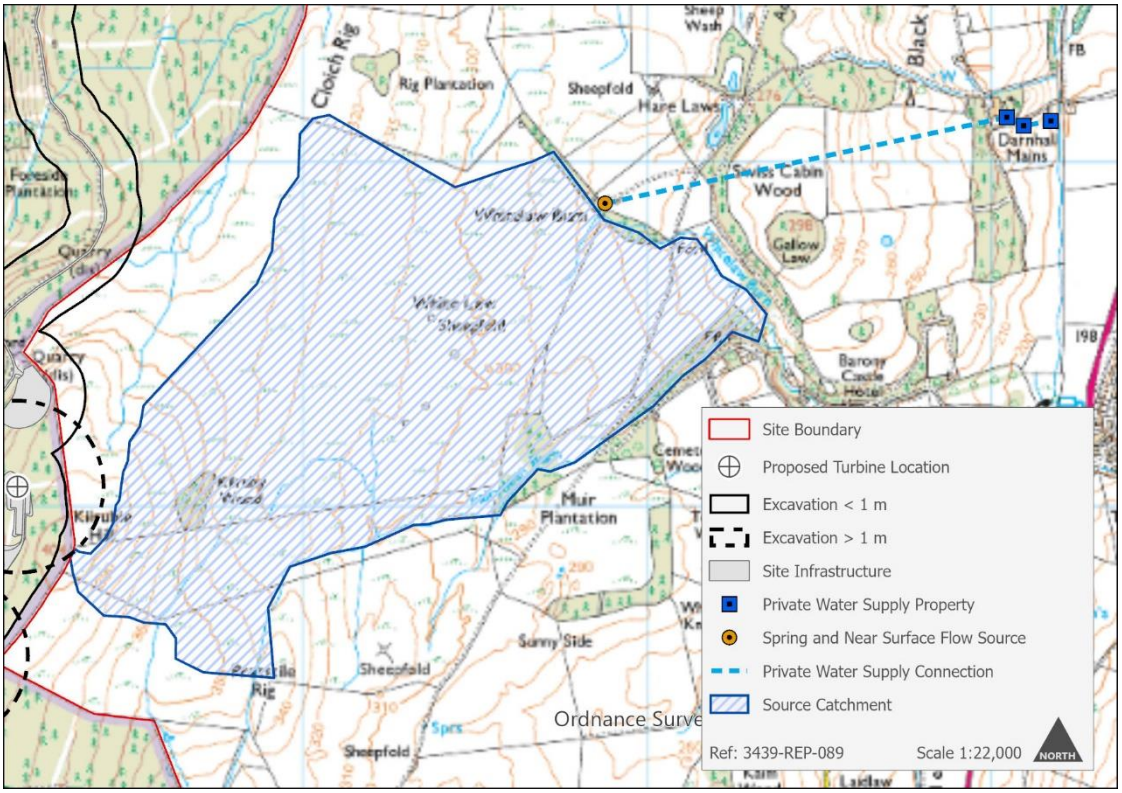
The groundwater unit is of the Kirkcolm Formation (wacke) and Moffat Shale group, overlain by lower permeability glacial till superficial deposits. The aquifer is of low productivity, limited to water in fractures and fault zones. The groundwater unit is of vulnerability class 4b, meaning it is vulnerable to those pollutants not readily adsorbed or transformed.

Springs supplying the Darnhall Mains supply are likely sourced from a combination of weathered fractured bedrock and a series of water-bearing faults within the source catchment area, as shown on Plate 5, potentially resulting in a line of springs in orientation with the fault.

The sensitivity of the supply at Darnhall Mains (& Whitelawburn) is classified as High, based on groundwater vulnerability class.

In relation to the Development, the surface water catchment is not located within the infrastructure buffer zones and is hydrologically disconnected by the Early Burn catchment. The infrastructure buffer zones do not extend into the source catchment area of the spring line, with the distance and intervening topography unlikely to impact the superficial and bedrock aquifer within the source area.

Plate 35: Darnhall Mains (& Whitelawburn) Source Catchment



5.1.6 Black Barony Home Farm

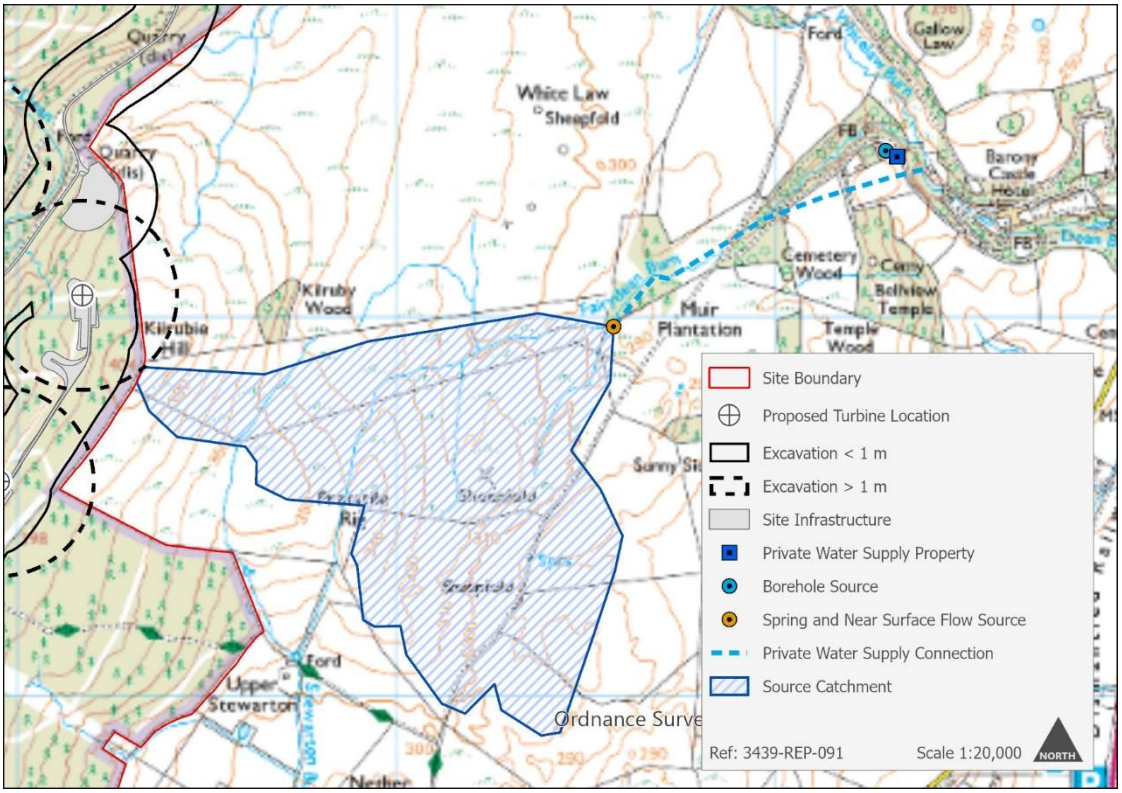
Black Barony Home Farm has two sources serving one property. The first primary source is a 45 m deep groundwater borehole and is considered to not be at risk from the Development due to the depth of the screened intake and due to the distance from the scheme (2 km from the closest infrastructure associated with the Development).

The area features a groundwater vulnerability of class 4b.

A secondary supply source to the property is from a surface water offtake from the Fairydean Burn. The source water catchment for the primary and secondary supplies are shown in Plate 6a. The collection point (intake) is located at approximately NT 22569 46979 and then piped to the property of Black Barony Home Farm.

The sensitivity of the supply at Black Barony Home Farm is classified as High based on groundwater vulnerability class.

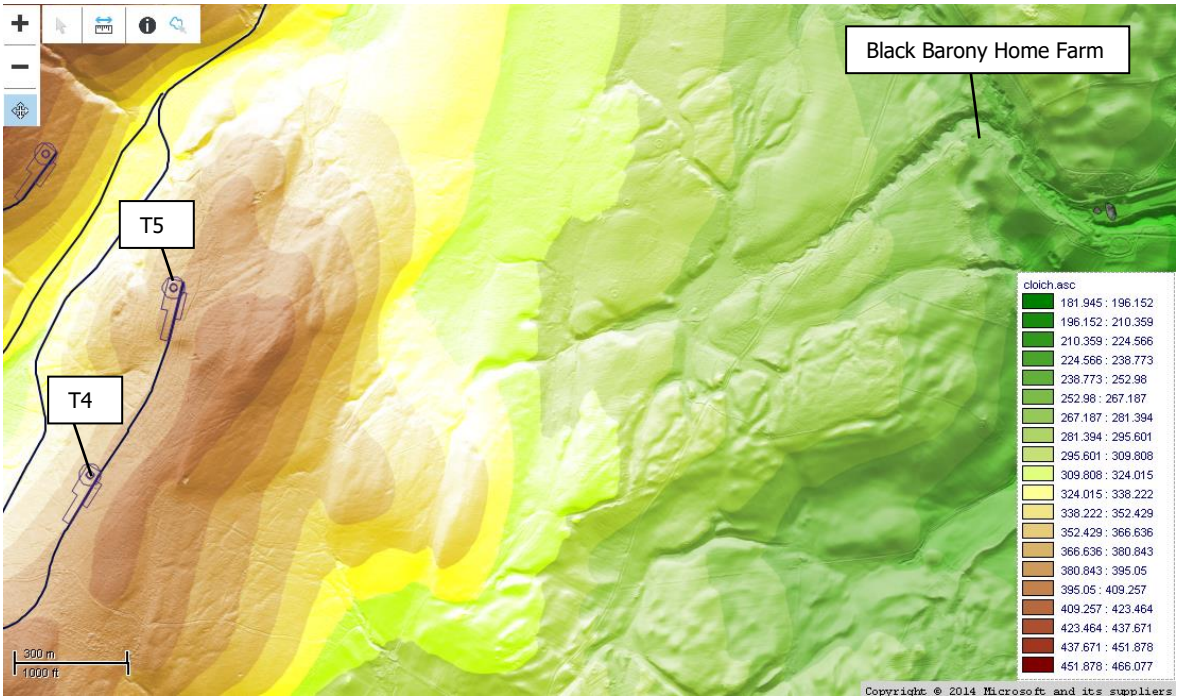
Plate 6a: Black Barony Home Farm Source Catchment



All infrastructure associated with the Development is hydrologically disconnected from the Fairydean Burn catchment (and source catchment of the PWS) by the catchment watershed boundary and topographical high of Kilrubie Hill. The source of the PWS drains north and east, whilst any run-off from the Development would drain west in the Courhope Burn catchment, as shown in Plate 6b.

The sensitivity of the supply at Black Barony Home Farm is classified as High, based on the groundwater vulnerability class.

Plate 6b: Black Barony Home Farm Topography



5.1.7 Earlyburn

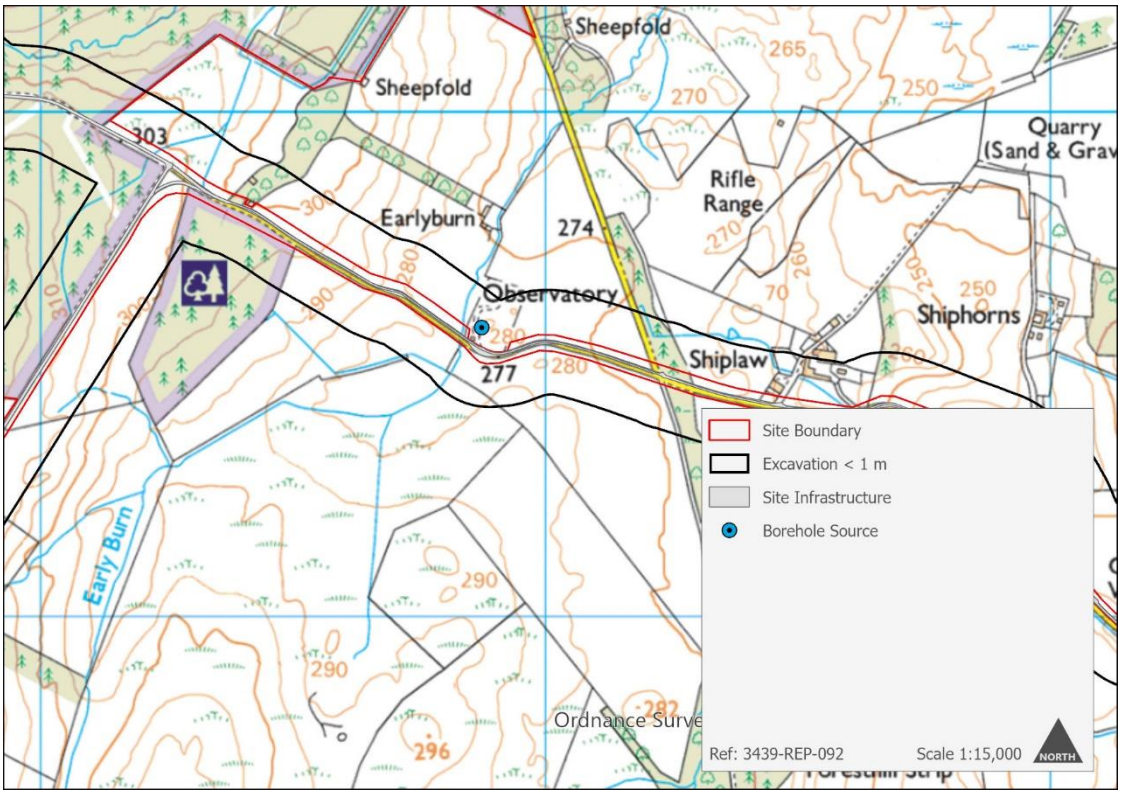
The Earlyburn (Observatory) PWS features borehole supply to 25 m depth (with an active pump at the base of the borehole), supplying to one property. The borehole is located on the property at approximately NT 22873 49574 and is within 100 m of the existing unnamed road. The borehole is relatively shallow (25 m deep) located adjacent to the Early Burn.

Alluvium and glaciofluvial superficial deposits, consisting of sands and gravels, overlay the bedrock aquifer at this location, with these units featuring moderate to higher permeability deposits. The bedrock aquifer is of the Kirkcolm Formation, featuring a low productivity aquifer with flow via secondary fractures and faults. The groundwater vulnerability class ranges from Class 3 to Class 4, suggesting it is vulnerable to pollutants which are not readily adsorbed or attenuated. A source catchment of 250 m is applied around the borehole, as shown in Plate 7.

The sensitivity of the supply at Earlyburn is classified as High, based on the groundwater vulnerability class.

In relation to the Development, the borehole is located approximately 17 m north of the existing public road where improvement / widening works are planned. The planned works (< 1m depth) have the potential to impact the quality of the supply due to its proximity to works, with the supply location shown within the 100 m buffer zone applied.

Plate 7: Earlyburn Source Catchment



5.1.8 Shiplaw & Shiphorns

The Shiplaw & Shiphorns supply(ies) are understood to supply five properties; Shiplaw Farm, Shiplaw Cottage, Glenview, Shiphorns Farm and Shiphorns Cottage. The source, which is registered with the Council as comprising two separate sources, is considered to be a groundwater spring located at NT 23203 50181 in a brick housing structure, and distributed from this point to the properties via piped infrastructure. The location of the infrastructure is not known and the distribution network illustrated on Plate is inferred. No response was received from residents of these properties during the consultation period and information on the source has been provided by neighbouring residences and through telephone consultation in March 2021.

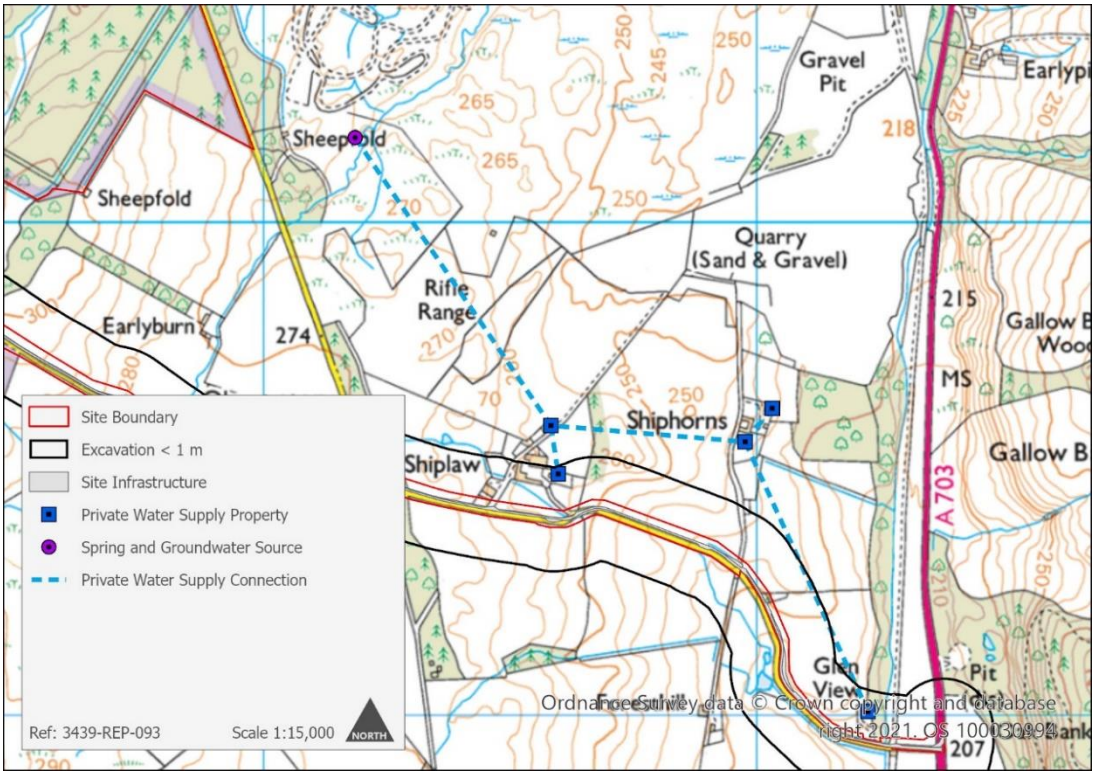
The bedrock unit is of the Kirkcolm Formation (wacke), which is a low productivity aquifer with groundwater flow primarily secondary fractures and faults. The BGS 1:50,000 map does not map any fault lines within this area and a 250 m source catchment is established for the groundwater spring, as shown on Plate 8.

The area features a groundwater vulnerability of class 4b, with the underlying bedrock classified by the BGS as having a low productivity 'Class 2C', featuring highly indurated greywackes with limited groundwater in near surface weathered zone and secondary fractures. As the bedrock unit is of low productivity, it is considered likely that the source water is partially sourced from the overlying glaciofluvial deposits (sands and gravels) which are more likely to be water-bearing and interact with the surface waters of the Shiplaw Burn. As such, the wider catchment of the Shiplaw Burn is also assessed in regards to risk from the Development, due to the widening works on the public road in proximity to Earlyburn.

The sensitivity of the supply at Shiplaw and Shiphorns is classified as High, based on groundwater vulnerability class.

As the supply is located approximately 650 m north of the nearest infrastructure, where track upgrades are proposed, with no hydrological connection to this area there is unlikely to be any impact to this supply.

Plate 8: Shiplaw & Shiphorns Source Catchment



5.1.9 Harehope

The Harehope supply consists of two sources - a deep borehole (approximately 80 m depth) and a secondary source from a surface water run-off, spring and near-surface flow collection in a reservoir. The borehole was installed following forestry felling in the catchment which is considered by the residents to have caused quality and quantity impacts to the reservoir supply.

The primary borehole supply, named Harehope A, provides to Harehope Farm and Farmhouse, Harehope Steading and Old Harehope with the secondary reservoir supply used as a back-up. The secondary reservoir supply also acts as the primary supply to Harehope Cottage.

The area features a groundwater vulnerability of class 4b.

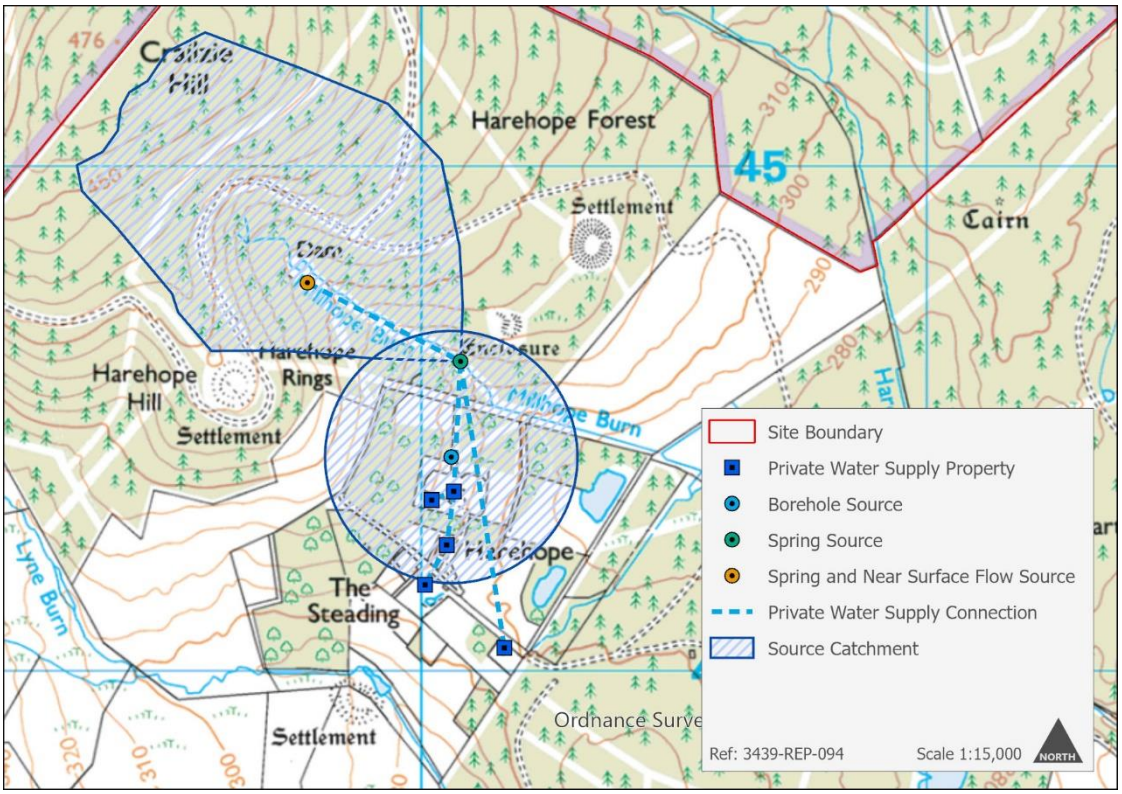
The borehole supply is not considered to be at risk from the Development, with the borehole located approximately 755 m from the Site boundary and over 1 km from the nearest infrastructure (Turbine 2), as shown in Plate 9.

The secondary supply, named for the purposes of this assessment as Harehope B, features a source point (reservoir) located at NT 19781 44775. The reservoir is considered to collect water from the wider surface water catchment of Harehope Burn including surface-water run-off, near-surface flow and potentially from springs. The water collected in the reservoir is distributed to a settlement tank at approximately NT 20076 44611 and piped in a gravity-fed system to the properties.

The source catchment, based on the intake location shown on Plate 9, is confined to the south-eastern slopes of Crailzie Hill and considered to be hydrologically disconnected from the Development by the watershed boundary of the Harehope burn. All drainage from the Development will drain north and west, with no hydrological connection to the supply.

The sensitivity of the supply at Harehope is classified as High, based on groundwater vulnerability class.

Plate 9: Harehope B Source Catchment



5.1.10 Nether Stewarton

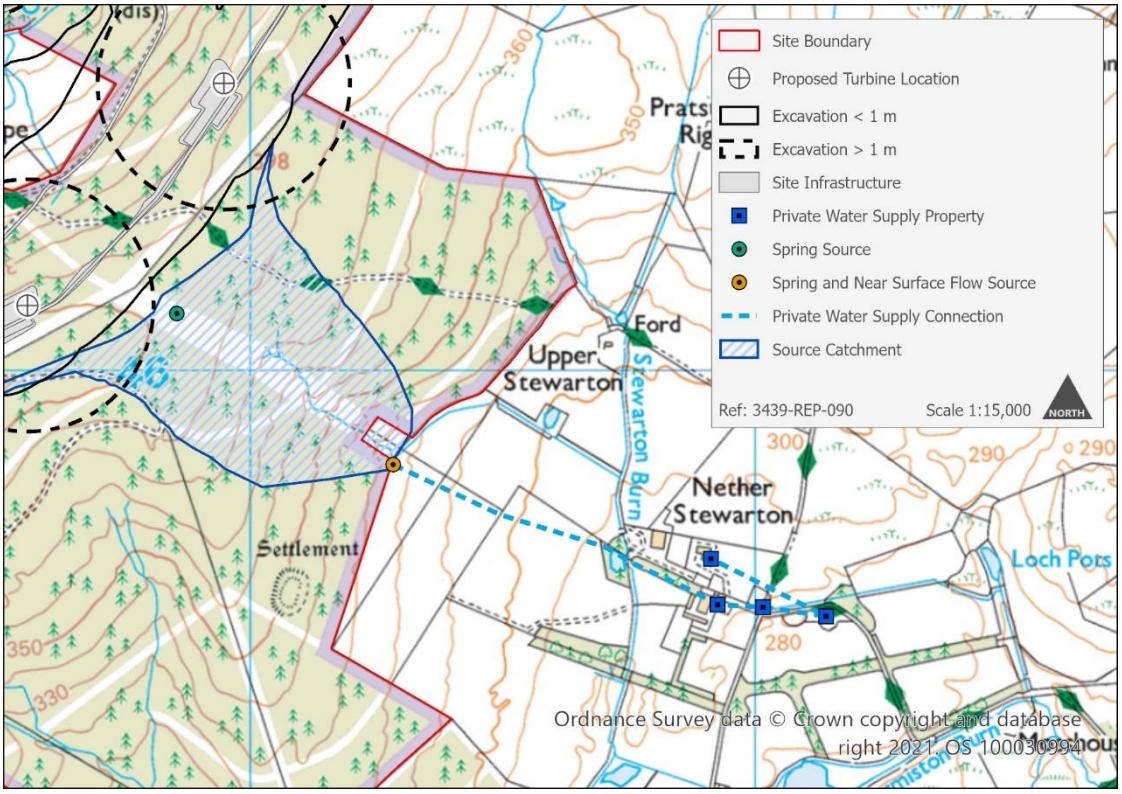
Supply

The Stewarton PWS provides water to four properties for domestic and livestock purposes - Stewarton Lodge, Stewarton Toll, Stewarton House and Nether Stewarton.

All properties are supplied by a combination of sources from surface-water and run-off associated with a minor tributary of Stewarton Burn, near-surface flow and groundwater springs. Water is collected in a header tank at approximately NT 21290 45829 (at approximately 330 m AOD) and distributed to the properties in a gravity-fed pipe system which is located underground. The exact location of the piped infrastructure is not known and the distribution infrastructure exhibited on Plate 10a is indicative only. Several previous studies have also been unsuccessful in locating the underground pipe network. There are reportedly a number of pipes which extend north-west from the header tank to collect water from the source catchment, the extent of this piped infrastructure is not known as the majority is installed underground.

A review of the PWSRA 2012 report identified a spring at the same approximate location (NT 213458) adjacent to the stream, comprising a newly covered well with a deep access pipe to a stop cock. The ground upstream of the well was reported to feature a number of pipes draining the valley, with one plastic pipe collecting water from the stream itself with a second ceramic pipe within the stream bed following the channel upstream.

Plate 4a: Stewarton source catchment with surface water catchments



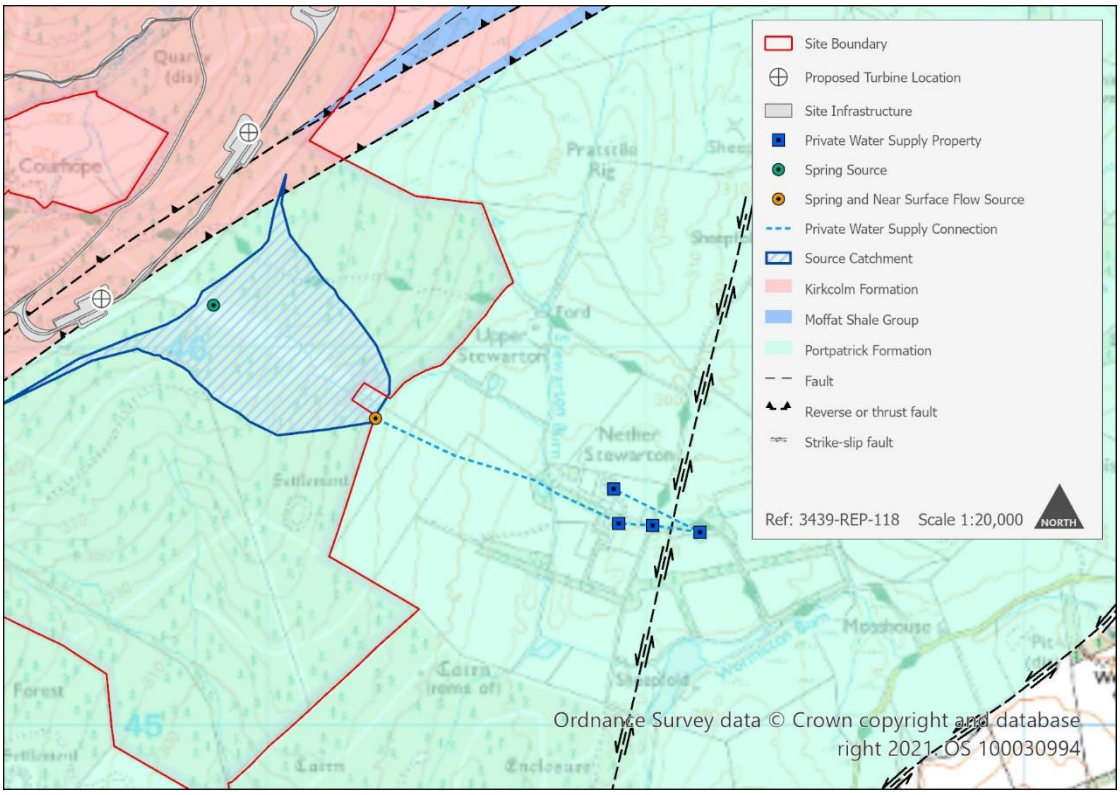
Geology and Hydrogeology

Based on the BGS report for Cloich Hill[29] the source is underlain by the Portpatrick Formation (wacke and siltstone turbidite succession) with no superficial deposits mapped in this area. BGS 1:625,000 scale mapping indicates a faultline trending north-east to south-west located approximately 800 m north, named on BGS 1:10,000 paper maps as the Leadhills fault. This separates the Portpatrick formation from the Kirkcolm Formation to the north-west. This is shown on Plate 10b.

BGS 1:625,000 Hydrogeology information shows the groundwater aquifer in this location is of the Portpatrick Formation and Glenwhargen Formation (indurated greywackes) low productivity bedrock aquifer which is stated to feature limited groundwater in near surface weathered zone and secondary fractures. Groundwater storage and flow is almost entirely via fractures, and groundwater flow paths are likely to be relatively shallow, short and localised. The groundwater vulnerability class ranges from Class 4b to Class 5, which are the most vulnerable to pollutants with rapid travel times in areas of fractures and faults.

A potential groundwater spring is located at approximately NT 20853 46113. Whilst a spring was not visible at this location during the site walkover, it is thought there is potential for a groundwater spring at this location due to the presence of potential groundwater dependent terrestrial ecosystem habitats (NVC community M6: mire and M23: rush pasture[17].

Plate 10b: Stewarton source catchment with groundwater aquifer units



Hydrology

The source catchment for the surface water and near-surface water source is outlined on Plate 10aand is representative of the catchment of the small tributary of the Stewarton Burn which is located within a forestry ride. The catchment shown in Plate 10a largely matches the indicative catchment outline provided by a resident[30]. The burn forms as a

29 British Geological Survey. Georeport: Cloich Hill. Dated March 2015 (Ref GR_210800/1)
30 J. Pratt via email 11/03/2020

defined watercourse at approximately NT 20997 46036 and drains east towards the Stewarton Burn.

Sensitivity

The sensitivity of the Stewarton supply is classified as High, based on groundwater vulnerability class and being supplied by both surface and groundwater sources.

Proposed Infrastructure

In relation to the proposed infrastructure, as the source is fed by a combination of surface and groundwater sources, potential impacts must be assessed with regards to both sources.

The nearest proposed infrastructure comprises a new access track approximately 770 m north-west and upgradient of the supply, with excavation depths anticipated at 1 m depth. Turbine 3 and its associated crane pad is located 770 m north-west and upgradient (approximately 400 m AOD), with Turbine 4 (and associated crane pad) located approximately 890 m north-west (approximately 380m AOD). The proposed infrastructure is located over the saddle of the hill approximately 50 to 80 m in elevation higher than the supply point location. Excavations associated with the turbine foundations are 24 m in diameter and a depth of 3 m (see Chapter 4 of the EIA Report for further information) to reach bedrock. Whilst no ground information is available for this area it is assumed dewatering in this area is likely to be required.

Hydrogeological connectivity

In relation to hydrogeological impacts, Turbine 3 is considered to be located within the same hydrogeological formation as the spring supply based on BGS mapping. As there are limited superficial deposits in this area, the primary aquifer of concern relates to the bedrock aquifer associated with the Portpatrick formation. This aquifer, whilst low in productivity, is present within the near surface weathered zone and secondary fractures and therefore features a relatively high vulnerability to contaminants and changes in flow upslope. Whilst the distance from the infrastructure makes any potential impacts to the supply unlikely, there is still potential for hydrogeological connectivity and therefore whilst less likely they cannot be fully eliminated given the absence of intrusive hydrogeological data pending further ground investigation and dewatering information.

This pathway is in contradiction to SEPA's previous comments that the Stewarton supply is not hydrologically linked to the Development.

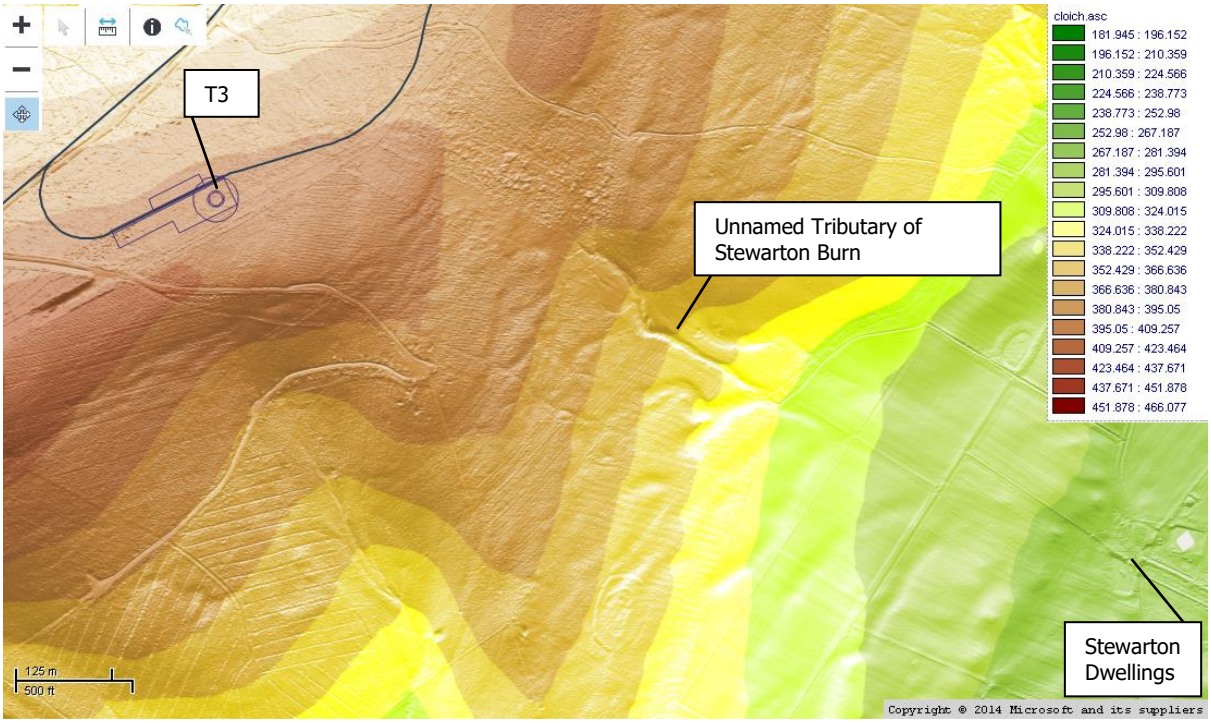
Hydrological connectivity

In relation to any surface water impacts, the Development infrastructure is hydrologically disconnected from the Stewarton source catchment by the Stewarton Burn and Courhope Burn catchment boundary, as shown in Plate 10ca. All surface water drainage from the Development at Turbines 3 and 4 will drain north away from the Stewarton source catchment.

Previous studies state that Stewarton is supplied by a narrow stream valley[31] with a piped network assumed (but not verified), while the Cloich Forest Wind Farm Private Water Supply Risk Assessment (WHS 2015) shows the supply catchment to be confined to a forestry ride. As requested by residents[32], LiDAR data (1 m resolution) has been obtained and Development infrastructure overlain, as shown in Plate10c.

31 Dr T R Nisbet. *Report on the Visit to Cloich Forest on 02 April 2012.*
32 J. Pratt. Email 11/03/2020

Plate 10c: LIDAR data in proximity to Stewarton



LIDAR elevations clearly show Development infrastructure is located outwith with surface water catchment supplying the unnamed tributary of Stewarton Burn.

Potential Impacts

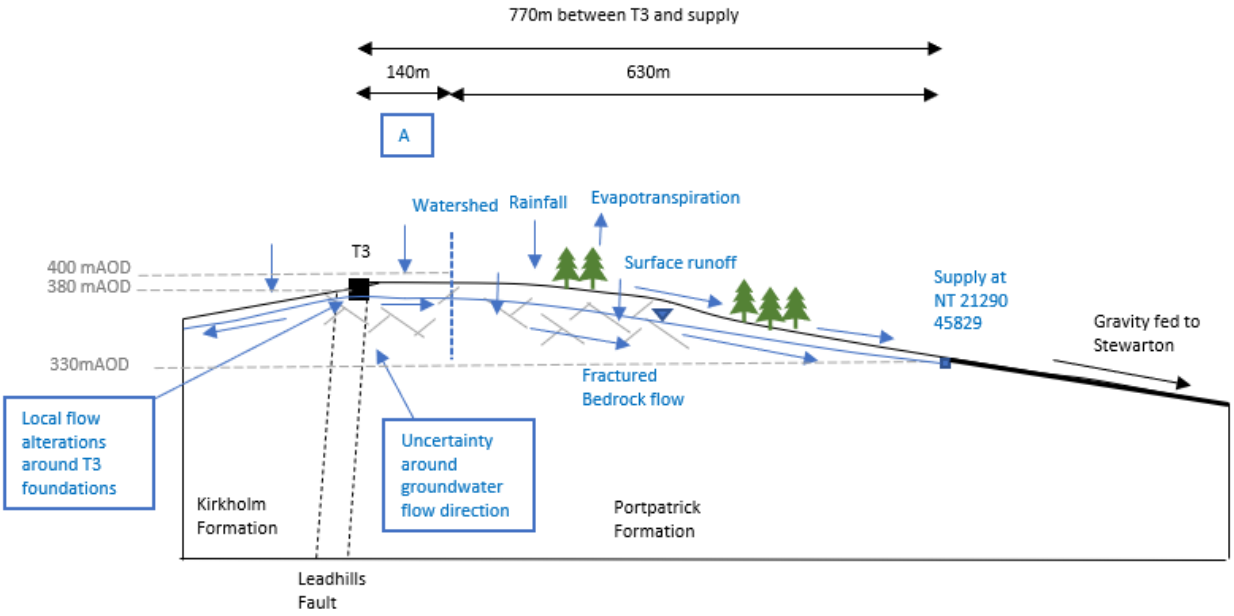
In relation to impacts to water quality relating to construction phase, whilst there is no hydrological connectivity, there is potential for the supply to be hydrogeologically connected. A number of mitigation measures will be in place during turbine base construction to prevent the ingress of concrete and other liquids, such as blinding concrete at the base of the excavation prior to concrete pouring and other good practice measures.

In relation to impacts relating to water supply yield during the operational phase, there is potential for the presence of turbine foundations and access tracks to locally alter or prevent the flow of groundwater within the wider source zone for Stewarton Farm.

In order to determine the potential impact on supply yield, the contribution of groundwater and surface water to the supply requires further consideration. A conceptual site model has been developed for the site shown on Plate 8b. There is limited information about groundwater flow at the ridge, whilst there is the assumption that groundwater flow is generally bound by the watershed, the presence of fracturing including the Leadhills fault implies groundwater flow via fractures, which may connect to the supply further downslope to the east. The foundations of Turbine 3 extend to a depth of 3 m which is likely to be within the bedrock and likely to locally prevent or obstruct groundwater flow. With this infrastructure located close to the top of the watershed on the north-western slopes (at a topographical high point) it is only likely to divert or alter a relatively small proportion of flow at this height. The majority of the surface water catchment (estimated to be over two thirds) is on the south-eastern slope and ultimately fed by rainfall from this eastern side. This portion of surface water input and groundwater flow is unlikely to be influenced by the proposed infrastructure (foundations) on the north-western slope.

The contribution source is likely to change in proportion during periods of high rainfall / wet and periods of drought. During periods of lower rainfall and drought, as there little or no rainfall contribution, the supply is likely to be sustained primarily by groundwater flow where the groundwater levels are lower, as shown in Plate 10d.

Plate 10d: Site Conceptual Model



Considering the potential impact to changes to groundwater flow and yield of supply, whilst there is potential for groundwater connectivity between the supply in the east and the area of works in the west, based on the distance and topography, a large proportion of the hydrological catchment is likely to be driven by rainfall input on the eastern slope with a smaller contribution of groundwater influence from the west.

Furthermore, in the long term, once the foundation has been completed and the exposed cut has been restored, it is anticipated that that near-surface water will migrate around the turbine foundation, under gravity and by fracture flow.

As such, the Development (T3) may lead to a noticeable but not significant change in yield particularly in times of drought, as a worst case scenario.

5.2 Sensitivity of Receptors

Table 5.1: Private Water Supply Sensitivity Rating

Ref	Supply Name	Sensitivity	Justification
44	Earlyvale House	Medium	Groundwater spring supply serving two properties. Groundwater Vulnerability Class 3. Moderately productive superficial aquifer / low productivity bedrock aquifer.
64	Upper Stewarton	High	Solely surface water source.
65	Cloich Farm	High	Groundwater spring supply serving one property. Groundwater Vulnerability Class 4 - 5.
68	Foresthill (Woodbank)	High	Groundwater spring supply serving two properties. Groundwater Vulnerability Class 4.
97	Darnhall Mains (& Whitelawburn)	High	Groundwater spring supply serving five properties. Groundwater Vulnerability Class 4. Low productivity bedrock aquifer.
114	Nether Stewarton	High	Groundwater spring source and surface water source serving four properties. Groundwater Vulnerability Classes 4 - 5.
116	Black Barony Home Farm	High	Groundwater spring supply serving one property. Groundwater Vulnerability Classes 4.
124	Earlyburn (Observatory)	High	Groundwater spring supply serving one property. Groundwater Vulnerability Classes 4. Moderate to Highly productive superficial aquifer / low productivity bedrock aquifer.
130 & 115	Shiplaw & Shiphorn	High	Highly productive superficial aquifer / low productivity bedrock aquifer. Supplemented by surface water abstraction.
145	Harehope A	High	Groundwater vulnerability of class 4b Low productivity bedrock aquifer.
145	Harehope B		

5.3 Magnitude of Effects

Table 5.2: Private Water Supply Magnitude of Effect Rating

Ref	Source Name	Magnitude of Effect	Rationale
44	Earlyvale House	Low	Construction activities within catchment relate to minor track upgrades which are considered to not result in substantial alteration to baseline conditions. i.e. *changes to quality, quantity or continuity do not result in a perceptible alteration to baseline conditions*.
64	Upper Stewarton	Negligible	No effect from Development to water quality, quantity or continuity on the basis of hydrologically disconnected and non-existent pathway in the 'source-pathway-receptor' model.
65	Cloich Farm	High	Potential for access track upgrade to cause severance of PWS distribution infrastructure. Supply source not at risk as it is upgradient of works.
68	Foresthill (Woodbank)	Negligible	No effect from Development to water quality, quantity or continuity on the basis of hydrologically disconnected and non-existent pathway in the 'source-pathway-receptor' model.
97	Darnhall Mains (& Whitelawburn)	Negligible	No effect from Development to water quality, quantity or continuity as no hydrological connection and unlikely to be hydrogeologically connected in the 'source-pathway-receptor' model.
114	Nether Stewarton Surface Water	Negligible	No hydrological effects from Development from surface water quality due to infrastructure being located in a separate surface water catchment from the supply source i.e. in a different watershed and. hydrological separation.
	Nether Stewarton Groundwater	Medium	Potential hydrogeological connection within the Portpatrick Formation, with nearest infrastructure along access track and Turbines 3 and 4 have the potential to impact supply. Potential for noticeable change in supply yield during operational phase (worst case scenario) i.e. *short-term (construction phase) reduction in and / or continuity of existing supplies*. Further hydrogeological assessment required at pre-construction stage based on ground investigation information and dewatering information.

Ref	Source Name	Magnitude of Effect	Rationale
116	Black Barony Home Farm	Negligible	No effect from Development to water quality, quantity or continuity on the basis of hydrologically disconnected and non-existent pathway in the 'source-pathway-receptor' model.
124	Earlyburn (Observatory)	Medium	Construction activities within catchment relate to laying of load bearing areas approximately 17 m south of the borehole i.e. *short-term reduction in quality of water supply compared to baseline (pre-construction) conditions*.
130 & 115	Shiplaw & Shiphorn	Low	Construction activities within catchment relate to minor track upgrades which are considered to not result in alteration to baseline conditions i.e. *changes to quality, quantity or continuity do not result in a perceptible alteration to baseline conditions*.
145	Harehope A	Negligible	No effect from Development to water quality, quantity or continuity on the basis of distance from the development.
145	Harehope B	Negligible	No effect from Development to water quality, quantity or continuity on the basis of hydrologically disconnected and non-existent pathway in the 'source-pathway-receptor' model.

5.4 Risk Rating

Table 5.3: Private Water Supply Risk Rating and Residual Risk Following Mitigation

Ref	Source Name	Risk	Mitigation (Detailed in Section 6)	Residual Risk
44	Earlyvale House	Minor	Water quality monitoring on the Shiplaw Burn and at supply. Good practice measures outlined in the CEMP.	Negligible
64	Upper Stewarton	Negligible	None required.	Negligible
65	Cloich Farm	Major	Watching brief to identify pipework and to protect infrastructure. Provision of alternative potable source on standby during the access track upgrade. Reinstatement of distribution infrastructure if required. Good practice measures outlined in the CEMP.	Negligible
68	Foresthill (Woodbank)	Negligible	None required.	Negligible
97	Darnhall Mains (& Whitelawburn)	Negligible	None required.	Negligible
114	Nether Stewarton Surface water	Negligible	None required.	Negligible
114	Nether Stewarton Groundwater	Moderate	Site investigation to confirm hydrogeological conceptual site model and carry out dewatering assessment at pre-construction stage. Watching brief to determine groundwater unit during excavations. Good practice measures outlined in the CEMP. Water Quality Monitoring in Stewarton Burn (tributary) and at supply. No construction works or felling associated with the Development to be undertaken within the Stewarton Burn surface water catchment.	Low
116	Black Barony Home Farm	Negligible	None required.	Negligible

Ref	Source Name	Risk	Mitigation (Detailed in Section 6)	Residual Risk
124	Earlyburn (Observatory)	Moderate	Water Quality Monitoring in Early Burn and at supply (borehole). Good practice measures outlined in the CEMP.	Negligible
130 & 115	Shiplaw & Shiphorn	Moderate	Water quality monitoring on the Shiplaw Burn and at supply. Good practice measures outlined in the CEMP.	Negligible
145	Harehope A	Negligible	None required.	Negligible
145	Harehope B	Negligible	None required.	Negligible

6 GOOD PRACTICE MEASURES

The following good practice mitigation measures will be implemented during the construction as per the WCEMP (Appendix 10.1 of the EIA Report):

- Silt traps to be installed on the down-slope side of tracks to ensure sediment is not transferred towards source catchments or into the wider hydrological system;
- Infiltration trenches to be placed down-slope of overburden and rock stockpiles and will be designed to treat run-off before discharging back into the drainage network;
- Settlement lagoons to be installed to facilitate the settlement of sediment-laden run-off from turbine foundation excavations by allowing suspended solids to settle out of the water before it is discharged to ground or a watercourse;
- Check dams and silt traps to be installed on the down-slope side of tracks up-gradient of the PWS to ensure sediment is not transferred towards the source; and
- Overburden and rock stockpiles and will not be located up-gradient of PWS sources.

Use of the following for turbine foundations:

- Use an impermeable geotextile wrapping layer around the foundation - i.e. line the shuttering with the geotextile layer, therefore limiting the contact between acidic groundwater / near-surface water and the foundation;
- Choosing the right concrete composition to make it as impermeable as possible (using limestone as the aggregate makes the concrete more resistant to acids e.g. Portland cement);
- Permanent swales and drainage ditches adjacent to access tracks will have outlets at specified intervals to reduce the volume of water collected in a single channel;
- Outfall pipes will drain into a bunded section of the drainage ditch to allow suspended solids to settle. Further measures could include the use of flocculent to further facilitate the settlement of suspended solids, if required. This would only be carried out following consultation with the local Environmental Health Officer; and
- Private Water Supply Monitoring Programme shall be implemented at supplies identified in Table 5.3 and in Section 6.1.2.

7 MITIGATION

7.1.1 Private Water Supply Monitoring Programme

A programme of water supply monitoring will be undertaken at the following properties / supplies (following agreement of the property owners):

- Earlyvale House (ref 44);
- Nether Stewarton (114);
- Earlyburn (Observatory) (ref 124); and
- Shiplaw & Shiphorn (ref 130 & 115).

The monitoring will ensure that the PWS is reinstated to baseline water quality and quantity conditions following construction phase.

The following sampling frequency is proposed:

- Once per month for 12 months prior to the construction phase at the source water, intake pipe and point of supply;
- Twice per month during the construction phase at the source water and supply point; and
- Twice per month for a period of six months following construction at the source water, new intake pipe, and point of supply.

The following water constituents will be monitored:

- pH;
- Turbidity;
- Suspended solids;
- Electrical conductivity;
- Heavy metals;
- Total Petroleum Hydrocarbons (TPH); and
- Microbiological parameters (e.coli, total coliforms and enterococci).

If required, the residents will be provided with an emergency contact sheet with the following details:

- A contact name and number of an appropriate person related to the Development; and
- A contact name and number at the environmental health department of the Council.

7.1.2 Watching brief

Where works are carried out within proximity to PWS distribution infrastructure, a 'watching brief' will be conducted during works. A 'watching brief' should be used to clearly mark any pipes which serve the property and aim to isolate pipes from construction works and avoid impact on the pipe infrastructure.

A watching brief is also to be employed during any excavation works at Turbine 3 and the access track between Turbine 3 and Turbine 4 to determine the aquifer unit and bedrock geology. This is on the basis that mapped geology may be different at a local scale.

7.1.3 Site Investigation of Stewarton

For the supply at Nether Stewarton, pre-construction investigation will be undertaken to provide information on the hydrogeological regime between the proposed works around Turbine 3 e.g. determine the location of any faults within the area. This will inform appropriate mitigation for potential impacts on water quality during construction and any potential changes to groundwater flow during operation on the supply at Nether Stewarton.

8 APPENDIX A: IDENTIFIED PRIVATE WATER SUPPLIES

Table 8.1: Identified Private Water Supplies – Scottish Borders Council Environmental Health Office

Reference	Source Name	Source/ Supply Type	No. Properties Supplied
3	Newlands House	Groundwater - spring	2
4	Halmyre Deans	Groundwater - spring	2
6	Halmyre House	Groundwater - spring	1
7	Flemington Farm	Groundwater - spring	3
8	Romanno Mains	Groundwater - spring	1
15	Grange Farm	Groundwater - spring	1
19	Cowieslinn 1	Groundwater - spring	2
22	Upper Linfall	Groundwater - borehole (36m approx..)	1
23	The Burrow	Groundwater - borehole	1
28	Dunrig	Groundwater - borehole (50m)	1
29	Waterheads	Groundwater - borehole	3
30	Railway Crossing	Groundwater - spring	1
31	Moorfoot View	Groundwater - borehole	1
32	Wester Deans	Groundwater - borehole	1
33	Easter Deans Farmhouse	Groundwater - well	1
36	Spylaw Farm	Groundwater - borehole	1
39	Linfall	Groundwater - borehole	2
41	Nether Falla Farm	Groundwater - spring	1
43	Earlypier	Groundwater - spring	2
44	Earlyvale	Groundwater - spring	2
45	Little Dean	Groundwater - spring / Near-surface flow	1
46	Cowieslinn 2	Groundwater - borehole 65m (Back-up supply: Groundwater - spring (Ref 19))	3
51	Falla Toll	Groundwater - spring	1
52	Nether Linfall	Groundwater - borehole	1
54	Silverdean	Groundwater - spring / Near-surface flow	1
56	Rudenleys House	Groundwater - spring	1
64	Upper Stewarton	Groundwater - spring / Surface water	1

Reference	Source Name	Source/ Supply Type	No. Properties Supplied
65	Cloich Farm	Groundwater - spring	2
68	Foresthill (Woodbank)	Groundwater - spring	2
71	Hattonknowe	Groundwater - spring	33
84	Mosshouses	Groundwater - spring	1
85	Fairydean Mill	Groundwater - borehole	1
97	Darnhall Mains (& Whitelawburn)	Groundwater - spring/ Near-surface flow	4
103	Milkieston	Groundwater - spring	5
104	Wormiston	Groundwater - spring	2
111	Dean Cottage	Spring & Near Surface Flow	1
114	Stewarton	Spring & Near Surface Flow	4
115	Shiphorns	Groundwater - spring	3
116	Black Barony Farm	Groundwater - borehole (45m)	1
124	Earlyburn	Groundwater - borehole	1
130	Shiplaw	Groundwater - spring	2

Reference	Source Name	Source/ Supply Type	No. Properties Supplied
135	Hillhead Cottage	Groundwater - spring	1
137	Portmore	Groundwater - spring	1
139	Stevenson Farm	Groundwater - spring	2
144	Windylaws Farm	Groundwater - spring	1
145	Harehope	Groundwater - borehole (80m) / Groundwater – spring / Surface water	5
149	Upper Kidston Farm	Groundwater - borehole	1
150	Upper Kidston	Groundwater - spring	2
153	Cowieslinn Quarry	Groundwater - borehole	1
157	Boreland Farm	Groundwater - spring	2
162	Linfall Cottage	Groundwater - well	1
164	Longcote (Burnhead)	Groundwater – spring / Surface water	1
174	Cringletie	Groundwater – spring	8
180	Kaimes	Groundwater – spring	1
181	Grange Loan	Groundwater – spring	1

Reference	Source Name	Source/ Supply Type	No. Properties Supplied
182	Garden Cottage (Eddleston)	Groundwater – spring	1
183	Woodlands	Groundwater – spring / Near-surface flow	1
188	Milkieston Toll	Groundwater - spring	1
204	West Loch	Groundwater - spring	1
169	Cringletie North Lodge	Scottish Water Mains	1
154	Whim Poultry (Glenrath – Millenium Sheds)	Scottish Water Mains	1
154	Whim Poultry (Glenrath – Processing)	Scottish Water Mains	1

Table 8.2: Identified Private Water Supplies – 2015 PWSRA & 2015 Hearing Response (Additional)

Reference	Source Name	Source/ Supply Type	No. Properties Supplied
9	Noblehall Farmhouse	Unknown	2
72	Darnhall Cottages	Groundwater - spring	1
73	Fairydean Lodge	Groundwater - borehole	1
176	Whim Farm	Unknown	1
177	The Yett	Scottish Water Mains	1

Table 8.3: Identified Private Water Supplies – 2020 Mail Shot (Additional)

Reference	Source Name	Source/ Supply Type	No. Properties Supplied
21	Linfall Stables	Groundwater - Borehole (56 m)	1
24	Hope Cottage	Unknown	1
53	The Bothy Waterheads	Groundwater - borehole	1
134	Primrose Cottage	Spring	1
199	Lilac Cottage	Unknown	1

9 APPENDIX B: RESIDENT CONSULTATION QUESTIONNAIRE RESULTS

Table 8.1: Questionnaire Results

Property Reference	Property Name	Source Reference	Source Name	Source Type	Supply Use	Treatment	No. of People	No. of Livestock
4	Halmyre Deans Farmhouse	4	Halmyre Deans	Groundwater - spring	Domestic &Livestock	UV Filter	2	Field troughs
6	Halmyre House	6	Halmyre House	Groundwater - spring	Domestic & livestock	-	7	Fields
7	Flemington Farmhouse	7	Flemington Farm	Groundwater - spring	Domestic	In house	1	-
8	Romanno Mains	8	Romanno Mains	Groundwater - spring	Domestic & livestock	UV filter	1 - 4	750
11	The Bothy (Halmyre Deans)	4	Halmyre Deans	Groundwater - spring	Domestic	UV Filter	3	-
12	Flemington Cottages	7	Flemington Farm	Groundwater - spring	-	-	-	-
19	Lamancha	19	Cowieslinn 1	Groundwater - spring	Domestic	-	3	-
21	Linfall Stables	21	Linfall Stables	Groundwater - borehole (56 m)	Domestic	UV filter & 2 particle filter	3	14
23	The Burrow	23	The Burrow	Groundwater - borehole	Domestic	UV & micron filter	3	0
28	Dunrig	28	Dunrig	Groundwater - borehole (50m)	Domestic/Livestock/Commercial	UV + Sediment filter	5+	150 - 200
36	Spylaw Farm	36	Spylaw Farm	Groundwater - borehole	Domestic	No treatment	2-4	-
38	Meadowspring	29	Waterheads	Groundwater - borehole	Domestic	UV Filter	4	0

Property Reference	Property Name	Source Reference	Source Name	Source Type	Supply Use	Treatment	No. of People	No. of Livestock
39	Bridge House	39	Linfall	Groundwater - borehole	Domestic	UV filter	6	-
43	Earlypier Farmhouse	43	Earlypier	Groundwater - spring	Domestic	UV Filter	4	0
44	Earlyvale	44	Earlyvale	Groundwater - spring	Domestic & livestock	UV Filter	4	23-40
45	Little Dean	45	Little Dean	Groundwater - spring & Near-surface flow	Domestic & livestock	UV filter	2	Variable
49	Langstrath	46	Cowieslinn 2	Borehole 65m (spring back-up -Ref 19)	Domestic	UV filter, filtration & softener	12	0
54	Silverdean	54	Silverdean	Groundwater - spring & Near-surface flow	Domestic	Cartridge Filter	2	0
61	2 Hattonknowe Farm Cottage	71	Hattonknowe	Groundwater - spring	Domestic	-	8?	-
65	Cloich Farmhouse & Farm	65	Cloich Farm	Groundwater - spring	Domestic & livestock	-	2	300
68	Woodbank	68	Foresthill (Woodbank)	Groundwater - spring	Domestic	UV Filter	10	-
71	Hattonknowe Farm	71	Hattonknowe	Groundwater - spring	Domestic & livestock	-	5	150 (winter)
43	Earlypier Farmhouse	43	Earlypier	Groundwater - spring	Domestic	UV Filter	4	0
44	Earlyvale	44	Earlyvale	Groundwater - spring	Domestic & livestock	UV Filter	4	23-40

Property Reference	Property Name	Source Reference	Source Name	Source Type	Supply Use	Treatment	No. of People	No. of Livestock
45	Little Dean	45	Little Dean	Groundwater - spring & Near-surface flow	Domestic & livestock	UV filter	2	Variable
49	Langstrath	46	Cowieslinn 2	Groundwater - borehole (65m) (back-up spring (Ref 19))	Domestic	UV filter, filtration & softener	12	0
54	Silverdean	54	Silverdean	Spring & Near Surface Flow	Domestic	Cartridge Filter	2	0
61	2 Hattonknowe Farm Cottage	71	Hattonknowe	Groundwater - spring	Domestic	-	8	-
65	Cloich Farmhouse & Farm	65	Cloich Farm	Groundwater - spring	Domestic & livestock	-	2	300
68	Woodbank	68	Foresthill (Woodbank)	Groundwater - spring	Domestic	UV Filter	10	-
71	Hattonknowe Farm	71	Hattonknowe	Groundwater - spring	Domestic & livestock	-	5	150 (winter)
72	2 Darnhall Cottages	72	Darnhall Cottages	Groundwater - spring	Domestic	UV Filter	3	-
73	Fairydean Lodge	73	Fairydean Lodge	Groundwater - borehole	Domestic	UV Filter	6	0
86	Stewarton Toll	114	Stewarton	Groundwater - spring & Near-surface flow	Domestic	-	1	-
90	Foresthill	68	Foresthill (Woodbank)	Near-surface flow (Horizontal pipes (approx. 5ft deep))	Domestic & livestock & commercial	UV & particulate	5	10

Property Reference	Property Name	Source Reference	Source Name	Source Type	Supply Use	Treatment	No. of People	No. of Livestock
91	Milkieston Farm	103	Milkieston	Groundwater - spring	Domestic & livestock	No treatment	5 houses	1100
97	Darnhall Farm	97	Darnhall Mains Farm (& Whitelaw Burn)	Groundwater - spring & Near-surface flow	Domestic & livestock	-	5 houses	200-300
103	Milkieston Farmhouse	103	Milkieston	Groundwater - spring	Domestic	-	4	500
111	Dean Cottage	111	Dean Cottage	Groundwater - spring & Near-surface flow	Domestic	Filter, UV filter & acidity regulator	2	-
112	Sunnybrae	71	Hattonknowe	Groundwater - spring	Domestic	-	1	0
113	Fearn Cottage	71	Hattonknowe	Groundwater - spring	Domestic	None	2	-
114	Nether Stewarton	114	Stewarton	Groundwater - spring & Near-surface flow	Domestic & livestock	-	2	1160
116	Home Farm	116	Black Barony Farm	Groundwater - borehole (45m)	Domestic	UV Filter	4	
124	Earlyburn House	124	Earlyburn	Groundwater - borehole	Domestic	UV & Carbon filter	1	
131	Meldon View	103	Milkieston	Groundwater - spring	Domestic/Livestock/Commercial	UV & Filter	6 houses	
134	Primrose Cottage	134	Primrose Cottage	Groundwater - spring	Domestic	UV & Filter	2	0
139	Stevenson Farmhouse	139	Stevenson Farm	Groundwater - spring	Domestic & livestock	Sand filter (UV?)	2	
140	Stevenson Cottage	139	Stevenson Farm	Groundwater - spring & Near-surface flow	Domestic & livestock	UV filter	2 houses	1100

Property Reference	Property Name	Source Reference	Source Name	Source Type	Supply Use	Treatment	No. of People	No. of Livestock
143	Harehope Steading	145	Harehope	Groundwater - borehole (80m)	-	Filter + UV	-	-
144	Windylaws Farmhouse	144	Windylaws Farm	Groundwater - spring	Domestic/Livestock/Commercial	UV	17	300
145	Harehope Farmhouse	145	Harehope	Groundwater - borehole	Domestic	UV & Filter	10	-
150	2 Upper Kidston (The Bungalow)	150	Upper Kidston	Groundwater - spring	Domestic/Livestock	UV & Strainer	5	200-300
151	Harehope Cottage	145	Harehope	Groundwater – spring & Near-surface flow & Surface water run-off	Domestic	Settling tank/boiling water	Holiday home	-
153	Coweislinn Quarry (Office)	153	Cowieslinn Quarry	Groundwater - borehole	Commercial	-	11	-
154	Glenrath Farm (Millenium Poultry)	-	-	Scottish Water Mains	-	-	-	-
156	Alridge	71	Hattonknowe	Groundwater - spring	Domestic	-	2	-
162	Linfall Cottage	162	Linfall Cottage	Groundwater - well	Domestic	UV filter, carbon	2	0
166	Cringletie Howe	174	Cringletie	Groundwater - spring	Domestic & livestock	-	8 - 10	16
167	Cringletie Farm Cottage	174	Cringletie	Groundwater - spring	Domestic & livestock	-	8 - 10	16
168	Cringletie House Hotel	-	-	Scottish Water Mains	-	-	-	-

Property Reference	Property Name	Source Reference	Source Name	Source Type	Supply Use	Treatment	No. of People	No. of Livestock
169	Cringletie North Lodge	-	-	Scottish Water Mains	-	-	-	-
172	Ardean	-	-	Scottish Water Mains	-	-	-	-
174	Cringletie Farm	174	Cringletie	Groundwater - spring	Domestic & livestock	-	8 - 10	16
175	Harehope Farm	145	Harehope	Groundwater - borehole (80m)	Domestic	Filter + UV	-	-
177	The Yett	-	-	Scottish Water Mains	Domestic	-	8	-
192	Keeper's Lodge, Cringletie	174	Cringletie	Near-surface flow & Surface water run-off	Domestic	0.2um filter	2-6	0

10 APPENDIX C: SCREENING PROCESS

Table 10.1: Identified Private Water Supplies – Screened-in to Risk Assessment

Reference	Source Name	No. Properties Supplied	Source/ Supply Type	Source Location (Grid Reference)	Approximate Distance from Development Infrastructure	Risk Assessment	Justification
44	Earlyvale House	2	Groundwater – Spring	NT 23389 50365	890 m north	Yes	Source located outside 250 m construction/ excavation buffer zone for groundwater abstraction & springs as determined by SEPA guidance. Potential for hydrological connection via Shiplaw Burn. Track associated with Development upstream of source location on Shiplaw Burn.
64	Upper Stewarton	1	Surface Water & Near-Surface Flow	NT 21739 46074 33(collection point from wider catchment)	150 m east	Yes	Wider surface water catchment of the Stewarton Burn that feeds water supply within 250 m proximity to Development infrastructure.
65	Cloich Farm	1	Groundwater - Springs	NT 21298 48743 NT 21178 48614	0 m	Yes	Source located outside 250 m construction / excavation buffer zone for groundwater abstraction & springs as determined by SEPA guidance. Distribution infrastructure within 100 m of shallow excavation (upgraded access track).
68	Foresthill (Woodbank)	2	Groundwater - Spring/ Near-Surface Flow	NT 23909 49025 (collection point from wider catchment)	200 m south	Yes	Source catchment downstream of track infrastructure associated with Development.
97	Darnhall Mains	5	Groundwater – Spring	NT 22873 47885 (collection point from wider catchment)	180 m East	Yes	Wider surface water catchment that feeds water supply within 250 m proximity to Development infrastructure.

33 WHS 2015 Report states NT 21681 46139

Reference	Source Name	No. Properties Supplied	Source/ Supply Type	Source Location (Grid Reference)	Approximate Distance from Development Infrastructure	Risk Assessment	Justification
114	Stewarton	4	Groundwater – Spring/ Near-Surface Flow	NT 21282 45814 (collection point from wider catchment) NT 20853 46113 (spring)	116 m east	Yes	Wider sub-surface water catchment that feeds water supply within 250 m proximity to Development infrastructure.
116	Black Barony Home Farm	3	Groundwater – Borehole/ Surface Water	NT 23298 47441 (borehole) NT 22569 46979 (collection point from wider catchment)	1.4 km east	Yes	Wider surface water catchment that feeds secondary water supply within 250 m proximity to Development infrastructure and excavations (>1 m deep).
124	Earlyburn	1	Groundwater – Borehole	NT 22873 49574	< 50 m	Yes	Source located within 250 m construction/ excavation buffer zone for groundwater abstraction & springs as determined by SEPA guidance.
130 115	Shiplaw & Shiphorns	4	Groundwater – Spring	NT 23185 50172	650 m north	Yes	Source located outside construction/ excavation buffer zone for groundwater abstraction & springs as determined by SEPA guidance. Potential for hydrological connection. Track associated with Development upstream of source location on Shiplaw Burn.
145	Harehope B	5	Groundwater – Spring/ Near-Surface Flow/ Surface Water	NT 20797 47905	600 m south	Yes	Wider surface water catchment that feeds water supply within 250 m proximity to Development infrastructure and excavations (>1 m deep).

Table 10.2: Identified Private Water Supplies – Screened-out of Risk Assessment

Reference	Source Name	No. Properties Supplied	Source/ Supply Type	Source Location (Grid Reference)	Approximate Distance from Development Infrastructure	Risk Assessment	Justification
04	Halmyre Deans	2	Groundwater – Spring	NT 17547 48700	2.6 km west	No	Hydrologically separated from Development by surface water catchment boundaries of the Cowieslinn Burn, Lyne Water/ Dead Burn and Fingland Burn. Source located outside 250 m buffer zone for groundwater abstraction. Hydrogeologically separated from Development by geological fault zone.
06	Halmyre House	1	Groundwater – Spring	NT 17911 49183 (approx.)	2.3 km west	No	Property considered to be sufficient distance from Development (> 2 km) for any hydrological effects. Hydrologically separated from Development by surface water catchment boundaries of the Cowieslinn Burn, Lyne Water/ Dead Burn and Fingland Burn. Development outside 250 m buffer zone for groundwater abstraction. Hydrogeologically separated from Development by geological fault zone.
07	Flemington Farm	3	Groundwater – Spring	NT 17052 45098	3.0 km	No	Source located in excess of 3 km from infrastructure associated with Development. Source catchment located outside 250 m construction/ excavation buffer zone for groundwater abstraction & springs as determined by SEPA guidance. Supply is gravity-fed and therefore not possible to be connected to Development due to variations in topography between Development infrastructure and source location.
08	Romanno Mains	1	Groundwater – Spring	NT 17496 48068	2.7 km west	No	Hydrologically separated from the Development by surface water catchment of the Fingland Burn. Development outside 250 m buffer zone for groundwater abstraction. Hydrogeologically separated from Development by geological fault zone.
19	Cowieslinn 1	2	Groundwater – Springs (3)	NT 22180 50747	743 m north	No	Source located outside 250 m construction/ excavation buffer zone for groundwater abstraction & springs as determined by SEPA guidance.

Reference	Source Name	No. Properties Supplied	Source/ Supply Type	Source Location (Grid Reference)	Approximate Distance from Development Infrastructure	Risk Assessment	Justification
21	Linfall Stables	1	Groundwater – Borehole	NT 24233 51066	1.74 km north	No	Source located outside 250 m construction/ excavation buffer zone for groundwater abstraction & springs as determined by SEPA guidance.
22	Upper Linfall	1	Groundwater – Borehole	NT 24194 50946	1.61 km north	No	Source located outside 250 m construction/ excavation buffer zone for groundwater abstraction & springs as determined by SEPA guidance.
23	The Burrow	1	Groundwater – Borehole	NT 24115 50980	1.63 km north	No	Source located outside 250 m construction/ excavation buffer zone for groundwater abstraction & springs as determined by SEPA guidance.
28	Dunrig	1	Groundwater – Borehole	NT 21868 52619	2.44 km north	No	Source located outside 250 m construction/ excavation buffer zone for groundwater abstraction & springs as determined by SEPA guidance.
29	Waterheads	3	Groundwater – Borehole	NT 24288 50979	1.62 km north	No	Source located outside 250 m construction/ excavation buffer zone for groundwater abstraction & springs as determined by SEPA guidance.
36	Spylaw	1	Groundwater – Well	NT 21925 52624	2.46 km north	No	Source located outside 250 m construction/ excavation buffer zone for groundwater abstraction & springs as determined by SEPA guidance.
39	Linfall	2	Groundwater – Borehole	NT 24251 50905	1.55 km north	No	Source located outside 250 m construction/ excavation buffer zone for groundwater abstraction & springs as determined by SEPA guidance.
43	Earlypier	2	Groundwater – Spring	NT 25245 49922	1.12 km north-east	No	Hydrologically disconnected from Development by surface water catchment boundary of Harcus Burn and Eddleston Water. Source located outside construction/ excavation buffer zone for groundwater abstraction & springs as determined by SEPA guidance. Hydrogeologically separated from Development by geological bedrock unit (at surface).

Reference	Source Name	No. Properties Supplied	Source/ Supply Type	Source Location (Grid Reference)	Approximate Distance from Development Infrastructure	Risk Assessment	Justification
45	Little Dean	1	Near-Surface Flow	NT 21558 52286 (approx.)	2.06 km north	No	Hydrologically disconnected from Development by Cowieslinn Burn. Source water drains from west which is hydrologically separated from Development.
46	Cowieslinn 2	3	Groundwater – Borehole	NT 23243 51524	1.91 km north	No	Source located outside construction/ excavation buffer zone for groundwater abstraction & springs as determined by SEPA guidance.
53	The Bothy	1	Groundwater – Borehole	NT 24339 50909	1.62 km north-east	No	Source located outside construction/ excavation buffer zone for groundwater abstraction & springs as determined by SEPA guidance.
54	Silverdean	1	Groundwater – Spring	NT 24908 51264	2.16 km north-east	No	Hydrologically disconnected from Development by Eddleston Water. Source located outside construction/ excavation buffer zone for groundwater abstraction & springs as determined by SEPA guidance.
71	Hattonknowe	6 (& 26 holiday lets)	Groundwater – Spring	NT 23556 46648	2.42 km east	No	Source located outside construction/ excavation buffer zone for groundwater abstraction & springs as determined by SEPA guidance.
72	Darnhall Cottages	2	Near-Surface Flow/ Surface Run-off/ Groundwater – Spring	NT 23703 48269 (approx.)	915 m north	No	Hydrologically disconnected from Development by surface water catchment boundary of Early Burn and Eddleston Water. Source located outside construction/ excavation buffer zone for groundwater abstraction & springs as determined by SEPA guidance.
73	Fairydean Lodge	1	Groundwater – Borehole	NT 23227 47404	1.86 km east	No	Source located outside construction/ excavation buffer zone for groundwater abstraction & springs as determined by SEPA guidance. Hydrogeologically separated from Development infrastructure by geological bedrock unit (at surface) and by geological fault zone.

Reference	Source Name	No. Properties Supplied	Source/ Supply Type	Source Location (Grid Reference)	Approximate Distance from Development Infrastructure	Risk Assessment	Justification
85	Fairydean Mill	2	Groundwater – Borehole	NT 23452 47322	2.1 km east	No	Source located outside construction/ excavation buffer zone for groundwater abstraction & springs as determined by SEPA guidance. Hydrogeologically separated from Development infrastructure by geological bedrock unit (at surface) and by geological fault zone.
103	Milkieston	5	Groundwater – Spring	NT 24655 45536	3.76 km east	No	Hydrologically disconnected from Development by Eddleston Water. Source located in excess of 3 km from Development infrastructure, outside of construction/ excavation buffer zone for groundwater abstraction & springs as determined by SEPA guidance. Hydrogeologically separated from Development by geological bedrock unit (at surface) and geological fault lines.
111	Dean Cottage	1	Groundwater – Spring	NT 23345 47575	1.9 km east	No	Source located outside of construction/ excavation buffer zone for groundwater abstraction & springs as determined by SEPA guidance. Hydrogeologically separated from Development by geological bedrock unit (at surface) and geological fault lines.
134	Primrose Cottage	1	Groundwater – Spring	NT 25343 48993	970 m east	No	Hydrologically separated from Development by surface water catchment boundary of the Eddleston Water. Development outside 250 m buffer zone for groundwater abstraction. Likely to be hydrogeologically separated from Development by geological faults and located within separate geological bedrock unit.

Reference	Source Name	No. Properties Supplied	Source/ Supply Type	Source Location (Grid Reference)	Approximate Distance from Development Infrastructure	Risk Assessment	Justification
139	Stevenson Farm	2	Groundwater – Spring/ Near-Surface Flow	NT 16747 43420	4.1 km south	No	Distance from closest infrastructure associated with Development (> 4 km). Hydrologically separated from Development by surface water catchment boundary of the Flemington Burn and Lyne Water. Source located outside 250 m construction/ excavation buffer zone for groundwater abstraction & springs. Likely to be hydrogeologically separated from Development by geological faults and located within separate geological bedrock unit (at surface).
144	Windylaws	2	Groundwater – Spring	NT 24664 44875	4.1 km south-east	No	Distance from closest infrastructure associated with Development (> 4 km). Hydrologically separated from Development by Eddleston Water. Source located outside 250 m construction/ excavation buffer zone for groundwater abstraction & springs. Hydrogeologically separated from Development by geological faults and located within separate geological bedrock unit (at surface).
145	Harehope A	4	Groundwater – Borehole	NT 20057 44422	1.6 km south	No	Source located outside 250 m construction/ excavation buffer zone for groundwater abstraction & springs.
153	Cowieslinn Quarry	n/a	Groundwater – Borehole	NT 23952 51558	2.28 km north	No	Source located outside 250 m construction/ excavation buffer zone for groundwater abstraction & springs.
157	Boreland Farm	2	Groundwater – Spring	NT 25487 48022	4 km east	No	Distance from closest infrastructure associated with Development (> 4 km). Hydrologically separated from Development by surface water catchment boundary of the Eddleston Water. Development outside 250 m buffer zone for groundwater abstraction. Likely to be hydrogeologically separated from Development by geological faults and located within separate geological bedrock unit (at surface).

Reference	Source Name	No. Properties Supplied	Source/ Supply Type	Source Location (Grid Reference)	Approximate Distance from Development Infrastructure	Risk Assessment	Justification
162	Linfall Cottage	1	Groundwater – Borehole	NT 22873 47885	1.46 km east	No	Source located outside 250 m construction/ excavation buffer zone for groundwater abstraction & springs.
174	Cringletie Farm	4	Groundwater – Spring	NT 22858 44193	2.9 km south-east	No	Hydrologically separated from Development by surface water catchment of the Stewarton Burn. Source located outside 250 m buffer zone for groundwater abstraction. Hydrogeologically separated from Development by geological fault zone and within separate geological unit (at surface).
183	Woodlands	1	Groundwater – Spring	NT 17587 48202 (approx.)	2.6 km west	No	Hydrologically separated from Development by Fingland Burn. Source located outside 250 m buffer zone for groundwater abstraction. Hydrogeologically separated from Development by geological fault zone and within separate geological unit (at surface).

Table 10.3: Identified Private Water Supplies – Limited Information

	Source Name	No. Properties Supplied	Source/ Supply Type	Source Location (Grid Reference)	Risk Assessment	Justification
03	Newlands House	4	Groundwater - Spring	Unknown	No	Property considered to be sufficient distance from infrastructure associated with the Development (> 3 km) for any hydrological effects. Hydrologically separated from Development by surface water catchment boundary of the Flemington Burn and Lyne Water. Outside 250 m buffer zone for groundwater abstraction. Hydrogeologically separated from the Development by geological fault zone. No response from resident to confirm location during consultation process.
09	Noblehall Farmhouse	-	Unknown	Unknown	No	Property considered to be sufficient distance from infrastructure associated with the Development (> 3 km) for any hydrological effects. Hydrologically separated from Development by surface water catchment boundary of the Flemington Burn and Lyne Water. Outside 250 m buffer zone for groundwater abstraction. Hydrogeologically separated from the Development by geological fault zone. No response from resident to confirm location during consultation process.
15	Grange Farm	1	Groundwater - Spring	Unknown	No	Property considered to be sufficient distance from Development (> 2 km) for any hydrological effects. Hydrologically separated from Development by surface water catchment boundary of the Cowieslinn Burn and Lyne Water/ Dead Burn. Development outside 250 m buffer zone for groundwater abstraction. Likely to be hydrogeologically separated from Development by geological fault zone and geological bedrock unit. No response from resident to confirm location during consultation process.
24	Hope Cottage	1	Unknown	Unknown	No	Likely to be hydrologically disconnected by the surface water catchment boundary of Cowieslinn Burn and Middle Burn. Likely to be outside 250 m construction/ excavation buffer zone and hydrogeologically separated from Development by geological fault zone and within separate geological bedrock unit (at surface). Resident confirmed private water supply but no further information on type and source provided during consultation process.

	Source Name	No. Properties Supplied	Source/ Supply Type	Source Location (Grid Reference)	Risk Assessment	Justification
30	Railway Crossing	1	Groundwater – Spring	Unknown	No	Likely to be hydrologically disconnected by the surface water catchment boundary of Cowieslinn Burn and Eddleston Water. Property located in excess of 2.3 km from infrastructure associated with the Development (excavations <1m deep). Source location likely to be outside 250 m construction/ excavation buffer zone. Supply considered to be gravity-fed and therefore not possible to be connected to Development due to variations in topography between Development infrastructure and property. No response from resident to confirm location during consultation process
31	Mootfoot View	1	Groundwater - Borehole	Unknown	No	Borehole likely to be located close to or on property. Source location likely to be outside 250 m construction/ excavation buffer zone. No response from resident to confirm location during consultation process.
32	Wester Deans	1	Groundwater – Borehole	Unknown	No	Borehole likely to be located close to or on property. Source location likely to be outside 250 m construction/ excavation buffer zone. No response from resident to confirm location during consultation process.
33	Easter Deans Farmhouse	3	Groundwater - Well	Unknown	No	Borehole likely to be located on property grounds and source location likely to be outside 250 m construction/ excavation buffer zone. No response from resident to confirm location during consultation process.
41	Nether Falla	3	Groundwater – Spring	Unknown	No	Property located in excess of 2.5 km from infrastructure associated with the Development (excavations <1m deep). Source location likely to be outside 250 m construction/ excavation buffer zone. No response from resident to confirm location during consultation process.

	Source Name	No. Properties Supplied	Source/ Supply Type	Source Location (Grid Reference)	Risk Assessment	Justification
51	Falla Toll House	1	Groundwater – Spring	Unknown	No	Likely to be hydrologically disconnected by the Eddleston Water. Likely to be outside 250 m construction/ excavation buffer zone. No response from resident to confirm location during consultation process.
52	Nether Linfall	1	Groundwater – Borehole	Unknown	No	Borehole likely to be located close to or on property – outside 250 m buffer zone. No response from resident to confirm location during consultation process.
56	Ruddenleys	2	Groundwater – Spring	Unknown	No	Property located in excess of 2.5 km from infrastructure associated with the Development (excavations <1m deep), upstream of the Development. Likely to be outside 250 m construction/ excavation buffer zone. Supply considered to be gravity-fed and therefore not possible to be connected to Development due to variations in topography between Development infrastructure and property. No response from resident to confirm location during consultation process.
84	Mosshouses	1	Groundwater – Spring	Unknown	No	Property located 2.2 km from infrastructure associated with the Development. Source location likely to be outside 250 m construction/ excavation buffer zone. No response from resident to confirm location during consultation process.
104	Wormiston	2	Groundwater – Spring	Unknown	No	Property located in excess of 2.5 km from infrastructure associated with the Development. Source location likely to be outside 250 m construction/ excavation buffer zone. Supply considered to be gravity-fed and therefore not possible to be connected to Development due to variations in topography between Development infrastructure and property. No response from resident to confirm location during consultation process.

	Source Name	No. Properties Supplied	Source/ Supply Type	Source Location (Grid Reference)	Risk Assessment	Justification
135	Hillhead Cottage	1	Groundwater – Spring	Unknown	No	Likely to be hydrologically separated from Development by surface water catchment boundary of the Eddleston Water. Development outside 250 m buffer zone for groundwater abstraction. Likely to be hydrogeologically separated from Development by geological faults and located within separate geological bedrock unit. Supply considered to be gravity-fed and therefore not possible to be connected to Development due to variations in topography between Development infrastructure and property. No response from resident to confirm location during consultation process.
137	Portmore House	7	Groundwater – Spring	Unknown	No	Likely to be hydrologically separated from Development by surface water catchment boundary of the Eddleston Water. Development outside 250 m buffer zone for groundwater abstraction. Likely to be hydrogeologically separated from Development by geological faults and located within separate geological bedrock unit. Supply considered to be gravity-fed and therefore not possible to be connected to Development due to variations in topography between Development infrastructure and property. No response from resident to confirm location during consultation process.
149	Upper Kidston Farm	1	Groundwater – Borehole	Unknown	No	Property located 4 km from infrastructure associated with the Development. Borehole likely to be located on property grounds and source location likely to be outside 250 m construction/ excavation buffer zone and hydrogeologically disconnected from Development by geological faults and separate bedrock unit. No response from resident to confirm location during consultation process.
150	Upper Kidston	2	Groundwater – Spring	Unknown	No	Property located in excess of 3.8 km from infrastructure associated with the Development. Source location likely to be outside 250 m construction/ excavation buffer zone and hydrogeologically disconnected from Development by geological faults and separate bedrock unit. Supply considered to be gravity-fed and therefore not possible to be connected to Development due to variations in topography between Development infrastructure and property. Source location not known/ not provided by resident.

	Source Name	No. Properties Supplied	Source/ Supply Type	Source Location (Grid Reference)	Risk Assessment	Justification
164	Longcote/ Burnhead	0	Groundwater – Spring/ Surface - Watercourse	Unknown	No	Likely to be hydrologically separated from Development by surface water catchment boundary of the Eddleston Water. Development outside 250 m buffer zone for groundwater abstraction. Likely to be hydrogeologically separated from Development by geological faults and located within separate geological bedrock unit (at surface). Supply considered to be gravity-fed and therefore not possible to be connected to Development due to variations in topography between Development infrastructure and property. Property/ water supply closed.
176	Whim Farmhouse	-	Unknown	Unknown	No	Property located in excess of 3 km from infrastructure associated with the Development. Source location likely to be outside 250 m construction/ excavation buffer zone and hydrogeologically disconnected from Development by geological faults and separate bedrock unit. Likely to be hydrologically separated from Development by surface water catchment Cowieslinn Burn. Likely to be hydrogeologically separated from Development by geological faults and located within separate geological bedrock unit (at surface). No response from resident to confirm location during consultation process.
180	Kaimes	1	Groundwater – Spring	Unknown	No	Property located in excess of 3.6 km from infrastructure associated with the Development. Source location likely to be outside 250 m construction/ excavation buffer zone and hydrogeologically disconnected from Development by geological faults and separate bedrock unit. Likely to be hydrologically separated from Development by surface water catchment boundary of the Cowieslinn Burn and Lyne Water/ Dead Burn Supply considered to be gravity-fed and therefore not possible to be connected to Development due to variations in topography between Development infrastructure and property. Property located outside 3 km PWS Study Area and not contacted during consultation process.

	Source Name	No. Properties Supplied	Source/ Supply Type	Source Location (Grid Reference)	Risk Assessment	Justification
181	Grange Loan	2	Groundwater – Spring	Unknown	No	Likely to be hydrologically separated from Development by surface water catchment boundary of the Cowieslinn Burn and Lyne Water/ Dead Burn. Development outside 250 m buffer zone for groundwater abstraction. Likely to be hydrogeologically separated from Development by geological faults and located within separate geological bedrock unit (at surface). Supply considered to be gravity-fed and therefore not possible to be connected to Development due to variations in topography between Development infrastructure and property.
182	Garden Cottage (Eddleston)	1	Groundwater – Spring	Unknown	No	Likely to be hydrologically separated from Development by surface water catchment boundary of the Shiplaw Burn and Eddleston Water. Likely to be hydrogeologically separated from Development by geological faults and located within separate geological bedrock unit (at surface). Supply considered to be gravity-fed and therefore not possible to be connected to Development due to variations in topography between Development infrastructure and property. No response from resident to confirm location during consultation process.
188	Milkieston Toll	1	Groundwater – Spring	Unknown	No	Property located in excess of 3.8 km from infrastructure associated with the Development. Source location likely to be outside 250 m construction/ excavation buffer zone and hydrogeologically disconnected from Development by geological faults and separate bedrock unit. Likely to be hydrologically separated from Development by surface water catchment Eddleston Water. Likely to be hydrogeologically separated from Development by geological faults.
199	Lilac Cottage (Nether Kidston Cottages)	1	Unknown	Unknown	No	Likely to be hydrologically separated from Development by surface water catchment of the Meldon Burn. Likely to be hydrogeologically separated from Development by geological faults and located within separate geological bedrock unit (at surface). Resident requested no further consultation.

	Source Name	No. Properties Supplied	Source/ Supply Type	Source Location (Grid Reference)	Risk Assessment	Justification
204	West Loch	4	Groundwater - Spring	Unknown	No	Property located in excess of 4 km from infrastructure associated with the Development. Source location likely to be outside 250 m construction/ excavation buffer zone and hydrogeologically disconnected from Development by geological faults and separate bedrock unit. Likely to be hydrologically separated from Development by surface water catchment Kidston Burn. Likely to be hydrogeologically separated from Development by geological faults.

11 APPENDIX D: RESIDENT CONSULTATION QUESTIONNAIRE EXAMPLE

Address

22 January 2020 Our Reference: 64-3439

Dear Sir / Madam

Private Water Supply Risk Assessment – Cloich Wind Farm

On the 7th October 2019 a hydrological desk study was undertaken in relation to the proposed Cloich Wind Farm to assess the hydrology and drainage conditions to inform an Environmental Impact Assessment (EIA), which the Development is subject to.

In order to fully assess the site hydrology of the area and to ensure that private water supplies are protected, Arcus is carrying out a Private Water Supply Risk Assessment. As such, it would be greatly appreciated if you could confirm if your property is served by a private water supply or Scottish Water mains.

If your property is served by a private water supply, it would greatly assist our assessment if you could clearly mark on the enclosed map the location of your private water supply and complete as many of the details regarding it below. A pre-paid self-addressed envelope has been provided for you to return the information to us.

PROPERTY NAME: .....

SCOTTISH WATER MAINS ☐ PRIVATE WATER SUPPLY ☐

If private water supply, please provide as much information as possible below:

TYPE OF SUPPLY (please tick):

Well	Borehole (depth in metres)	Spring	Near surface through flow	Groundwater	Surface run-off	Active pump

USE OF SUPPLY:

DOMESTIC ☐ LIVESTOCK ☐ SUPPLY TO INDUSTRIAL/ COMMERCIAL PROPERTIES ☐

TYPE OF WATER TREATMENT (if applicable) e.g. UV filter: .....

NUMBER PEOPLE SUPPLIED: ..... NUMBER OF LIVESTOCK: .....

VOLUME OF WATER ABSTRACTED (m^3 / DAY): .....

ANY COMMENT ON THE CONDITION OF YOUR WATER SUPPLY:

.....

.....

Should you have any queries regarding this request, please do not hesitate to contact me on the telephone number below.

Thank you in advance for any assistance you can offer on this matter.

Yours faithfully

On behalf of Arcus Consultancy Services

Liam Nevins BSc (hons) MCIWEM C.WEM

Principal Hydrologist

12 APPENDIX E: PRIVATE WATER SUPPLY RISK ASSESSEMENT METHOD STATEMENT

CLOICH FOREST WIND FARM
PRIVATE WATER SUPPLY RISK ASSESSMENT: METHODOLOGY

JUNE 2021

Prepared By:
Arcus Consultancy Services

		v1-0	v2-0
Author	Holly Clark BSc (hons) MSc MCIWEM	02/03/2020	28/10/2020
Reviewed by	Liam Nevins BSc (hons) MCIWEM C.WEM	03/03/2020	30/10/2020
Approved by	Stuart Davidson Registered EIA Practitioner	04/03/2020	
Approved by	Fiona MacGregor		24/06/2021

7th Floor, 144 West George Street, Glasgow, G2 2HG
T +44 (0)141 221 9997 l E info@arcusconsulting.co.uk
W www.arcusconsulting.co.uk
Registered in England & Wales No. 5644976

1 INTRODUCTION

This Private Water Supply (PWS) methodology outlines the process and steps taken by Arcus Consultancy Services Ltd on behalf of EDF Renewables ('the Developer'), as a third party consultant, to assess the risk of potential effects of the Cloich Forest Wind Farm ('the Development') on the quantity, quality and continuity of water supplied to PWS in the vicinity of the Development.

This methodology has been developed in line with the following legislation and guidance:

- The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017[1] ('the 2017 Regulations');
- Private Water Supplies (Scotland) Regulations 2006 ('the 2006 Regulations');
- The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017 - Guidance for Local Authorities (v4.0)[2];
- Water Environment (Controlled Activities) (Scotland) Regulations 2011[3]; and
- Land Use Planning System (LUPS) Scottish Environment protection Agency (SEPA) Guidance Note 31 2017 v2.0[4].

2 PWS REGULATION AND PROTECTION

PWS are water supplies intended for human consumption which are not provided, maintained or regulated by Scottish Water. They are the responsibility of property owners and / or PWS users with regulation enforced by local authorities and the Drinking Water Quality Regulator (DWQR)[5], where regulation is required.

During pre-construction, construction, operational and decommissioning phases of the Development, it is a legal duty of the Developer to protect the water quality, quantity and continuity of PWS by preventing contamination and reduced yield of any and all water sources supplying PWS, as required by the Regulations.

In Scotland and as defined in the 2017 Regulations and 2006 Regulations, PWS are separated into two categories:

- Regulated (Type A): supply 50 or more people, and / or abstract >10 m^3 of water per day (on average), and any PWS which is used in a commercial or public activity regardless of the volume abstracted or number of people supplied (e.g. B&B, community halls, schools); and
- Exempt (Type B): supply <50 people to a domestic property with abstraction of <10 m^3 per day (on average).

The 2017 Regulations transpose the Drinking Water Directive (DWD) exemption for supplies which provide water to less than 50 persons or less than 10m^3 a day. In determining whether a supply serves 50 persons or less, the maximum occupancy of any premises served by the supply must be considered. Separate legislation covers domestic

[1] The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017 [Available Online] http://www.legislation.gov.uk/ssi/2017/282/contents/made (Last accessed: 02/03/2020)
[2] DWQR (2019) The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017 Guidance for Local Authorities [Available Online] https://dwqr.scot/media/42030/the-water-intended-for-human-consumption-private-supplies-scotland-regulations-2017-guidance-v4-feb-2019-as-issued.pdf (Last accessed: 03/03/2020)
[3] The Scottish Government (2011) The Water Environment (Controlled Activities) (Scotland) Regulations 2011 [Available online] http://www.legislation.gov.uk/ssi/2011/209/contents/made (Last accessed: 02/03/2020)
[4] SEPA (2017) Land Use Planning System (lups) SEPA Guidance Note 31 2017: Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems Version 2 [Available Online] https://www.sepa.org.uk/media/143868/lupsgu31_planning_guidance_on_groundwater_abstractions.pdf (Last accessed: 03/03/2020)
[5] DWQR (2017) Drinking Water Quality in Scotland 2017 Private Water Supplies [Available Online] https://dwqr.scot/media/39966/dwqr-pws-annual-report-2017-compiled-report-final-24-september-2018.pdf (Last accessed: 02/03/2020)

supplies which are currently referred to in Scots law as Type B supplies in The Private Water Supplies (Scotland) Regulations 2006.

The 2017 Regulations also enforce local authorities to risk assess 'Regulated' (Type A) supplies for water quality in accordance with DWQR approved methodology. Regulated supplies are required to be sampled on an annual basis for water quality. 'Exempt' (Type B) supplies do not require routine risk assessment and water quality testing; however, can be tested on request by the owner.

For projects such as the Development, SEPA requires all groundwater abstractions within the following distances of the Development to be identified and risk assessed:

- Within 100 m radius of all excavations less than 1 m in depth; and
- Within 250 m of all excavations deeper than 1 m.

SEPA also requires the location of all groundwater abstractions for drinking water supplies to be obtained by consultation with local authorities, local residents and a site walkover, as outlined in Appendix 3 of the SEPA LUPS Guidance Note 31. SEPA also considers all and any impacts of the Development on surface waters and near-surface flows.

Whilst the SEPA guidance relates to groundwater abstractions only, surface water abstractions are considered separately in relation to whether there is a hydrological link to Development infrastructure.

3 EIA HYDROLOGY ASSESSMENT

The PWS risk assessment is carried out as part of a wider hydrological assessment which is incorporated into the Environmental Impact Assessment (EIA) for the Development. The hydrological assessment provides an integrated understanding of watercourses, drainage patterns and groundwater associated with the Development.

The hydrological assessment includes a desk-based review and site walkover of the hydrology and hydrogeology of the Development and surrounding area. The hydrology assessment includes, but is not limited to, the delineation of surface water catchments and near-surface drainage patterns, review of geology maps and corresponding hydrogeology, identification of all statutory designations supported by the hydrological environment up to 10 km from the site boundary, a review of flood risk and risk assessment of public and private water supplies. All hydrological assessment is carried out in line with ecology, heritage and engineering disciplines, also conducted by Arcus. This includes review of groundwater dependent terrestrial ecosystems (GWDTEs), peat deposits and soils and historical mapping.

Whilst the methodology outlined in this document is solely for the assessment of PWS, it is integrated with a wider hydrology assessment of the Development and surrounding area.

4 METHODOLOGY

The procedure for identifying and risk assessing PWS is outlined below and is based on the aforementioned legislation, guidance and best practice. Arcus have used this methodology in a number of PWS risk assessments and has previously been well received by statutory consultees. The methodology consists of the following stages:

- Stage One: Identification of PWS;
- Stage Two: Resident consultation;
- Stage Three: Initial desk-based review;
- Stage Four: Site-based survey;
- Stage Five: Risk assessment; and
- Stage Six: Approval by consultees.

4.1 Stage One: Identification of PWS

An initial desk-based review is conducted to identify all PWS within a pre-defined 'search zone' of the wind farm as feasibly possible.

The PWS search zone is based on the following location criteria:

- Property or PWS source located within the site boundary of the wind farm;
- Property or PWS source located within 3 km of the site boundary; and
- Property or PWS source located within a catchment connected to the Development.

Properties which are located within a Scottish Water supply zone and do not have a registered private water supply, are considered to be supplied by Scottish Water mains, and are not assessed under the PWS risk assessment.

If a PWS does not meet the above criteria it is excluded from the PWS risk assessment.

Properties supplied by PWS are identified by consulting the following sources of information and consultees:

- Contacting Scottish Borders Council Environmental Health Officer (EHO) requesting a list of registered PWS, with information on location, type and number of properties supplied;
- Contacting residents of properties within a defined search zone via letter to ascertain if their property is supplied by a PWS or Scottish Water Mains, plus additional information to inform Stage Two; and
- SEPA abstraction database to ascertain all water abstractions authorised through the Water Environment (Controlled Activities) (Scotland) Regulations 2011;
- Review of the 2015 Cloich Forest Wind Farm Private Water Supply Risk Assessment[6];
- Available information from the previous Cloich Wind Farm submission and Inquiry

4.2 Stage Two: Resident Consultation

All properties located within the search zone are contacted via letter to identify if the property is supplied by a PWS, and not Scottish Water mains, as outlined in Section 4.1.

If the property is supplied by PWS, residents or property owners are asked to provide further information by completing a questionnaire to inform the initial desk-based risk assessment as outlined in Section 4.3. A template of the letter is provided at Appendix A.

Table 1 outlines the questions included in the questionnaire and how they inform the risk assessment.

Table 1: Resident Consultation Questionnaire and Reasoning

Question	Reasoning
Type of supply (with list of options)	Allows for identification of the likely PWS source water and provide an understanding of its potential connectivity to the Development. This allows for an initial level of sensitivity to be applied to the PWS source as part of the final risk assessment.
Use of supply	Categorise supply into Type A or Type B to attribute sensitivity for the final risk assessment. Also provides information on the likely volumes of water abstracted at the PWS.

[6] Wallingford HydroSolutions Limited (2015) Cloich Forest Wind Farm Private Water Supply Risk Assessment

Question	Reasoning
Type of water treatment	Understanding of the baseline vulnerability of the source and existing protection measures in place.
Number of people supplied	Categorise supply into Type A or Type B to attribute sensitivity for the final risk assessment. Also provides information on the likely volumes of water abstracted at the PWS. It is acknowledged that this number can vary, particularly if the PWS supplies a commercial property.
Number of livestock supplied	Categorise supply into Type A or Type B to attribute sensitivity for the final risk assessment. Also provides information on the likely volumes of water abstracted at the PWS. It is acknowledged that this number can vary seasonally.
Volume of water abstracted (m^3)	Allows for initial assessment on the catchment or 'zone of influence' of the water supply. This is the likely area the supply is draining water from. This informs an understanding of the PWS potential connectivity to the Development. For example, a large groundwater abstraction further from the Development may be hydrologically connected due to its larger zone of influence. A smaller abstraction, closer to the Development, may not be hydrologically connected because it has a very small zone of influence. It is acknowledged that this is often unknown or estimated by residents.
Any comment of the condition of your water supply	This informs an understanding of the existing level of vulnerability of the PWS and potential need for additional protection measures. For example, PWS that have previously been influenced by quantity reductions during drought periods may be more vulnerable than those who have not experienced this. Any information regarding previous water quality issues or quantity issues can inform an understanding of where the water is likely to be sourced from and the pathway it takes to get to the property.

If the property is supplied solely by Scottish Water mains, it excluded from the PWS risk assessment.

4.3 Stage Three: Initial Desk-based Review

An initial desk-based review is carried out to process the information gathered from the returned questionnaires.

This process involves reviewing desk-based information associated with PWS, including geological maps, historical maps and surface water catchments, in conjunction with the information provided by the resident consultation process.

Where locations of the PWS water source are provided, this detail is overlain with mapped infrastructure associated with the Development to inform an initial source-pathway-receptor model[7].

[7] SEPA (2019) Oil storage at sites where there is an onward distribution (WAT-SG-15-A) Supporting Guidance for Asset Improvement Plans Version 1 (Section 3.2.) [Available Online] https://www.sepa.org.uk/media/421127/wat-sg-15-a.pdf (Last accessed: 03/03/2020)

Following the initial desk-based review, PWS and associated properties are identified as potentially 'at-risk' or 'not at-risk' from the Development.

A PWS will be deemed as not at-risk at this stage if there is sufficient information to demonstrate that the PWS is not connected to the Development e.g. drawing water from an area not connected to the Development. If a PWS is deemed as not at-risk from the Development it is eliminated at this stage and not incorporated into the PWS risk assessment.

If a PWS is potentially at-risk from the Development, a site survey will be carried out to inform the risk assessment as part of Stage Four.

4.4 Stage Four: Site-based Survey

The site-based survey involves a hydrologist visiting potentially at-risk properties identified during Stage Three to gain further information and 'ground-truth' the information from the desk study and provided by residents in the questionnaire. This will also include a walkover of the area where the PWS source is considered to be, if access and health & safety allows. The assessment conducted as part of the site-based survey incorporates the methods for general site survey guidance, as detailed in the risk assessment methodology for private water supplies provided by the DWQR[8].

The aim of the site visit is to:

- Consult with residents and obtain further information, where required;
- Confirm the type of PWS;
- Identify, inspect and trace any associated infrastructure e.g. pipes, header tanks, pumps etc.;
- Identify the source water, if possible; and
- Estimate the volume of water abstracted, if not known by resident.

This is also an opportunity to ask more in-depth questions regarding the quality, quantity and history of the PWS with residents and answer any queries they may have, if they are willing to do so.

The location of the source water, regardless of the source type, is to be identified where reasonably possible[9]. For supplies which are provided by multiple sources (e.g. spring and surface water run-off), the assessment will determine and risk assess sensitivity of, and effects to, all potential sources (e.g. groundwater aquifer unit and surface water catchment).

[8] Drinking Water Quality Regulator (2016) PWS Technical Manual Section 4 Risk Assessment for Private Water Supplies [Online] Available at: https://dwqr.scot/private-supply/technical-information/pws-technical-manual/risk-assessment/ (Accessed: 28/10/2020)

[9] Reasonably possible is defined as obtaining all available datasets, conducting consultation and site visit to identify the source of the private water supply. Should the source not be confirmed/ identified following this assessment, the source location will be highlighted as not known and all potential and feasible source locations assessed. A collection chamber will not be determined as the source water.

4.5 Stage Five: PWS Risk Assessment

Collation of all information gathered during Stages One to Four informs the PWS Risk Assessment.

The PWS Risk Assessment attributes the vulnerability / sensitivity of the PWS (including source point and catchment, distribution infrastructure and supply point) and the magnitude of any potential effect from works associated with the Development. These will be combined to inform the risk rating, as outlined in Section 4.5.1. Each PWS source and associated property will be assessed to conclude which one of the following risk ratings apply:

- Major;
- Moderate;
- Minor; or
- Negligible.

4.5.1 Risk Rating Criteria

4.5.1.1 Sensitivity of Receptor (PWS)

The sensitivity criteria for the receptor, the PWS source water and supply, is based on the following criteria:

- Type of PWS (e.g. Type A or Type B) and use in agricultural or commercial activities;
- Source of water (e.g. groundwater, surface water);
- Volume of abstraction;
- Distance from construction activities;
- Existing treatment measures; and
- Construction activities planned within catchment.

These criteria will be used in conjunction with professional judgement to apply a sensitivity rating to each receptor. The sensitivity ratings are as follows:

- Very High;
- High;
- Moderate;
- Low; or
- Negligible.

4.5.1.2 Magnitude of effects

The magnitude of effects, the level of effect from the Development attributed to each PWS source and supply, is based on the following criteria:

- Permanent loss of supply;
- Permanent negative change to water quality or yield of PWS source water or supply;
- Short-term reduction in yield;
- Long-term reduction in yield;
- Water quality reduced compared to baseline (pre-development) conditions; and
- Changes to quality, levels or yields that do not represent a risk to existing baseline conditions.

These criteria will be used in conjunction with professional judgment to apply a magnitude of effects rating to each receptor. The magnitude of effect ratings are as follows:

- High;
- Moderate;
- Low; or

- Negligible.

The magnitude of effect may change during the course of the design and construction of the Development, and the rating will be continually assessed during the course of the Development.

4.5.1.3 Risk Rating

The overall risk rating is attributed to the PWS and associated supplied properties by combining the sensitivity of the receptor and magnitude of effect criteria. Drawing from Arcus' experience, a risk rating of minor or lower is generally considered acceptable by statutory consultees.

4.5.2 Avoidance and Mitigation Measures

Following an assessment to determine the PWS risk rating, site specific mitigation can be applied as outlined in Section 4.6. A final risk rating is then applied to each PWS to determine the overall risk to the receptor from the Development with appropriate mitigation measures in place.

The PWS Risk Assessment and mitigation measures will be collated into a PWS plan. The PWS plan will likely include the following measures, which are not exhaustive:

- Description of risk assessment process and results;
- Record of liaison with residents, statutory consultees and planning authority;
- Details of a pre-construction (baseline) water quality monitoring programme to ascertain PWS conditions prior to construction;
- Agreement of all mitigation measures with SEPA and other relevant bodies;
- Details of water quality monitoring programme required during construction and operational phases; and
- Site-specific contingency and emergency response plans.

The PWS plans will be distributed to Scottish Borders Council for written approval prior to commencement of construction works.

Avoidance and mitigation measures are based on the source-pathway-receptor model referenced under Stage Three. Avoidance and mitigation measures are put in place to prevent the pathway from existing, and thus preventing works associated with the Development from impacting upon PWS quality and quantity, of both the source water and end-supply to properties.

Avoidance measures are built into the layout of the Development design and construction practices to avoid impacts on receptors, such as watercourses and groundwater. In terms of the source-pathway-receptor model, this effectively removes all potential pathways.

Mitigation measures are installed to further protect watercourses and groundwater, where avoidance measures are not possible. Standard water quality mitigation measures are based on best practice of construction activities and environmental protection, including SEPA's Guidance for Pollution Prevention (GPPs)[10]. Mitigation measures are built into the Development design as part of a Water and Construction Environmental Management Plan (WCEMP) which is submitted prior to construction.

[10] NetRegs (various dates) Guidance for Pollution Prevention (GPPs) [Available Online] https://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/ (Last accessed: 28/02/2020)

Water quality mitigation measures include, but are not limited to:

- Appropriate buffer zones around receptors where no construction works are to be carried out e.g. watercourses (50 m) or private water supplies (buffer zone is dependent on type and abstraction volume of supply);
- Appropriate material storage and maintenance;
- Silt management including silt traps, silt fencing, sediment mats and settlement lagoons;
- Infiltration trenches and rock stockpiles to treat run-off before discharging back to the hydrological network; and
- Vehicle wash-out facilities for the washing of concrete associated vehicles.

Water quantity mitigation measures to prevent changes to yield include, but are not limited to:

- Settlement lagoons to attenuate run-off from turbine foundations and tracks; and
- Permanent swales and drainage ditches adjacent to access tracks with outlets at specified intervals to reduce the volume of water collected in a single channel and, therefore, reduce the potential for erosion.

Where standard avoidance and mitigation measures are considered to be insufficient, additional measures may be necessary. These measures are not often necessary but, if required, such advanced mitigation measures can include:

- Installation of improved water treatment at the PWS source/supply;
- Replacing and upgrading existing treatment;
- Identifying and assessing alternative local PWS and connect;
- Identifying and assessing additional local PWS and connect; or
- Connecting to Scottish Water mains.

4.5.2.1 Emergency Response Plan

In the unlikely effect that mitigation measures fail, an emergency response plan will be actioned.

The emergency response plan will be site-specific and prepared prior to construction. This plan will be designed following collection of baseline data to ascertain the quality and quantity prior to construction.

The emergency response plan would include, but not be limited to:

- Established lines of communication, including number for residents to call in the event of contamination and vice versa;
- Plan for immediate distribution of potable water (bottled);
- Plan for medium to long-term alternative supply (bowser/ tanker);
- Protocol for assessing the source of contamination;
- Plan for rapid response water quality analysis; and
- Plan for re-instating supply.

4.6 Stage Six: Approval by Statutory Consultees

Prior to the construction phase the PWS plan and site-specific emergency response plan will be distributed to Scottish Borders Council for written approval, and shared with statutory consultees including SEPA.

APPENDIX A: PWS LETTER TEMPLATE

Address

22 January 2020 Our Reference: 64-3439

Dear Sir / Madam

Private Water Supply Risk Assessment – Cloich Wind Farm

On the 7th October 2019 a hydrological desk study was undertaken in relation to the proposed Cloich Wind Farm to assess the hydrology and drainage conditions to inform an Environmental Impact Assessment (EIA), which the Development is subject to.

In order to fully assess the site hydrology of the area and to ensure that private water supplies are protected, Arcus is carrying out a Private Water Supply Risk Assessment. As such, it would be greatly appreciated if you could confirm if your property is served by a private water supply or Scottish Water mains.

If your property is served by a private water supply, it would greatly assist our assessment if you could clearly mark on the enclosed map the location of your private water supply and complete as many of the details regarding it below. A pre-paid self-addressed envelope has been provided for you to return the information to us.

PROPERTY NAME: .....

SCOTTISH WATER MAINS ☐ PRIVATE WATER SUPPLY ☐

If private water supply, please provide as much information as possible below:

TYPE OF SUPPLY (please tick):

Well	Borehole (depth in metres)	Spring	Near surface through flow	Groundwater	Surface run-off	Active pump

USE OF SUPPLY:

DOMESTIC ☐ LIVESTOCK ☐ SUPPLY TO INDUSTRIAL/ COMMERCIAL PROPERTIES ☐

TYPE OF WATER TREATMENT (if applicable) e.g. UV filter: .....

NUMBER PEOPLE SUPPLIED: ..... NUMBER OF LIVESTOCK: .....

VOLUME OF WATER ABSTRACTED (m^3 / DAY): .....

ANY COMMENT ON THE CONDITION OF YOUR WATER SUPPLY:

.....

.....

Should you have any queries regarding this request, please do not hesitate to contact me on the telephone number below.

Thank you in advance for any assistance you can offer on this matter.

Yours faithfully

On behalf of Arcus Consultancy Services

Liam Nevins BSc (hons) MCIWEM C.WEM

Principal Hydrologist

CLOICH FOREST WIND FARM

VOLUME 3: TECHNICAL APPENDICES

TECHNICAL APPENDIX A12.1: ABNORMAL LOAD ROUTE ASSESSMENT

JUNE 2021

Prepared By:

Arcus Consultancy Services

7th Floor
144 West George Street
Glasgow
G2 2HG

T +44 (0)141 221 9997 l **E** info@arcusconsulting.co.uk
w www.arcusconsulting.co.uk

Registered in England & Wales No. 5644976

TABLE OF CONTENTS

1 INTRODUCTION

Cloich Forest Wind Farm ('the Development') is a proposed wind farm located within Cloich Forest approximately 5.5 kilometres (km) north-west of Peebles ('the Site'). This Abnormal Load Route Assessment (ALRA) provides an assessment of land based routes to the Development Site for the delivery of wind turbine components.

2 METHODOLOGY

This ALRA is a desk based study which uses publically available Ordinance Survey (OS) mapping to conduct swept path analysis of pinch points on the proposed delivery route. Swept path analysis is conducted in AutoCAD using the Vehicle Tracking software and a bespoke set of delivery vehicles developed for this ALRA.

2.1 Mapping

OS Mastermap was used to conduct swept path analysis along the proposed delivery route. This mapping is two-dimensional; and therefore, the assessment only considers the horizontal geometry of points of constraint (PCs) on the route. Topographical surveys may be required in order to undertake an assessment of vertical constraints.

2.2 Delivery Vehicle Specifications

This assessment is based upon a Vestas V136 candidate turbine. The vehicle data sheet is included in Appendix A. Dimensions of the blade and corresponding delivery vehicle specifications are provided in the following tables.

Table 2.1: Turbine Blade Data

Blade	Data Used in Assessment
Vestas V136	Length 66.66m

Table 2.2: Assumed delivery vehicles for Turbine Blade

Blade Trailer	Data	Source
Nooteboom Superwing Trailer	Vehicle length – 62.62m Blade overhang – 8.8m	Volvo Cab / Nooteboom Superwing Trailer

2.3 Route to Site

Wind turbine components will be delivered to the Grangemouth Dock for onward overland delivery to the Wind Farm Site. The route for turbine components will be as follows:

- Loads will exit the port and proceed towards Earl's Gate Roundabout via the A904 Earl's Road;
- At the roundabout, turn left onto the A905 and travel southbound towards Cadger Brae Roundabout and merge onto the M9 via the M9 Junction 5 Slip Road;
- Continue along the M9 southeast bound and merge onto the M8 via the M8 Junction 2 Slip Road;
- Continue along the M8 westbound towards Hermiston Gait Roundabout and at the roundabout, take the 3rd exit onto the A720 City of Edinburgh Bypass and travel toward Sheriffhall Roundabout;
- At the roundabout take the 5th exit onto the A7 and travel southbound toward Hardengreen Roundabout;
- At the roundabout, take the 3rd exit onto the B6392 and travel southbound towards Rosewell;

- At the B6392 / A6094 Roundabout, take the 1st exit onto the A6094;
- Continue on the A6094 southbound and turn right onto the B6372 northbound at its junction with the B6372;
- Continue on the B6372 northbound and turn left onto the B7026 southbound at its junction with the B7026;
- Continue on the B7026 southbound towards the B7026 / A6094 roundabout and take the 2nd exit back onto the A6094;
- Continue on the A6094 southbound towards the A6094 / A703 / A701 junction and turn left onto the A703;
- Continue on the A703 southbound for approximately 7.2 km and turn right onto the D17 Road towards Cloich Farm;
- Continue on the D17 Road for approximately 1.6 km and merge onto the D18 Cloich Road;
- Continue on the D18 Cloich Road for approximately 1.6 km and turn left onto Cloich Farm Road;
- Continue on Cloich Farm Road until the Secondary Entrance (as per **Chapter 3: Project Description** of the EIA Report).

Figure 1, included in Appendix B, indicates the assessed abnormal load route from the Grangemouth Docks.

2.4 Site Entrance Location

As described in **Chapter 3: Project Description** of the EIA Report, the Site Entrance will be located approximately 1 km north-west of the D18's junction with Cloich Farm Road; and the Secondary Entrance is located 1.5 km south-west of the D18's junction with Cloich Farm Road.

2.5 Assumptions

In order to keep the results of assessment as concise as possible, the following assumptions have been made at each PC:

- During transit, delivery vehicles will be accompanied by an escort vehicle and a police escort if required;
- At all locations where the delivery vehicle occupies the full road width, or is required to contraflow a junction, appropriate traffic management procedures will be implemented by the escort. This will usually involve temporary closure of the road or junction whilst the vehicle passes; and
- A detailed traffic management plan will be prepared prior to delivery to inform all relevant stakeholders of road closures and other procedures to be implemented during delivery.

2.6 Categorisation of Risk

Risk has been categorised according to the following criteria:

- High Risk – PCs which require land areas beyond the public road boundary either for oversail or overrun;
- Medium Risk – PCs which may require land beyond the public road boundary depending on confirmation of the exact positioning of land boundaries and fences or those which do not require land beyond the public road boundary but do require the construction of overrun areas within the public road boundary; and
- Low Risk – PCs which do not require land beyond the public road boundary and do not require construction of overrun areas.

3 RESULTS OF ASSESSMENT

Based on swept path analysis of all PCs identified on the proposed delivery route, outcomes and mitigation requirements have been defined and are detailed in Table 3.1.

Table 3.1: Assessment of Constraints

Ref	Location	Assessment Outcome	Mitigation	Risk
PC/01	Carron Dock	Vehicle to overrun verge at simple priority junction.	Loadbearing surface to be laid in area of overrun. Clearance of street furniture to be confirmed prior to delivery. Furniture in vehicle path to be relocated / mounted on de-mountable posts.	Medium
PC/02	Central Dock Road Junction	Oversail to verges on both sides of carriageway.	Clearance to street furniture to be confirmed prior to delivery. Furniture in vehicle path to be relocated / mounted on de-mountable posts.	Low
PC/03	Timber Basin Roundabout	Oversail on both sides of carriageway.	Clearance to street furniture to be confirmed prior to delivery. Furniture in vehicle path to be relocated / mounted on de-mountable posts.	Low
PC04	Earls Gate Roundabout	Areas of oversail outwith carriageway.	Clearance to street furniture to be confirmed prior to delivery. Furniture in vehicle path to be relocated / mounted on de-mountable posts.	Low
PC/05	A905 / Caledonian Green Roundabout	Areas of oversail outwith carriageway.	Clearance to street furniture to be confirmed prior to delivery. Furniture in vehicle path to be relocated / mounted on de-mountable posts.	Low
PC/06	Beancross Roundabout	Areas of oversail outwith carriageway.	Clearance to street furniture to be confirmed prior to delivery. Furniture in vehicle path to be relocated / mounted on de-mountable posts.	Low

Ref	Location	Assessment Outcome	Mitigation	Risk
PC/07	Cadgers Brae Roundabout	Areas of oversail outwith carriageway.	Clearance to street furniture to be confirmed prior to delivery. Furniture in vehicle path to be relocated / mounted on de-mountable posts.	Low
PC/08	Hermiston Gait Roundabout	Areas of oversail to island at north east junction.	Clearance to street furniture to be confirmed prior to delivery. Furniture in vehicle path to be relocated / mounted on de-mountable posts.	Low
PC/09	Sherrifhall Roundabout	Areas of oversail outwith carriageway.	Clearance to street furniture to be confirmed prior to delivery. Furniture in vehicle path to be relocated / mounted on de-mountable posts.	Low
PC/10	Gilmerton Road Roundabout	Areas of oversail outwith carriageway and potential overrun at roundabout and on south eastern verge	Clearance to street furniture to be confirmed prior to delivery. Furniture in vehicle path to be relocated / mounted on de-mountable posts. Load bearing surface to be laid in areas of overrun if required.	Medium
PC/11	Melville Dykes Road Roundabout	Areas of oversail outwith carriageway. Vehicle to overrun through roundabout.	Clearance to street furniture to be confirmed prior to delivery. Furniture in vehicle path to be relocated / mounted on de-mountable posts. Load bearing surface to be laid in areas of overrun.	Medium
PC/12	Eskbank Road Roundabout	Areas of oversail outwith carriageway.	Clearance to street furniture to be confirmed prior to delivery. Furniture in vehicle path to be relocated / mounted on de-mountable posts. Clearance height to pedestrian fencing to be confirmed prior to delivery.	Low

Ref	Location	Assessment Outcome	Mitigation	Risk
PC/13	Hardengreen Roundabout	Areas of oversail outwith carriageway.	Clearance to street furniture to be confirmed prior to delivery. Furniture in vehicle path to be relocated / mounted on de-mountable posts.	Low
PC/14	B6592 / B704 Roundabout	Areas of oversail outwith carriageway and potential overrun at roundabout and western verge	Clearance to street furniture to be confirmed prior to delivery. Furniture in vehicle path to be relocated / mounted on de-mountable posts. Load bearing surface to be laid in areas of overrun if required.	Medium
PC/15	Burnbrae Road Roundabout	Areas of oversail outwith carriageway. Vehicle to overrun through roundabout.	Clearance to street furniture to be confirmed prior to delivery. Furniture in vehicle path to be relocated / mounted on de-mountable posts. Load bearing surface to be laid in areas of overrun.	Medium
PC/16	Burnbrae Terrace Roundabout	Areas of oversail outwith carriageway. Vehicle to overrun roundabout.	Clearance to street furniture to be confirmed prior to delivery. Furniture in vehicle path to be relocated / mounted on de-mountable posts. Load bearing surface to be laid in areas of overrun.	Medium
PC/17	Rosewell Road Roundabout	Areas of oversail outwith carriageway. Vehicle to overrun roundabout.	Clearance to street furniture to be confirmed prior to delivery. Furniture in vehicle path to be relocated / mounted on de-mountable posts. Load bearing surface to be laid in areas of overrun.	Medium

Ref	Location	Assessment Outcome	Mitigation	Risk
PC/18	A6094 / B7003 / A7 Roundabout	Areas of oversail outwith carriageway and potential overrun at roundabout.	Clearance to street furniture to be confirmed prior to delivery. Furniture in vehicle path to be relocated / mounted on de-mountable posts. Load bearing surface to be laid in areas of overrun if required.	Medium
PC/19	A6094 / Lindsay Row Roundabout	Areas of oversail outwith carriageway.	Clearance to street furniture to be confirmed prior to delivery. Furniture in vehicle path to be relocated / mounted on de-mountable posts.	Low
PC/20	Bend on A6094, Newbigging Farm	Areas of oversail outwith carriageway. Potential for oversail beyond the public road boundary.	Clearance to street furniture to be confirmed prior to delivery. Furniture in vehicle path to be relocated / mounted on de-mountable posts.	Medium
PC/21	A6094 Bend before Howgate	Blade to oversail beyond the public road boundary. Potential clearance issue with embankment height.	Clearance of blade to be confirmed prior to delivery.	High
PC/22	A6094 / B7026 Roundabout, Howgate	Vehicle to overrun grass area to the west.	Permission to be sought from local authority regarding land use. Load bearing surface to be laid in area ofd overrun. Clearance to street furniture to be confirmed prior to delivery. Furniture in vehicle path to be relocated / mounted on de-mountable posts.	Medium
PCB01	A6094 / B6372 Junction	Vehicle to overrun and oversail beyond the public road boundary to north of junction if route chosen.	Load bearing surface to be laid in area of overrun. Trees to be removed to provide clear access for vehicle.	High

Ref	Location	Assessment Outcome	Mitigation	Risk
PCB02	B6372 / B7026 Junction	Vehicle to overosail field to south of junction if route chosen.	Clearance to street furniture to be confirmed prior to delivery. Furniture in vehicle path to be relocated / mounted on de-mountable posts.	High
PC/23	A6094 / A703 Junction	Vehicle to overrun traffic island and oversail eastern verge.	Clearance to street furniture to be confirmed prior to delivery. Furniture in vehicle path to be relocated / mounted on de-mountable posts. Load bearing surface to be laid in areas of overrun if required.	Medium
PC/24	A703 / D17 Junction	Vehicle to overrun and oversail beyond the public road boundary to north of junction.	Trees to be removed to allow vehicle passage. Load bearing surface to be laid in areas of overrun. Clearance to street furniture to be confirmed prior to delivery. Furniture in vehicle path to be relocated / mounted on de-mountable posts.	High
PC/25	Bend on D17 Beyond Eddleston Water	Vehicle to overrun and oversail beyond the public road boundary	Load bearing surface to be laid in areas of overrun. Clearance to gabion baskets, stone wall and wire fence to be confirmed prior to delivery.	High
PC/26	Bend on D17 Beyond Shiplaw Embankment	Vehicle to overrun on grass verge and oversail beyond the public road boundary.	Trees to be removed to allow vehicle passage. Load bearing surface to be laid in areas of overrun.	High
PC/27	Bend by Shiplaw Farm	Vehicle to overrun / oversail beyond the public road boundary	Load bearing surface to be laid in areas of overrun. Clearance to street furniture to be confirmed prior to delivery. Furniture in vehicle path to be relocated / mounted on de-mountable posts.	High

Ref	Location	Assessment Outcome	Mitigation	Risk
PC/28	Bend Before Shiplaw Burn	Vehicle to overrun / oversail beyond the public road boundary	Load bearing surface to be laid in areas of overrun. Fence line to be relocated and structural survey of bridge to be undertaken prior to delivery.	High
PC/29	Bend After Shiplaw Burn	Vehicle to overrun / oversail beyond the public road boundary	Load bearing surface to be laid in areas of overrun. Clearance to street furniture to be confirmed prior to delivery. Furniture in vehicle path to be relocated / mounted on de-mountable posts.	High
PC/30	Bend onto Cloich Farm Access Road	Vehicle to overrun / oversail beyond the public road boundary	Load bearing surface to be laid in areas of overrun. Clearance to street furniture to be confirmed prior to delivery. Furniture in vehicle path to be relocated / mounted on de-mountable posts.	High
PC/31	Bend at Cloich Farm	Vehicle to overrun / oversail beyond the public road boundary	Load bearing surface to be laid in areas of overrun.	High
PC/32	Bend at Western Track	Vehicle to overrun verge and oversail land to south of junction.	Load bearing surface to be laid in areas of overrun.	High

4 CONCLUSION

4.1 Summary

Areas of land beyond the public road boundary are expected until the A703 /D17 Junction. It is expected that additional Load bearing surfaces will need to be constructed along the route between the port of entry and the junction with the D17 road.

PC21 sees significant oversail and overrun of land at Howgate, crossing pedestrian pathways. Approval should be sought from the local authority prior to utilising this route.

Nine points of constraint were noted along the D17 and D18, all requiring land beyond the public road boundary.

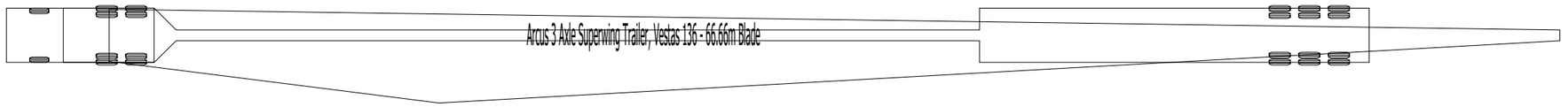
Several bridges and gabion baskets were noted along the route. Structural surveys of these bridges and clearance height of the baskets should be undertaken and checked prior to delivery.

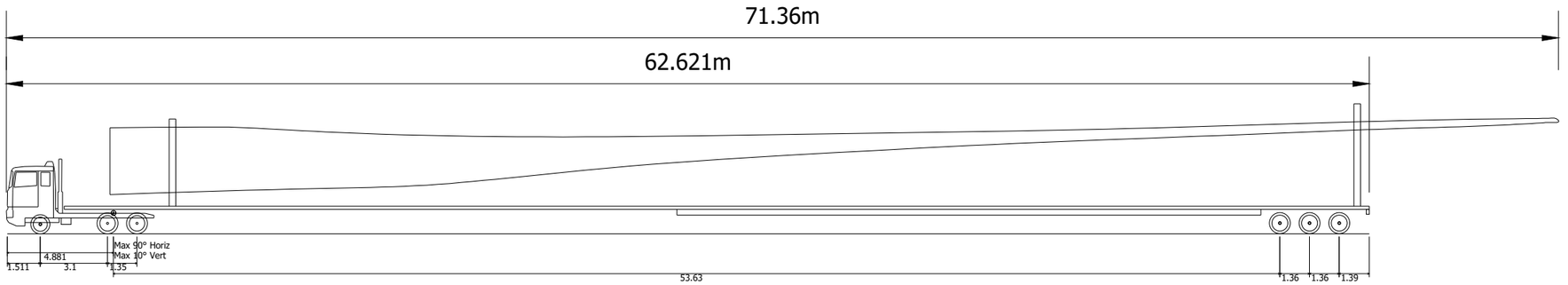
4.2 Recommendations for Further Work

Structural surveys may need to be undertaken at structures along the route in order to establish weight limits. An abnormal indivisible loads application should be submitted to the relevant authority which will initiate consultations with all relevant parties and identify areas where further review is required.

At a number of locations identified it is not clear from the mapping exactly where the extent of public road verge terminates. At these locations a topographical survey has been recommended in order to establish these limit. Landownership searches should be undertaken at these locations and at all locations where the need for land beyond the public road boundary has been identified.

APPENDIX A – VEHICLE DATA SHEET





Arcus 3 Axle Superwing Trailer, Vestas 136 - 66.66m Blade

Overall Length	71.360m
Overall Width	4.100m
Overall Body Height	3.436m
Min Body Ground Clearance	0.360m
Max Track Width	2.740m
Lock to lock time	6.00s
Kerb to Kerb Turning Radius	6.600m

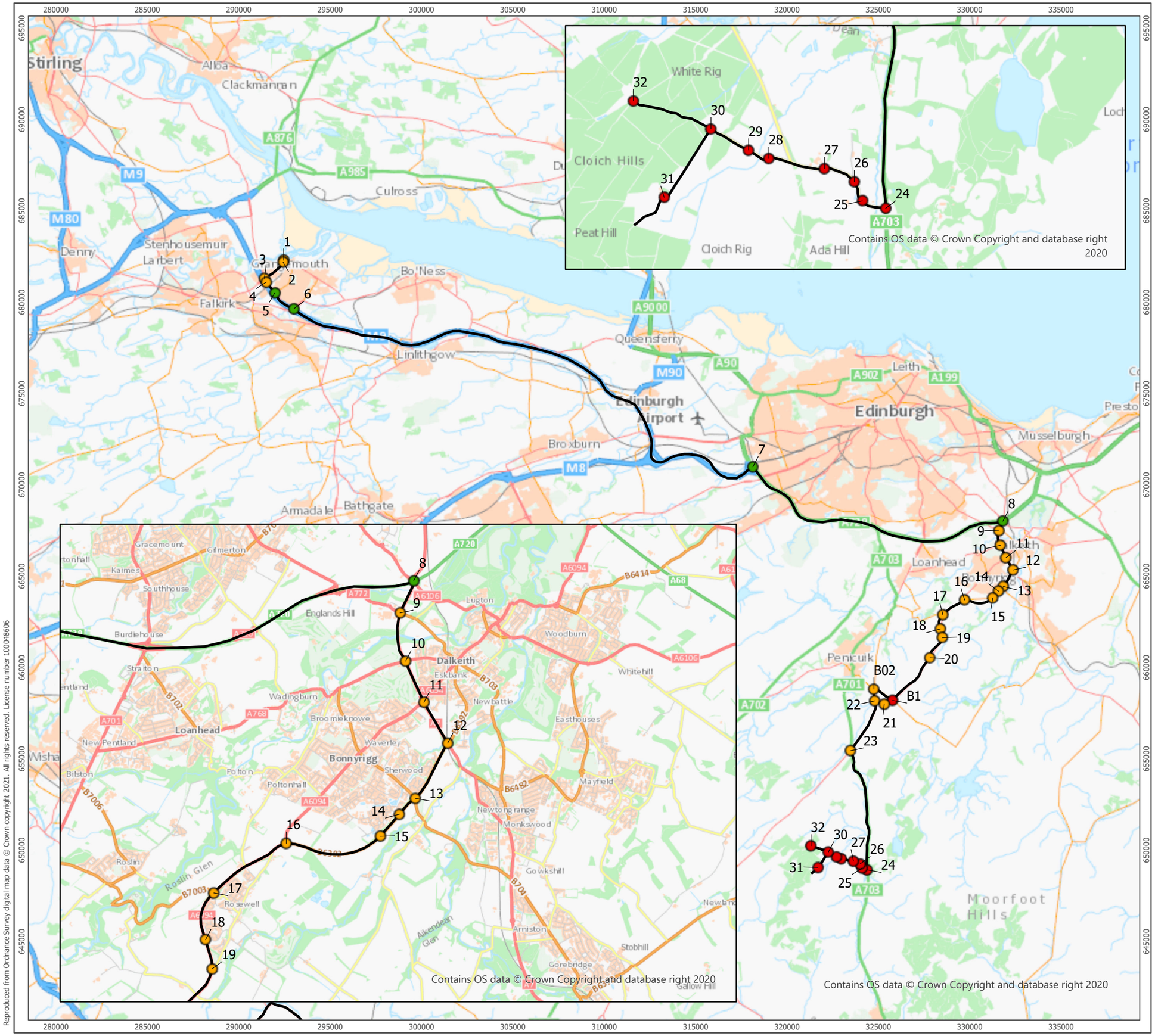
Project Title: CLOICH WIND FARM EIA	Drawing Title: VEHICLE DATA SHEET	Purpose of issue: FOR INFORMATION	
Client: EDF ENERGY RENEWABLES LTD		Designed: KL / Drawn: KL / Checked: TAT / Approved: TAT	
		Arcus Internal Project No.: 3439	Date: 23/08/18
		Scale @ A3: 1:250	

Drawing Number: 3439_SK_P_0001	Rev: -

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

ARCUS

APPENDIX B – ROUTE TO SITE



P:\Projects\Engineering\Projects\Previous System\Transport\Transport2.aprx\3122-REP-002

eDF renewable energy

ARCUS

- Site Boundary
- Abnormal Load Route
- Low Risk Pinch Point
- Medium Risk Pinch Point
- High Risk Pinch Point

1:200,000 Scale @ A3

0 5 10 km NORTH

Produced By: KL	Ref: 3122-REP-002
Checked By: SC	Date: 25/07/2019

Pinch Point Location Plan

Cloich Wind Farm
Abnormal Load Route Assessment

APPENDIX C – SWEPT PATH ANALYSIS DRAWINGS

LEGEND:

- VEHICLE
- VEHICLE WHEEL TRACK
- VEHICLE OVERHANG
- LOAD
- LOAD OVERHANG
- OVERRUN
- OVERSAIL

NOTES:

1. AUTOMATIC REAR WHEEL STEERING USED UNLESS OTHERWISE INDICATED.
2. ANALYSIS HAS NOT CONSIDERED VERTICAL GROUND CLEARANCE OF THE VEHICLE AND LOAD.
3. FURTHER INVESTIGATION WORKS WILL BE REQUIRED IN ORDER TO IDENTIFY THE IMPROVEMENT WORKS REQUIRED INCLUDING BUT NOT LIMITED TO CARRIAGEWAY WIDENING, EARTHWORKS, DRAINAGE, SERVICES, PEDESTRIAN FACILITIES AND TRAFFIC MANAGEMENT.
4. ANALYSIS BASED ON 75m BLADE DELIVERY VEHICLE
5. ANALYSIS BASED ON OS MASTERMAP. WHERE REQUIRED TOPOGRAPHICAL SURVEY TO BE UNDERTAKEN AND USED AS A BASIS FOR DETAILED DESIGN.
6. A 0.75m MAX BUFFER IS INDICATED OUTSIDE OVERRUN AND OVERSAIL AREAS FROM THE EXTENT OF VEHICLE SWEPT PATH WHERE LAND OWNERSHIP ALLOWS. THIS IS TO PROVIDE A FACTOR OF SAFETY AND TO INDICATE THE AREA WHICH SHOULD BE ALLOWED FOR, IN ORDER TO PROVIDE A MARGIN OF ERROR DURING DELIVERY.

Project Title
CLOICH WIND FARM EIA

Client
EDF ENERGY RENEWABLES LTD

Drawing Title
ALV SWEPT PATH ANALYSIS
VESTAS V136 66.6m BLADE
PC 01
CARRON DOCK

Purpose of issue
FOR INFORMATION

Designed	Drawn	Checked	Approved
	GR	KL	TAT

Arcus Internal Project No.
3439

Scale @ A3
1:1000

Date
05/03/2021

Drawing Number
3439_DR_ALR_0001

Rev
-

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

ARCUS

LEGEND:

- VEHICLE
- VEHICLE WHEEL TRACK
- VEHICLE OVERHANG
- LOAD
- LOAD OVERHANG
- OVERRUN
- OVERSAIL

NOTES:

1. AUTOMATIC REAR WHEEL STEERING USED UNLESS OTHERWISE INDICATED.
2. ANALYSIS HAS NOT CONSIDERED VERTICAL GROUND CLEARANCE OF THE VEHICLE AND LOAD.
3. FURTHER INVESTIGATION WORKS WILL BE REQUIRED IN ORDER TO IDENTIFY THE IMPROVEMENT WORKS REQUIRED INCLUDING BUT NOT LIMITED TO CARRIAGEWAY WIDENING, EARTHWORKS, DRAINAGE, SERVICES, PEDESTRIAN FACILITIES AND TRAFFIC MANAGEMENT.
4. ANALYSIS BASED ON 75m BLADE DELIVERY VEHICLE
5. ANALYSIS BASED ON OS MASTERMAP. WHERE REQUIRED TOPOGRAPHICAL SURVEY TO BE UNDERTAKEN AND USED AS A BASIS FOR DETAILED DESIGN.
6. A 0.75m MAX BUFFER IS INDICATED OUTSIDE OVERRUN AND OVERSAIL AREAS FROM THE EXTENT OF VEHICLE SWEPT PATH WHERE LAND OWNERSHIP ALLOWS. THIS IS TO PROVIDE A FACTOR OF SAFETY AND TO INDICATE THE AREA WHICH SHOULD BE ALLOWED FOR, IN ORDER TO PROVIDE A MARGIN OF ERROR DURING DELIVERY.

APPROXIMATE LOCATION OF LIGHTING COLUMN. DRY RUN OR TOPOGRAPHICAL SURVEY REQUIRED TO CONFIRM EXACT LOCATION

APPROXIMATE LOCATION OF SIGNPOST. TO BE MOUNTED ON DEMOUNTABLE SUPPORTS

APPROXIMATE LOCATION OF SIGNPOST. TO BE MOUNTED ON DEMOUNTABLE SUPPORTS.

APPROXIMATE LOCATION OF LIGHTING COLUMN. DRY RUN OR TOPOGRAPHICAL SURVEY REQUIRED TO CONFIRM EXACT LOCATION

APPROXIMATE LOCATION OF LIGHTING COLUMN TO BE REMOVED

APPROXIMATE LOCATION OF SIGNPOST. TO BE MOUNTED ON DEMOUNTABLE SUPPORTS

Project Title: CLOICH WIND FARM EIA	Drawing Title: ALV SWEPT PATH ANALYSIS VESTAS V136 66.6m BLADE PC 02 CENTRAL DOCK ROAD JUNCTION	Purpose of issue: FOR INFORMATION	THIS DOCUMENT HAS BEEN PREPARED IN ACCORDANCE WITH THE SCOPE OF ARCUS' APPOINTMENT WITH ITS CLIENT AND IS SUBJECT TO THE TERMS OF THAT APPOINTMENT. ARCUS ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS CLIENT AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED
Client: EDF ENERGY RENEWABLES LTD		Designed: — Drawn: GR Checked: KL Approved: TAT	
		Arcus Internal Project No.: 3439 Date: 05/03/2021	Drawing Number: 3439_DR_ALR_0002 Rev: -
		Scale @ A3: 1:1000	

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

ARCUS

LOAD BEARING SURFACE TO BE LAID IN OVERRUN AREA

APPROXIMATE LOCATION OF LIGHTING COLUMN TO BE REMOVED

APPROXIMATE LOCATION OF SIGNPOST. TO BE MOUNTED ON DEMOUNTABLE SUPPORTS

APPROXIMATE LOCATION OF TELEGRAPH POST TO BE RELOCATED

MINOR VEGETATION CLEARANCE MAY BE REQUIRED

APPROXIMATE LOCATION OF CHEVRON SIGNPOST. TO BE MOUNTED ON DEMOUNTABLE SUPPORTS

LEGEND:

- VEHICLE
- VEHICLE WHEEL TRACK
- VEHICLE OVERHANG
- LOAD
- LOAD OVERHANG
- OVERRUN
- OVERSAIL

NOTES:

1. AUTOMATIC REAR WHEEL STEERING USED UNLESS OTHERWISE INDICATED.
2. ANALYSIS HAS NOT CONSIDERED VERTICAL GROUND CLEARANCE OF THE VEHICLE AND LOAD.
3. FURTHER INVESTIGATION WORKS WILL BE REQUIRED IN ORDER TO IDENTIFY THE IMPROVEMENT WORKS REQUIRED INCLUDING BUT NOT LIMITED TO CARRIAGEWAY WIDENING, EARTHWORKS, DRAINAGE, SERVICES, PEDESTRIAN FACILITIES AND TRAFFIC MANAGEMENT.
4. ANALYSIS BASED ON 75m BLADE DELIVERY VEHICLE
5. ANALYSIS BASED ON OS MASTERMAP. WHERE REQUIRED TOPOGRAPHICAL SURVEY TO BE UNDERTAKEN AND USED AS A BASIS FOR DETAILED DESIGN.
6. A 0.75m MAX BUFFER IS INDICATED OUTSIDE OVERRUN AND OVERSAIL AREAS FROM THE EXTENT OF VEHICLE SWEPT PATH WHERE LAND OWNERSHIP ALLOWS. THIS IS TO PROVIDE A FACTOR OF SAFETY AND TO INDICATE THE AREA WHICH SHOULD BE ALLOWED FOR, IN ORDER TO PROVIDE A MARGIN OF ERROR DURING DELIVERY.

Project Title: CLOICH WIND FARM EIA	Drawing Title: ALV SWEPT PATH ANALYSIS VESTAS V136 66.6m BLADE PC 03 TIMBER BASIN ROUNDABOUT	Purpose of issue: FOR INFORMATION	
Client: EDF ENERGY RENEWABLES LTD		Designed:	Drawn: GR
		Checked: KL	Approved: TAT
		Arcus Internal Project No.: 3439	Date: 05/03/2021
		Scale @ A3: 1:500	

Drawing Number	Rev
3439_DR_ALR_0003	-

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

ARCUS

APPROXIMATE LOCATION OF
TRAFFIC SIGNAL CONTROLS

APPROXIMATE LOCATION OF SIGNPOSTS

APPROXIMATE LOCATION OF
TRAFFIC SIGNAL CONTROLS
TO BE REMOVED

APPROXIMATE LOCATION OF
SIGNPOST. TO BE MOUNTED
ON DEMOUNTABLE SUPPORTS.

APPROXIMATE LOCATION OF
TRAFFIC SIGNAL CONTROLS

APPROXIMATE LOCATION OF
LIGHTING COLUMN TO BE REMOVED

APPROXIMATE LOCATION OF
LIGHTING COLUMN TO BE REMOVED

APPROXIMATE LOCATION OF
PLASTIC BOLLARD TO BE REMOVED

LEGEND:

- VEHICLE
- VEHICLE WHEEL TRACK
- VEHICLE OVERHANG
- LOAD
- LOAD OVERHANG
- OVERRUN
- OVERSAIL

NOTES:

1. AUTOMATIC REAR WHEEL STEERING USED UNLESS OTHERWISE INDICATED.
2. ANALYSIS HAS NOT CONSIDERED VERTICAL GROUND CLEARANCE OF THE VEHICLE AND LOAD.
3. FURTHER INVESTIGATION WORKS WILL BE REQUIRED IN ORDER TO IDENTIFY THE IMPROVEMENT WORKS REQUIRED INCLUDING BUT NOT LIMITED TO CARRIAGEWAY WIDENING, EARTHWORKS, DRAINAGE, SERVICES, PEDESTRIAN FACILITIES AND TRAFFIC MANAGEMENT.
4. ANALYSIS BASED ON 75m BLADE DELIVERY VEHICLE
5. ANALYSIS BASED ON OS MASTERMAP. WHERE REQUIRED TOPOGRAPHICAL SURVEY TO BE UNDERTAKEN AND USED AS A BASIS FOR DETAILED DESIGN.
6. A 0.75m MAX BUFFER IS INDICATED OUTSIDE OVERRUN AND OVERSAIL AREAS FROM THE EXTENT OF VEHICLE SWEPT PATH WHERE LAND OWNERSHIP ALLOWS. THIS IS TO PROVIDE A FACTOR OF SAFETY AND TO INDICATE THE AREA WHICH SHOULD BE ALLOWED FOR, IN ORDER TO PROVIDE A MARGIN OF ERROR DURING DELIVERY.

Project Title
CLOICH WIND FARM EIA

Client
EDF ENERGY RENEWABLES LTD

Drawing Title
ALV SWEPT PATH ANALYSIS
VESTAS V136 66.6m BLADE
PC 04
EARLS GATE ROUNDABOUT

Purpose of issue
FOR INFORMATION

Designed	Drawn	Checked	Approved
	GR	KL	TAT

Arcus Internal Project No.
3439

Date
05/03/2021

Scale @ A3
1:500

Drawing Number
3439_DR_ALR_0004

Rev
-

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: 0141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

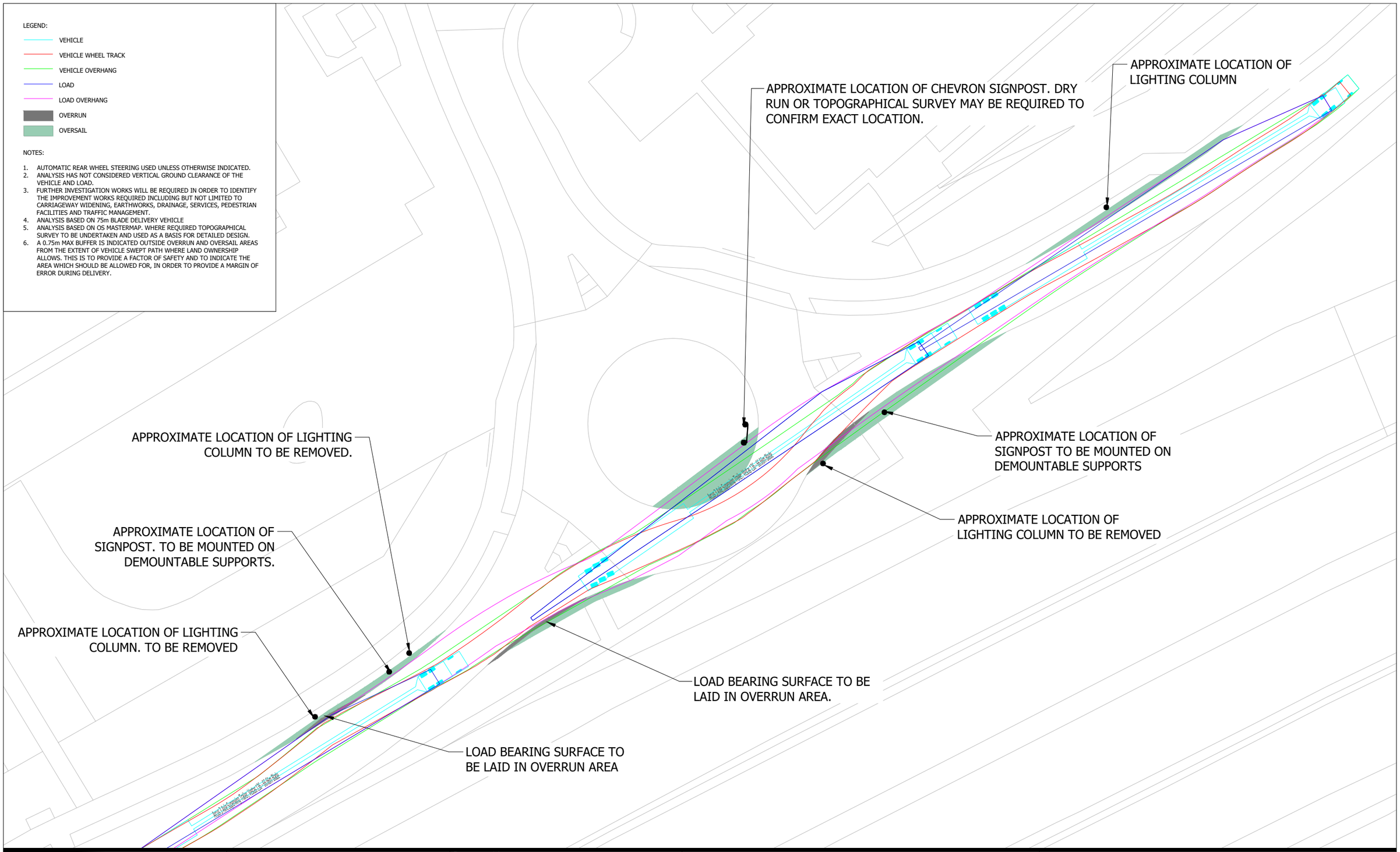
ARCUS

LEGEND:

- VEHICLE
- VEHICLE WHEEL TRACK
- VEHICLE OVERHANG
- LOAD
- LOAD OVERHANG
- OVERRUN
- OVERSAIL

NOTES:

1. AUTOMATIC REAR WHEEL STEERING USED UNLESS OTHERWISE INDICATED.
2. ANALYSIS HAS NOT CONSIDERED VERTICAL GROUND CLEARANCE OF THE VEHICLE AND LOAD.
3. FURTHER INVESTIGATION WORKS WILL BE REQUIRED IN ORDER TO IDENTIFY THE IMPROVEMENT WORKS REQUIRED INCLUDING BUT NOT LIMITED TO CARRIAGEWAY WIDENING, EARTHWORKS, DRAINAGE, SERVICES, PEDESTRIAN FACILITIES AND TRAFFIC MANAGEMENT.
4. ANALYSIS BASED ON 75m BLADE DELIVERY VEHICLE
5. ANALYSIS BASED ON OS MASTERMAP. WHERE REQUIRED TOPOGRAPHICAL SURVEY TO BE UNDERTAKEN AND USED AS A BASIS FOR DETAILED DESIGN.
6. A 0.75m MAX BUFFER IS INDICATED OUTSIDE OVERRUN AND OVERSAIL AREAS FROM THE EXTENT OF VEHICLE SWEPT PATH WHERE LAND OWNERSHIP ALLOWS. THIS IS TO PROVIDE A FACTOR OF SAFETY AND TO INDICATE THE AREA WHICH SHOULD BE ALLOWED FOR, IN ORDER TO PROVIDE A MARGIN OF ERROR DURING DELIVERY.



Project Title: CLOICH WIND FARM EIA	Drawing Title: ALV SWEPT PATH ANALYSIS VESTAS V136 66.6m BLADE PC 05 A905/CALEDON GREEN ROUNDABOUT	Purpose of issue: FOR INFORMATION	
Client: EDF ENERGY RENEWABLES LTD		Designed:	Drawn: GR
		Checked: KL	Approved: TAT
		Arcus Internal Project No.: 3439	Date: 05/03/2021
		Scale @ A3: 1:500	

Drawing Number	Rev
3439_DR_ALR_0005	-

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

ARCUS

LEGEND:

- VEHICLE
- VEHICLE WHEEL TRACK
- VEHICLE OVERHANG
- LOAD
- LOAD OVERHANG
- OVERRUN
- OVERSAIL

NOTES:

1. AUTOMATIC REAR WHEEL STEERING USED UNLESS OTHERWISE INDICATED.
2. ANALYSIS HAS NOT CONSIDERED VERTICAL GROUND CLEARANCE OF THE VEHICLE AND LOAD.
3. FURTHER INVESTIGATION WORKS WILL BE REQUIRED IN ORDER TO IDENTIFY THE IMPROVEMENT WORKS REQUIRED INCLUDING BUT NOT LIMITED TO CARRIAGEWAY WIDENING, EARTHWORKS, DRAINAGE, SERVICES, PEDESTRIAN FACILITIES AND TRAFFIC MANAGEMENT.
4. ANALYSIS BASED ON 75m BLADE DELIVERY VEHICLE
5. ANALYSIS BASED ON OS MASTERMAP. WHERE REQUIRED TOPOGRAPHICAL SURVEY TO BE UNDERTAKEN AND USED AS A BASIS FOR DETAILED DESIGN.
6. A 0.75m MAX BUFFER IS INDICATED OUTSIDE OVERRUN AND OVERSAIL AREAS FROM THE EXTENT OF VEHICLE SWEPT PATH WHERE LAND OWNERSHIP ALLOWS. THIS IS TO PROVIDE A FACTOR OF SAFETY AND TO INDICATE THE AREA WHICH SHOULD BE ALLOWED FOR, IN ORDER TO PROVIDE A MARGIN OF ERROR DURING DELIVERY.

APPROXIMATE LOCATION OF BOLLARD TO BE REMOVED

ROUNDABOUT TO BE CONTRAFLOWED

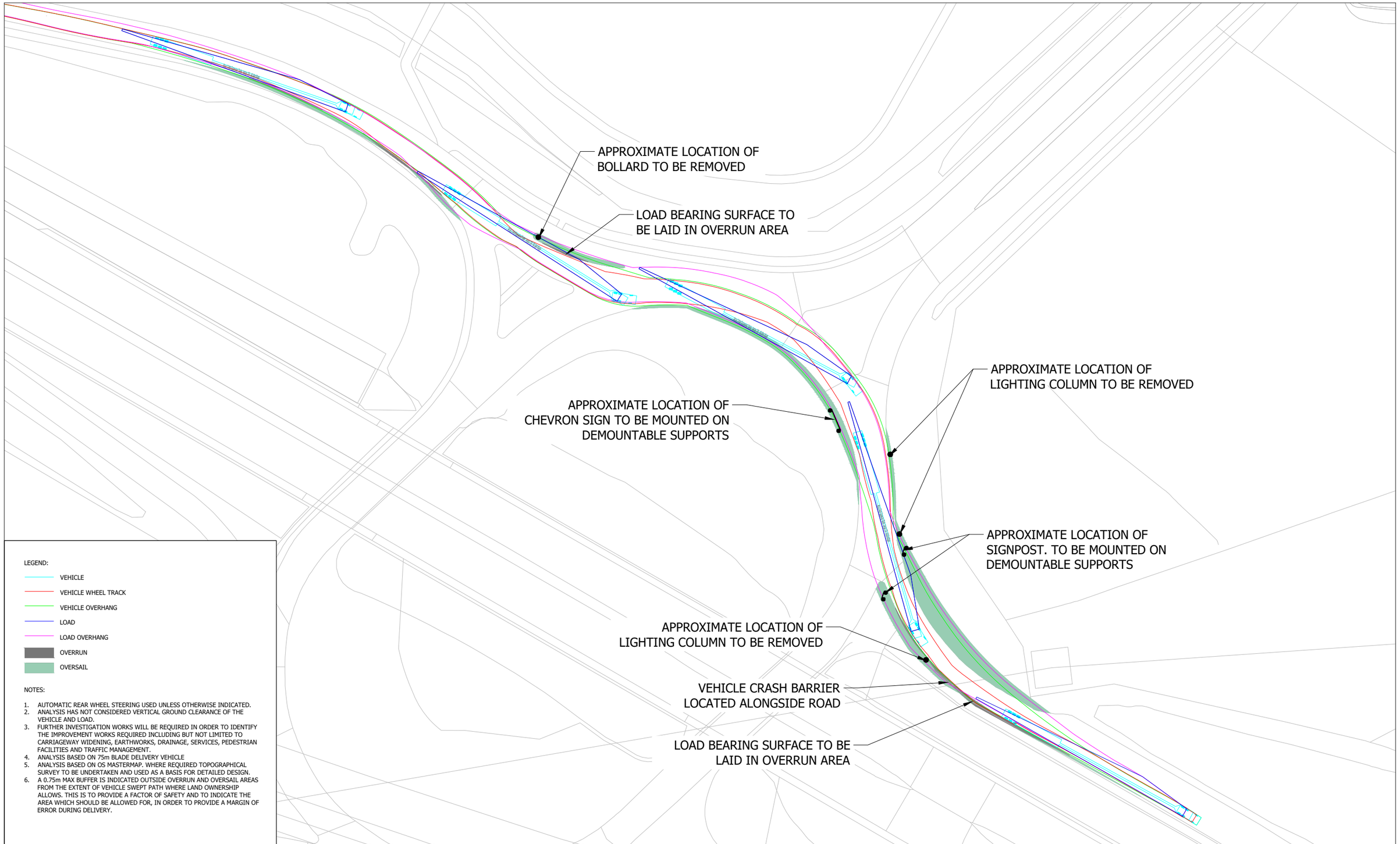
Project Title: CLOICH WIND FARM EIA	Drawing Title: ALV SWEPT PATH ANALYSIS VESTAS V136 66.6m BLADE PC 06 BEANCROSS ROUNDABOUT	Purpose of issue: FOR INFORMATION	
Client: EDF ENERGY RENEWABLES LTD		Designed:	Drawn: GR
		Checked: KL	Approved: TAT
		Arcus Internal Project No.: 3439	Date: 05/03/2021
		Scale @ A3: 1:500	

Drawing Number: 3439_DR_ALR_0006

Rev: -

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

ARCUS



LEGEND:

- VEHICLE
- VEHICLE WHEEL TRACK
- VEHICLE OVERHANG
- LOAD
- LOAD OVERHANG
- OVERRUN
- OVERSAIL

NOTES:

1. AUTOMATIC REAR WHEEL STEERING USED UNLESS OTHERWISE INDICATED.
2. ANALYSIS HAS NOT CONSIDERED VERTICAL GROUND CLEARANCE OF THE VEHICLE AND LOAD.
3. FURTHER INVESTIGATION WORKS WILL BE REQUIRED IN ORDER TO IDENTIFY THE IMPROVEMENT WORKS REQUIRED INCLUDING BUT NOT LIMITED TO CARRIAGEWAY WIDENING, EARTHWORKS, DRAINAGE, SERVICES, PEDESTRIAN FACILITIES AND TRAFFIC MANAGEMENT.
4. ANALYSIS BASED ON 75m BLADE DELIVERY VEHICLE
5. ANALYSIS BASED ON OS MASTERMAP. WHERE REQUIRED TOPOGRAPHICAL SURVEY TO BE UNDERTAKEN AND USED AS A BASIS FOR DETAILED DESIGN.
6. A 0.75m MAX BUFFER IS INDICATED OUTSIDE OVERRUN AND OVERSAIL AREAS FROM THE EXTENT OF VEHICLE SWEPT PATH WHERE LAND OWNERSHIP ALLOWS. THIS IS TO PROVIDE A FACTOR OF SAFETY AND TO INDICATE THE AREA WHICH SHOULD BE ALLOWED FOR, IN ORDER TO PROVIDE A MARGIN OF ERROR DURING DELIVERY.

Project Title
CLOICH WIND FARM EIA

Client
EDF ENERGY RENEWABLES LTD

Drawing Title
ALV SWEPT PATH ANALYSIS
VESTAS V136 66.6m BLADE
PC 07
CADGERS BRAE ROUNDABOUT

Purpose of issue
FOR INFORMATION

Designed	Drawn	Checked	Approved
	GR	KL	TAT

Arcus Internal Project No.
3439

Scale @ A3
1:1000

Date
05/03/2021

Drawing Number
3439_DR_ALR_0007

Rev
-

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

ARCUS

LEGEND:

- VEHICLE
- VEHICLE WHEEL TRACK
- VEHICLE OVERHANG
- LOAD
- LOAD OVERHANG
- OVERRUN
- OVERSAIL

NOTES:

1. AUTOMATIC REAR WHEEL STEERING USED UNLESS OTHERWISE INDICATED.
2. ANALYSIS HAS NOT CONSIDERED VERTICAL GROUND CLEARANCE OF THE VEHICLE AND LOAD.
3. FURTHER INVESTIGATION WORKS WILL BE REQUIRED IN ORDER TO IDENTIFY THE IMPROVEMENT WORKS REQUIRED INCLUDING BUT NOT LIMITED TO CARRIAGEWAY WIDENING, EARTHWORKS, DRAINAGE, SERVICES, PEDESTRIAN FACILITIES AND TRAFFIC MANAGEMENT.
4. ANALYSIS BASED ON 75m BLADE DELIVERY VEHICLE
5. ANALYSIS BASED ON OS MASTERMAP. WHERE REQUIRED TOPOGRAPHICAL SURVEY TO BE UNDERTAKEN AND USED AS A BASIS FOR DETAILED DESIGN.
6. A 0.75m MAX BUFFER IS INDICATED OUTSIDE OVERRUN AND OVERSAIL AREAS FROM THE EXTENT OF VEHICLE SWEPT PATH WHERE LAND OWNERSHIP ALLOWS. THIS IS TO PROVIDE A FACTOR OF SAFETY AND TO INDICATE THE AREA WHICH SHOULD BE ALLOWED FOR, IN ORDER TO PROVIDE A MARGIN OF ERROR DURING DELIVERY.

N

APPROXIMATE LOCATION OF TRAFFIC CONTROL SIGNALS

Project Title: CLOICH WIND FARM EIA	Drawing Title: ALV SWEPT PATH ANALYSIS VESTAS V136 66.6m BLADE PC 08 HERMISTON GAIT ROUNDABOUT	Purpose of issue: FOR INFORMATION	THIS DOCUMENT HAS BEEN PREPARED IN ACCORDANCE WITH THE SCOPE OF ARCUS' APPOINTMENT WITH ITS CLIENT AND IS SUBJECT TO THE TERMS OF THAT APPOINTMENT. ARCUS ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS CLIENT AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED
Client: EDF ENERGY RENEWABLES LTD		Designed: — / Drawn: GR / Checked: KL / Approved: TAT	
		Arcus Internal Project No.: 3439	Drawing Number: 3439_DR_ALR_0008
		Scale @ A3: 1:1000	Rev: -
		Date: 05/03/2021	

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

ARCUS

LEGEND:

- VEHICLE
- VEHICLE WHEEL TRACK
- VEHICLE OVERHANG
- LOAD
- LOAD OVERHANG
- OVERRUN
- OVERSAIL

NOTES:

1. AUTOMATIC REAR WHEEL STEERING USED UNLESS OTHERWISE INDICATED.
2. ANALYSIS HAS NOT CONSIDERED VERTICAL GROUND CLEARANCE OF THE VEHICLE AND LOAD.
3. FURTHER INVESTIGATION WORKS WILL BE REQUIRED IN ORDER TO IDENTIFY THE IMPROVEMENT WORKS REQUIRED INCLUDING BUT NOT LIMITED TO CARRIAGEWAY WIDENING, EARTHWORKS, DRAINAGE, SERVICES, PEDESTRIAN FACILITIES AND TRAFFIC MANAGEMENT.
4. ANALYSIS BASED ON 75m BLADE DELIVERY VEHICLE
5. ANALYSIS BASED ON OS MASTERMAP. WHERE REQUIRED TOPOGRAPHICAL SURVEY TO BE UNDERTAKEN AND USED AS A BASIS FOR DETAILED DESIGN.
6. A 0.75m MAX BUFFER IS INDICATED OUTSIDE OVERRUN AND OVERSAIL AREAS FROM THE EXTENT OF VEHICLE SWEPT PATH WHERE LAND OWNERSHIP ALLOWS. THIS IS TO PROVIDE A FACTOR OF SAFETY AND TO INDICATE THE AREA WHICH SHOULD BE ALLOWED FOR, IN ORDER TO PROVIDE A MARGIN OF ERROR DURING DELIVERY.

APPROXIMATE LOCATION OF TRAFFIC CONTROL SIGNALS TO BE REMOVED

APPROXIMATE LOCATION OF SIGNPOST. TO BE MOUNTED ON DEMOUNTABLE SUPPORTS

APPROXIMATE LOCATION OF BOLLARD TO BE REMOVED

APPROXIMATE LOCATION OF TRAFFIC CONTROL SIGNALS TO BE REMOVED

APPROXIMATE LOCATION OF TRAFFIC CONTROL SIGNALS TO BE REMOVED

APPROXIMATE LOCATION OF TRAFFIC CONTROL SIGNALS TO BE REMOVED

APPROXIMATE LOCATION OF ROUNDABOUT SIGN

APPROXIMATE LOCATION OF BOLLARD TO BE REMOVED

APPROXIMATE LOCATION OF SIGNPOST. TO BE MOUNTED ON DEMOUNTALE SUPPORTS

APPROXIMATE LOCATION OF TRAFFIC CONTROL SIGNALS TO BE REMOVED

APPROXIMATE LOCATION OF LIGHTING COLUMN TO BE REMOVED

APPROXIMATE LOCATION OF SIGNPOST. TO BE MOUNTED ON DEMOUNTABLE SUPPORTS

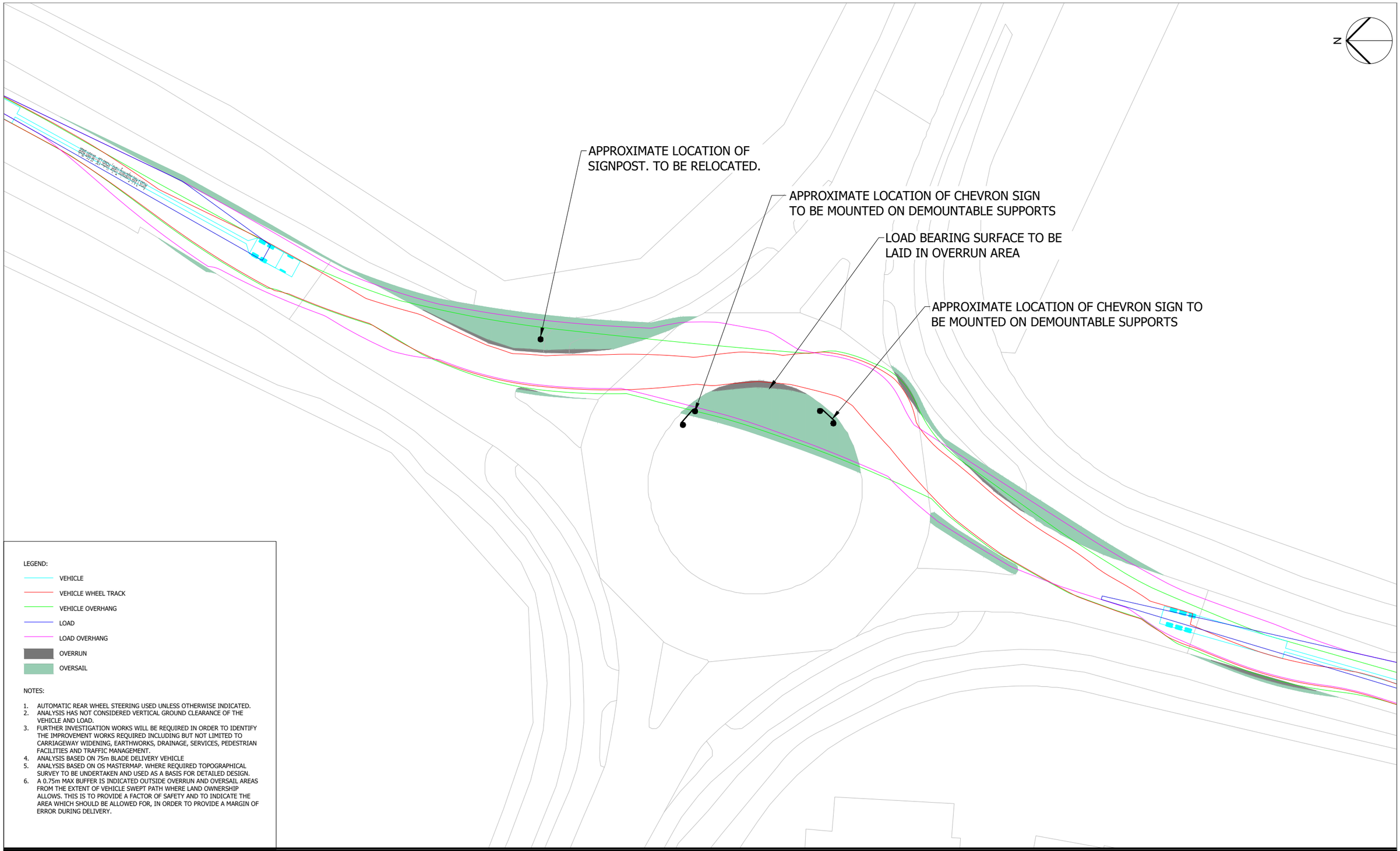
Project Title: CLOICH WIND FARM EIA	Drawing Title: ALV SWEPT PATH ANALYSIS VESTAS V136 66.6m BLADE PC 09 SHERIFFHALL ROUNDABOUT A720	Purpose of issue: FOR INFORMATION	
Client: EDF ENERGY RENEWABLES LTD		Designed:	Drawn: GR
		Checked: KL	Approved: TAT
		Arcus Internal Project No.: 3439	Date: 05/03/2021
		Scale @ A3: 1:1000	

Drawing Number: 3439_DR_ALR_0009

Rev: -

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

ARCUS



LEGEND:

- VEHICLE
- VEHICLE WHEEL TRACK
- VEHICLE OVERHANG
- LOAD
- LOAD OVERHANG
- OVERRUN
- OVERSAIL

NOTES:

1. AUTOMATIC REAR WHEEL STEERING USED UNLESS OTHERWISE INDICATED.
2. ANALYSIS HAS NOT CONSIDERED VERTICAL GROUND CLEARANCE OF THE VEHICLE AND LOAD.
3. FURTHER INVESTIGATION WORKS WILL BE REQUIRED IN ORDER TO IDENTIFY THE IMPROVEMENT WORKS REQUIRED INCLUDING BUT NOT LIMITED TO CARRIAGEWAY WIDENING, EARTHWORKS, DRAINAGE, SERVICES, PEDESTRIAN FACILITIES AND TRAFFIC MANAGEMENT.
4. ANALYSIS BASED ON 75m BLADE DELIVERY VEHICLE
5. ANALYSIS BASED ON OS MASTERMAP. WHERE REQUIRED TOPOGRAPHICAL SURVEY TO BE UNDERTAKEN AND USED AS A BASIS FOR DETAILED DESIGN.
6. A 0.75m MAX BUFFER IS INDICATED OUTSIDE OVERRUN AND OVERSAIL AREAS FROM THE EXTENT OF VEHICLE SWEPT PATH WHERE LAND OWNERSHIP ALLOWS. THIS IS TO PROVIDE A FACTOR OF SAFETY AND TO INDICATE THE AREA WHICH SHOULD BE ALLOWED FOR, IN ORDER TO PROVIDE A MARGIN OF ERROR DURING DELIVERY.

Project Title: CLOICH WIND FARM EIA	Drawing Title: ALV SWEPT PATH ANALYSIS VESTAS V136 66.6m BLADE PC 10 GILMERTON ROAD ROUNDABOUT A7	Purpose of issue: FOR INFORMATION	
Client: EDF ENERGY RENEWABLES LTD		Designed:	Drawn: GR
		Checked: KL	Approved: TAT
		Arcus Internal Project No.: 3439	Date: 05/03/2021
		Scale @ A3: 1:500	

Drawing Number	Rev
3439_DR_ALR_0010	-

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

ARCUS

LEGEND:

- VEHICLE
- VEHICLE WHEEL TRACK
- VEHICLE OVERHANG
- LOAD
- LOAD OVERHANG
- OVERRUN
- OVERSAIL

NOTES:

1. AUTOMATIC REAR WHEEL STEERING USED UNLESS OTHERWISE INDICATED.
2. ANALYSIS HAS NOT CONSIDERED VERTICAL GROUND CLEARANCE OF THE VEHICLE AND LOAD.
3. FURTHER INVESTIGATION WORKS WILL BE REQUIRED IN ORDER TO IDENTIFY THE IMPROVEMENT WORKS REQUIRED INCLUDING BUT NOT LIMITED TO CARRIAGEWAY WIDENING, EARTHWORKS, DRAINAGE, SERVICES, PEDESTRIAN FACILITIES AND TRAFFIC MANAGEMENT.
4. ANALYSIS BASED ON 75m BLADE DELIVERY VEHICLE
5. ANALYSIS BASED ON OS MASTERMAP. WHERE REQUIRED TOPOGRAPHICAL SURVEY TO BE UNDERTAKEN AND USED AS A BASIS FOR DETAILED DESIGN.
6. A 0.75m MAX BUFFER IS INDICATED OUTSIDE OVERRUN AND OVERSAIL AREAS FROM THE EXTENT OF VEHICLE SWEPT PATH WHERE LAND OWNERSHIP ALLOWS. THIS IS TO PROVIDE A FACTOR OF SAFETY AND TO INDICATE THE AREA WHICH SHOULD BE ALLOWED FOR, IN ORDER TO PROVIDE A MARGIN OF ERROR DURING DELIVERY.

N

APPROXIMATE LOCATION OF CHEVRON SIGN TO BE MOUNTED ON DEMOUNTABLE SUPPORTS

APPROXIMATE LOCATION OF BOLLARD TO BE REMOVED

APPROXIMATE LOCATION OF SIGNPOST. TO BE MOUNTED ON DEMOUNTABLE SUPPORTS

LOAD BEARING SURFACE TO BE LAID IN OVERRUN AREA

APPROXIMATE LOCATION CHEVRON SIGN TO BE MOUNTED ON DEMOUNTABLE SUPPORTS

Project Title: CLOICH WIND FARM EIA	Drawing Title: ALV SWEPT PATH ANALYSIS VESTAS V136 66.6m BLADE PC 11 MELVILLE DYKES ROAD ROUNDABOUT	Purpose of issue: FOR INFORMATION	THIS DOCUMENT HAS BEEN PREPARED IN ACCORDANCE WITH THE SCOPE OF ARCUS' APPOINTMENT WITH ITS CLIENT AND IS SUBJECT TO THE TERMS OF THAT APPOINTMENT. ARCUS ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS CLIENT AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED
Client: EDF ENERGY RENEWABLES LTD		Designed: — Drawn: GR Checked: KL Approved: TAT Arcus Internal Project No.: 3439 Scale @ A3: 1:500 Date: 05/03/2021	Drawing Number: 3439_DR_ALR_0011 Rev: -

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

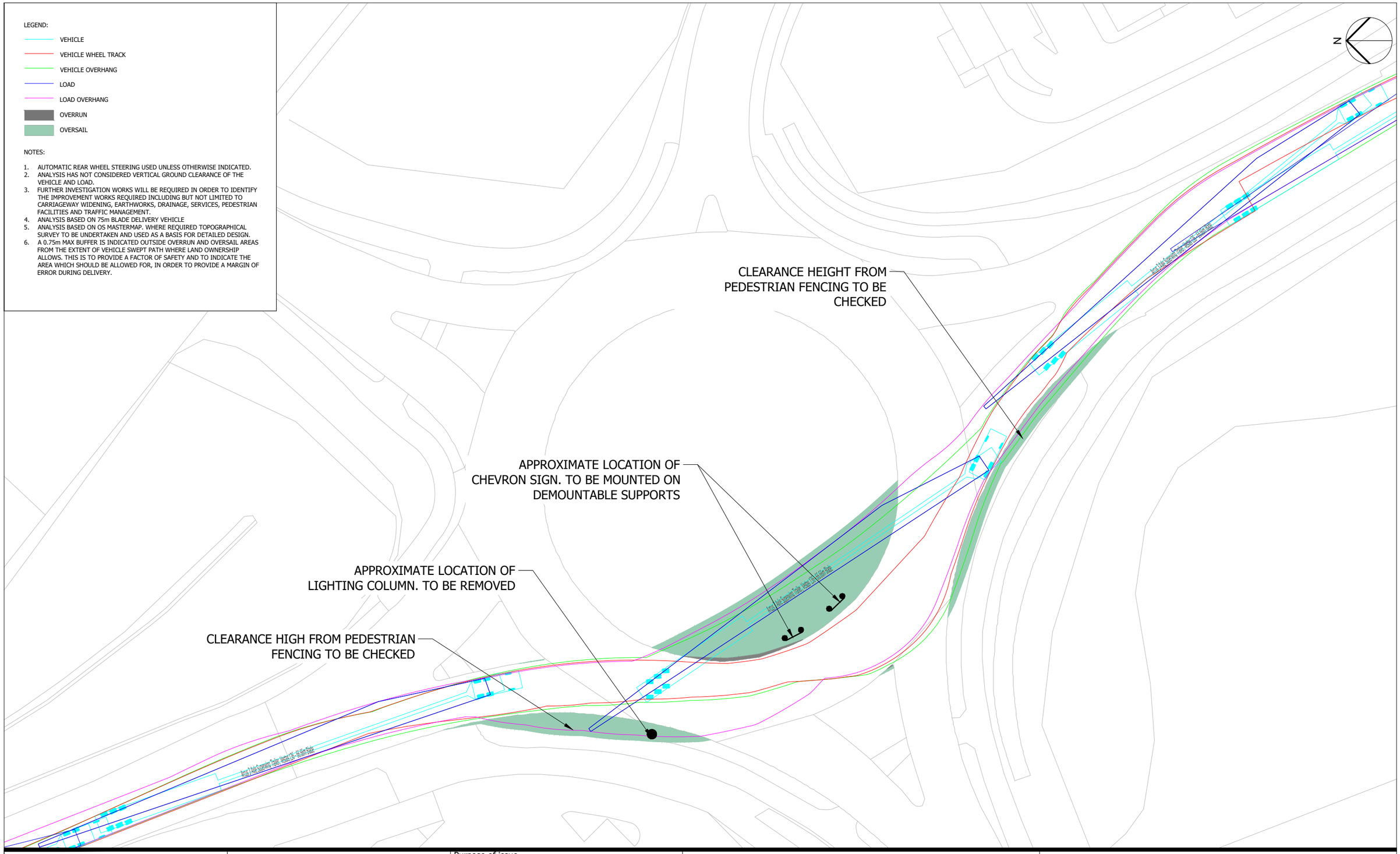
ARCUS

LEGEND:

- VEHICLE
- VEHICLE WHEEL TRACK
- VEHICLE OVERHANG
- LOAD
- LOAD OVERHANG
- OVERRUN
- OVERSAIL

NOTES:

1. AUTOMATIC REAR WHEEL STEERING USED UNLESS OTHERWISE INDICATED.
2. ANALYSIS HAS NOT CONSIDERED VERTICAL GROUND CLEARANCE OF THE VEHICLE AND LOAD.
3. FURTHER INVESTIGATION WORKS WILL BE REQUIRED IN ORDER TO IDENTIFY THE IMPROVEMENT WORKS REQUIRED INCLUDING BUT NOT LIMITED TO CARRIAGEWAY WIDENING, EARTHWORKS, DRAINAGE, SERVICES, PEDESTRIAN FACILITIES AND TRAFFIC MANAGEMENT.
4. ANALYSIS BASED ON 75m BLADE DELIVERY VEHICLE
5. ANALYSIS BASED ON OS MASTERMAP. WHERE REQUIRED TOPOGRAPHICAL SURVEY TO BE UNDERTAKEN AND USED AS A BASIS FOR DETAILED DESIGN.
6. A 0.75m MAX BUFFER IS INDICATED OUTSIDE OVERRUN AND OVERSAIL AREAS FROM THE EXTENT OF VEHICLE SWEPT PATH WHERE LAND OWNERSHIP ALLOWS. THIS IS TO PROVIDE A FACTOR OF SAFETY AND TO INDICATE THE AREA WHICH SHOULD BE ALLOWED FOR, IN ORDER TO PROVIDE A MARGIN OF ERROR DURING DELIVERY.



Project Title: CLOICH WIND FARM EIA	Drawing Title: ALV SWEPT PATH ANALYSIS VESTAS V136 66.6m BLADE PC 12 ESKBANK ROAD ROUNDABOUT A7	Purpose of issue: FOR INFORMATION	
Client: EDF ENERGY RENEWABLES LTD		Designed:	Drawn: GR
		Checked: KL	Approved: TAT
		Arcus Internal Project No.: 3439	Date: 05/03/2021
		Scale @ A3: 1:500	

Drawing Number	Rev
3439_DR_ALR_0012	-

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

ARCUS

LEGEND:

- VEHICLE
- VEHICLE WHEEL TRACK
- VEHICLE OVERHANG
- LOAD
- LOAD OVERHANG
- OVERRUN
- OVERSAIL

NOTES:

1. AUTOMATIC REAR WHEEL STEERING USED UNLESS OTHERWISE INDICATED.
2. ANALYSIS HAS NOT CONSIDERED VERTICAL GROUND CLEARANCE OF THE VEHICLE AND LOAD.
3. FURTHER INVESTIGATION WORKS WILL BE REQUIRED IN ORDER TO IDENTIFY THE IMPROVEMENT WORKS REQUIRED INCLUDING BUT NOT LIMITED TO CARRIAGEWAY WIDENING, EARTHWORKS, DRAINAGE, SERVICES, PEDESTRIAN FACILITIES AND TRAFFIC MANAGEMENT.
4. ANALYSIS BASED ON 75m BLADE DELIVERY VEHICLE
5. ANALYSIS BASED ON OS MASTERMAP. WHERE REQUIRED TOPOGRAPHICAL SURVEY TO BE UNDERTAKEN AND USED AS A BASIS FOR DETAILED DESIGN.
6. A 0.75m MAX BUFFER IS INDICATED OUTSIDE OVERRUN AND OVERSAIL AREAS FROM THE EXTENT OF VEHICLE SWEPT PATH WHERE LAND OWNERSHIP ALLOWS. THIS IS TO PROVIDE A FACTOR OF SAFETY AND TO INDICATE THE AREA WHICH SHOULD BE ALLOWED FOR, IN ORDER TO PROVIDE A MARGIN OF ERROR DURING DELIVERY.

N

APPROXIMATE LOCATION OF PLASTIC BOLLARD TO BE REMOVED

APPROXIMATE LOCATION OF LIGHTING COLUMN TO BE REMOVED

APPROXIMATE LOCATION OF LIGHTING COLUMN

Project Title: CLOICH WIND FARM EIA	Drawing Title: ALV SWEPT PATH ANALYSIS VESTAS V136 66.6m BLADE PC 13 ESKBANK ROAD ROUNDABOUT	Purpose of issue: FOR INFORMATION	THIS DOCUMENT HAS BEEN PREPARED IN ACCORDANCE WITH THE SCOPE OF ARCUS' APPOINTMENT WITH ITS CLIENT AND IS SUBJECT TO THE TERMS OF THAT APPOINTMENT. ARCUS ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS CLIENT AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED
Client: EDF ENERGY RENEWABLES LTD		Designed: — Drawn: KL Checked: KL Approved: TAT	Drawing Number: 3439_DR_ALR_0013 Rev: -
		Arcus Internal Project No.: 3439 Date: 05/03/2021	
		Scale @ A3: 1:500	

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

ARCUS

LEGEND:

- VEHICLE
- VEHICLE WHEEL TRACK
- VEHICLE OVERHANG
- LOAD
- LOAD OVERHANG
- OVERRUN
- OVERSAIL

NOTES:

1. AUTOMATIC REAR WHEEL STEERING USED UNLESS OTHERWISE INDICATED.
2. ANALYSIS HAS NOT CONSIDERED VERTICAL GROUND CLEARANCE OF THE VEHICLE AND LOAD.
3. FURTHER INVESTIGATION WORKS WILL BE REQUIRED IN ORDER TO IDENTIFY THE IMPROVEMENT WORKS REQUIRED INCLUDING BUT NOT LIMITED TO CARRIAGEWAY WIDENING, EARTHWORKS, DRAINAGE, SERVICES, PEDESTRIAN FACILITIES AND TRAFFIC MANAGEMENT.
4. ANALYSIS BASED ON 75m BLADE DELIVERY VEHICLE
5. ANALYSIS BASED ON OS MASTERMAP. WHERE REQUIRED TOPOGRAPHICAL SURVEY TO BE UNDERTAKEN AND USED AS A BASIS FOR DETAILED DESIGN.
6. A 0.75m MAX BUFFER IS INDICATED OUTSIDE OVERRUN AND OVERSAIL AREAS FROM THE EXTENT OF VEHICLE SWEPT PATH WHERE LAND OWNERSHIP ALLOWS. THIS IS TO PROVIDE A FACTOR OF SAFETY AND TO INDICATE THE AREA WHICH SHOULD BE ALLOWED FOR, IN ORDER TO PROVIDE A MARGIN OF ERROR DURING DELIVERY.

N

APPROXIMATE LOCATION OF LIGHTING COLUMN TO BE REMOVED

LOAD BEARING SURFACE TO BE LAID IN OVERRUN AREA

APPROXIMATE LOCATION OF SIGN. TO BE MOUNTED ON DEMOUNTABLE SUPPORTS

APPROXIMATE LOCATION OF LIGHTING COLUMN TO BE REMOVED

APPROXIMATE LOCATION OF CHEVRON SIGN. TO BE MOUNTED ON DEMOUNTABLE SUPPORTS

APPROXIMATE LOCATION OF BOLLARD TO BE REMOVED

APPROXIMATE LOCATION OF SIGNPOST. TO BE MOUNTED ON DEMOUNTABLE SUPPORTS

APPROXIMATE LOCATION OF BOLLARD TO BE REMOVED

Project Title: CLOICH WIND FARM EIA	Drawing Title: ALV SWEPT PATH ANALYSIS VESTAS V136 66.6m BLADE PC 14 HARDENGREEN ROUNDABOUT	Purpose of issue: FOR INFORMATION	THIS DOCUMENT HAS BEEN PREPARED IN ACCORDANCE WITH THE SCOPE OF ARCUS' APPOINTMENT WITH ITS CLIENT AND IS SUBJECT TO THE TERMS OF THAT APPOINTMENT. ARCUS ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS CLIENT AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED
Client: EDF ENERGY RENEWABLES LTD		Designed: — Drawn: GR Checked: KL Approved: TAT	
		Arcus Internal Project No.: 3439	Drawing Number: 3439_DR_ALR_0014
		Scale @ A3: 1:500	Rev: -
		Date: 05/03/2021	

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

ARCUS

LEGEND:

- VEHICLE
- VEHICLE WHEEL TRACK
- VEHICLE OVERHANG
- LOAD
- LOAD OVERHANG
- OVERRUN
- OVERSAIL

NOTES:

1. AUTOMATIC REAR WHEEL STEERING USED UNLESS OTHERWISE INDICATED.
2. ANALYSIS HAS NOT CONSIDERED VERTICAL GROUND CLEARANCE OF THE VEHICLE AND LOAD.
3. FURTHER INVESTIGATION WORKS WILL BE REQUIRED IN ORDER TO IDENTIFY THE IMPROVEMENT WORKS REQUIRED INCLUDING BUT NOT LIMITED TO CARRIAGEWAY WIDENING, EARTHWORKS, DRAINAGE, SERVICES, PEDESTRIAN FACILITIES AND TRAFFIC MANAGEMENT.
4. ANALYSIS BASED ON 75m BLADE DELIVERY VEHICLE
5. ANALYSIS BASED ON OS MASTERMAP. WHERE REQUIRED TOPOGRAPHICAL SURVEY TO BE UNDERTAKEN AND USED AS A BASIS FOR DETAILED DESIGN.
6. A 0.75m MAX BUFFER IS INDICATED OUTSIDE OVERRUN AND OVERSAIL AREAS FROM THE EXTENT OF VEHICLE SWEPT PATH WHERE LAND OWNERSHIP ALLOWS. THIS IS TO PROVIDE A FACTOR OF SAFETY AND TO INDICATE THE AREA WHICH SHOULD BE ALLOWED FOR, IN ORDER TO PROVIDE A MARGIN OF ERROR DURING DELIVERY.

N

LOAD BEARING SURFACE TO BE LAID IN OVERRUN AREA

APPROXIMATE LOCATION OF CHEVRON SIGNPOSTS. TOPOGRAPHICAL SURVEY OR DRY RUN SHOULD BE USED TO CONFIRM CLEARANCE.

APPROXIMATE LOCATION OF BOLLARD TO BE REMOVED

APPROXIMATE LOCATION OF LIGHTING COLUMN. TOPOGRAPHICAL SURVEY OR DRY RUN SHOULD BE USED TO CONFIRM CLEARANCE.

Project Title: CLOICH WIND FARM EIA	Drawing Title: ALV SWEPT PATH ANALYSIS VESTAS V136 66.6m BLADE PC 15 BURNBRAE ROADROUNDABOUT	Purpose of issue: FOR INFORMATION	
Client: EDF ENERGY RENEWABLES LTD		Designed:	Drawn: GR
		Checked: KL	Approved: TAT
		Arcus Internal Project No.: 3439	Date: 05/03/2021
		Scale @ A3: 1:500	

Drawing Number: 3439_DR_ALR_0015

Rev: -

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

ARCUS

LEGEND:

- VEHICLE
- VEHICLE WHEEL TRACK
- VEHICLE OVERHANG
- LOAD
- LOAD OVERHANG
- OVERRUN
- OVERSAIL

NOTES:

1. AUTOMATIC REAR WHEEL STEERING USED UNLESS OTHERWISE INDICATED.
2. ANALYSIS HAS NOT CONSIDERED VERTICAL GROUND CLEARANCE OF THE VEHICLE AND LOAD.
3. FURTHER INVESTIGATION WORKS WILL BE REQUIRED IN ORDER TO IDENTIFY THE IMPROVEMENT WORKS REQUIRED INCLUDING BUT NOT LIMITED TO CARRIAGEWAY WIDENING, EARTHWORKS, DRAINAGE, SERVICES, PEDESTRIAN FACILITIES AND TRAFFIC MANAGEMENT.
4. ANALYSIS BASED ON 75m BLADE DELIVERY VEHICLE
5. ANALYSIS BASED ON OS MASTERMAP. WHERE REQUIRED TOPOGRAPHICAL SURVEY TO BE UNDERTAKEN AND USED AS A BASIS FOR DETAILED DESIGN.
6. A 0.75m MAX BUFFER IS INDICATED OUTSIDE OVERRUN AND OVERSAIL AREAS FROM THE EXTENT OF VEHICLE SWEPT PATH WHERE LAND OWNERSHIP ALLOWS. THIS IS TO PROVIDE A FACTOR OF SAFETY AND TO INDICATE THE AREA WHICH SHOULD BE ALLOWED FOR, IN ORDER TO PROVIDE A MARGIN OF ERROR DURING DELIVERY.

N

APPROXIMATE LOCATION OF BOLLARDS TO BE REMOVED.

LOAD BEARING SURFACE TO BE LAID IN OVERRUN AREA

APPROXIMATE LOCATION OF TREES. MAY REQUIRE TO BE CUT BACK TO ENABLE DELIVERY.

APPROXIMATE LOCATION OF SIGNPOST. TO BE MOUNTED ON DEMOUNTABLE SUPPORTS

APPROXIMATE LOCATION OF CHEVRON SIGNPOSTS. TOPOGRAPHICAL SURVEY OR DRY RUN SHOULD BE USED TO CONFIRM CLEARANCE

APPROXIMATE LOCATION OF SIGNPOST. TO BE MOUNTED ON DEMOUNTABLE SUPPORTS.

APPROXIMATE LOCATION OF BOLLARDS TO BE REMOVED.

Project Title: CLOICH WIND FARM EIA	Drawing Title: ALV SWEPT PATH ANALYSIS VESTAS V136 66.6m BLADE PC 16 BURNBRAE TERRACE ROUNDABOUT	Purpose of issue: FOR INFORMATION	THIS DOCUMENT HAS BEEN PREPARED IN ACCORDANCE WITH THE SCOPE OF ARCUS' APPOINTMENT WITH ITS CLIENT AND IS SUBJECT TO THE TERMS OF THAT APPOINTMENT. ARCUS ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS CLIENT AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED
Client: EDF ENERGY RENEWABLES LTD		Designed: — Drawn: GR Checked: KL Approved: TAT Arcus Internal Project No.: 3439 Date: 05/03/2021 Scale @ A3: 1:500	Drawing Number: 3439_DR_ALR_0016 Rev: -

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

ARCUS

LEGEND:

- VEHICLE
- VEHICLE WHEEL TRACK
- VEHICLE OVERHANG
- LOAD
- LOAD OVERHANG
- OVERRUN
- OVERSAIL

NOTES:

1. AUTOMATIC REAR WHEEL STEERING USED UNLESS OTHERWISE INDICATED.
2. ANALYSIS HAS NOT CONSIDERED VERTICAL GROUND CLEARANCE OF THE VEHICLE AND LOAD.
3. FURTHER INVESTIGATION WORKS WILL BE REQUIRED IN ORDER TO IDENTIFY THE IMPROVEMENT WORKS REQUIRED INCLUDING BUT NOT LIMITED TO CARRIAGEWAY WIDENING, EARTHWORKS, DRAINAGE, SERVICES, PEDESTRIAN FACILITIES AND TRAFFIC MANAGEMENT.
4. ANALYSIS BASED ON 75m BLADE DELIVERY VEHICLE
5. ANALYSIS BASED ON OS MASTERMAP. WHERE REQUIRED TOPOGRAPHICAL SURVEY TO BE UNDERTAKEN AND USED AS A BASIS FOR DETAILED DESIGN.
6. A 0.75m MAX BUFFER IS INDICATED OUTSIDE OVERRUN AND OVERSAIL AREAS FROM THE EXTENT OF VEHICLE SWEPT PATH WHERE LAND OWNERSHIP ALLOWS. THIS IS TO PROVIDE A FACTOR OF SAFETY AND TO INDICATE THE AREA WHICH SHOULD BE ALLOWED FOR, IN ORDER TO PROVIDE A MARGIN OF ERROR DURING DELIVERY.

N

APPROXIMATE LOCATION OF CHEVRON SIGNPOST. TOPOGRAPHICAL SURVEY OR DRY RUN MAY BE REQUIRED TO CONFIRM CLEARANCE.

LOAD BEARING SURFACE TO BE LAID IN OVERRUN AREA

APPROXIMATE LOCATION OF LIGHTING COLUMN TO BE REMOVED

APPROXIMATE LOCATION OF LIGHTING COLUMN TO BE REMOVED

Arcus 3 Axle Superwing Trailer, Vestas 136 - 66.6m Blade

Arcus 3 Axle Superwing Trailer, Vestas 136 - 66.6m Blade

APPROXIMATE LOCATION OF BOLLARD TO BE REMOVED

APPROXIMATE LOCATION OF BOLLARD TO BE REMOVED

Project Title: CLOICH WIND FARM EIA	Drawing Title: ALV SWEPT PATH ANALYSIS VESTAS V136 66.6m BLADE PC 17 ROSEWELL ROAD ROUNDABOUT	Purpose of issue: FOR INFORMATION	THIS DOCUMENT HAS BEEN PREPARED IN ACCORDANCE WITH THE SCOPE OF ARCUS' APPOINTMENT WITH ITS CLIENT AND IS SUBJECT TO THE TERMS OF THAT APPOINTMENT. ARCUS ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS CLIENT AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED
Client: EDF ENERGY RENEWABLES LTD		Designed: — Drawn: GR Checked: KL Approved: TAT	
		Arcus Internal Project No.: 3439 Date: 05/03/2021	
		Scale @ A3: 1:500	Drawing Number: 3439_DR_ALR_0017 Rev: -

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

ARCUS

LEGEND:

- VEHICLE
- VEHICLE WHEEL TRACK
- VEHICLE OVERHANG
- LOAD
- LOAD OVERHANG
- OVERRUN
- OVERSAIL

NOTES:

1. AUTOMATIC REAR WHEEL STEERING USED UNLESS OTHERWISE INDICATED.
2. ANALYSIS HAS NOT CONSIDERED VERTICAL GROUND CLEARANCE OF THE VEHICLE AND LOAD.
3. FURTHER INVESTIGATION WORKS WILL BE REQUIRED IN ORDER TO IDENTIFY THE IMPROVEMENT WORKS REQUIRED INCLUDING BUT NOT LIMITED TO CARRIAGEWAY WIDENING, EARTHWORKS, DRAINAGE, SERVICES, PEDESTRIAN FACILITIES AND TRAFFIC MANAGEMENT.
4. ANALYSIS BASED ON 75m BLADE DELIVERY VEHICLE
5. ANALYSIS BASED ON OS MASTERMAP. WHERE REQUIRED TOPOGRAPHICAL SURVEY TO BE UNDERTAKEN AND USED AS A BASIS FOR DETAILED DESIGN.
6. A 0.75m MAX BUFFER IS INDICATED OUTSIDE OVERRUN AND OVERSAIL AREAS FROM THE EXTENT OF VEHICLE SWEPT PATH WHERE LAND OWNERSHIP ALLOWS. THIS IS TO PROVIDE A FACTOR OF SAFETY AND TO INDICATE THE AREA WHICH SHOULD BE ALLOWED FOR, IN ORDER TO PROVIDE A MARGIN OF ERROR DURING DELIVERY.

N

ROUNDABOUT TO BE CONTRAFLOWED

LOAD BEARING SURFACE TO BE LAID IN OVERRUN AREA

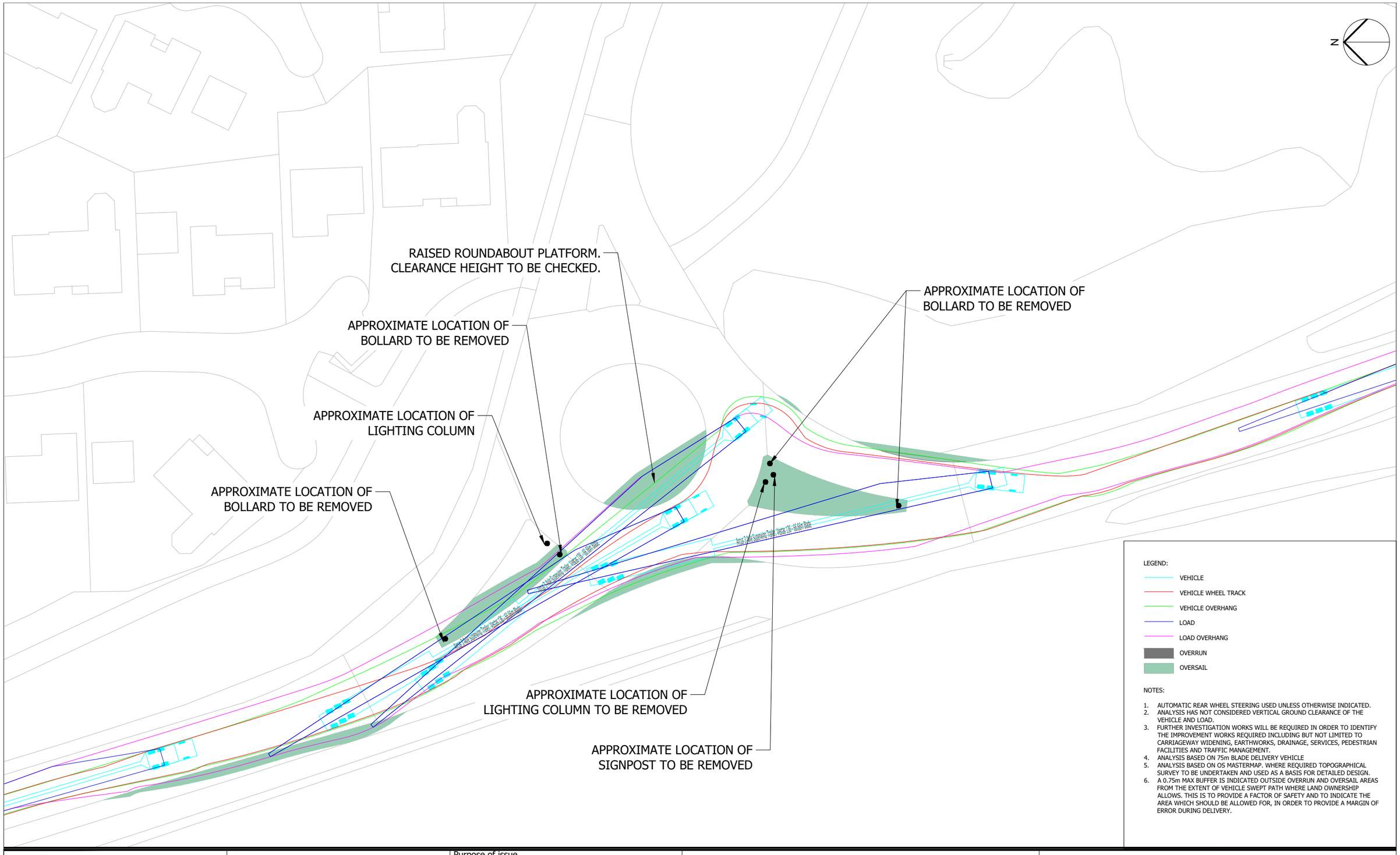
STREET VIEW UNAVAILABLE. ROUNDABOUT RECENTLY CONSTRUCTED. SITE VISIT REQUIRED TO CONFIRM CONSTRAINTS.

Project Title: CLOICH WIND FARM EIA	Drawing Title: ALV SWEPT PATH ANALYSIS VESTAS V136 66.6m BLADE PC 18 A6094/B7003/A7/ROUNDABOUT	Purpose of issue: FOR INFORMATION	
Client: EDF ENERGY RENEWABLES LTD		Designed:	Drawn: GR
		Checked: KL	Approved: TAT
		Arcus Internal Project No.: 3439	Date: 05/03/2021
		Scale @ A3: 1:500	

Drawing Number	Rev
3439_DR_ALR_0018	-

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

ARCUS



Project Title
CLOICH WIND FARM EIA

Client
EDF ENERGY RENEWABLES LTD

Drawing Title
ALV SWEPT PATH ANALYSIS
VESTAS V136 66.6m BLADE
PC 19
HARDENGREEN ROUNDABOUT

Purpose of issue
FOR INFORMATION

Designed	Drawn	Checked	Approved
	GR	KL	TAT

Arcus Internal Project No.
3439

Scale @ A3
1:500

Date
05/03/2021

Drawing Number
3439_DR_ALR_0019

Rev
-

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

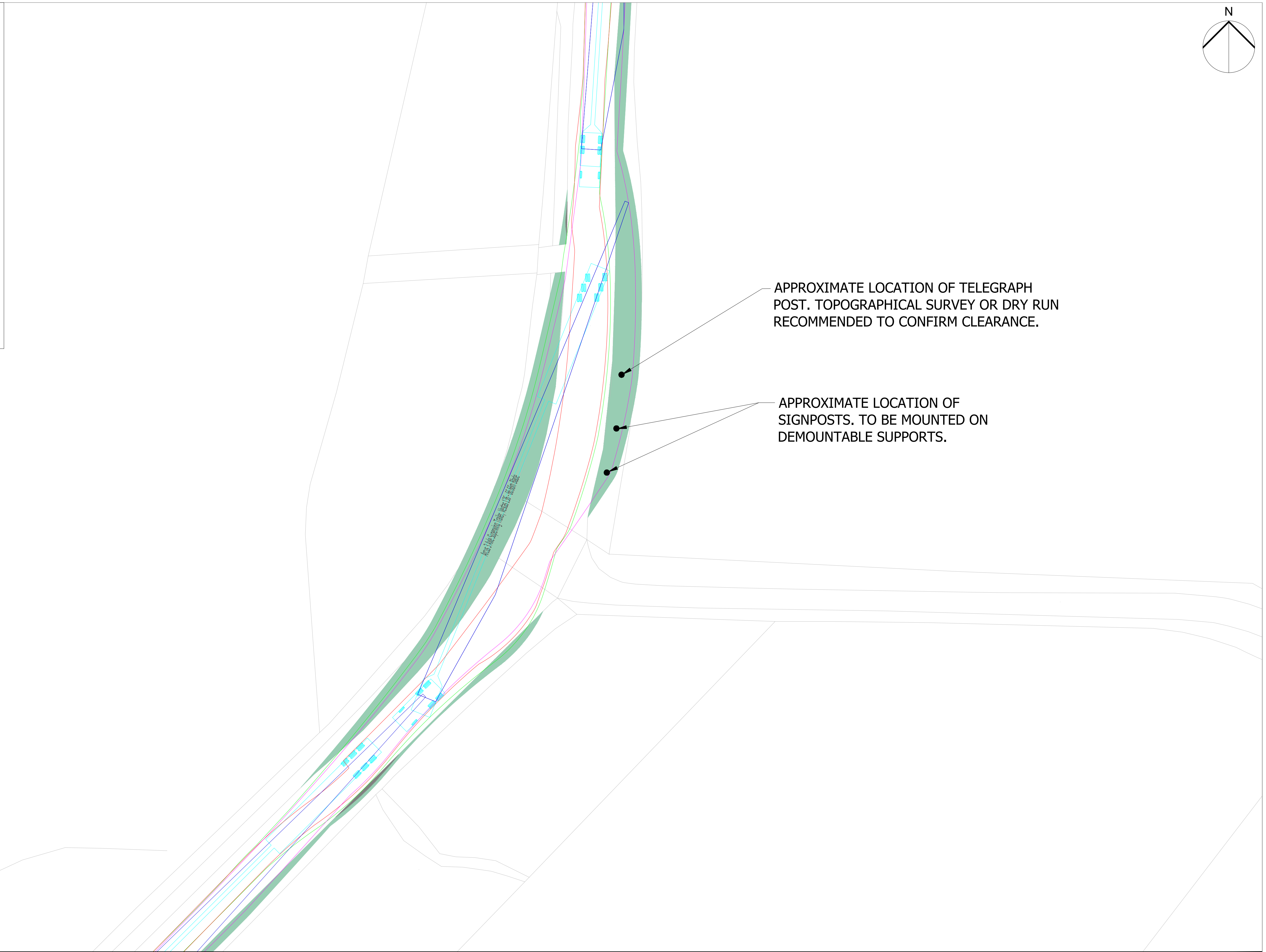
ARCUS

LEGEND:

- VEHICLE
- VEHICLE WHEEL TRACK
- VEHICLE OVERHANG
- LOAD
- LOAD OVERHANG
- OVERRUN
- OVERSAIL

NOTES:

1. AUTOMATIC REAR WHEEL STEERING USED UNLESS OTHERWISE INDICATED.
2. ANALYSIS HAS NOT CONSIDERED VERTICAL GROUND CLEARANCE OF THE VEHICLE AND LOAD.
3. FURTHER INVESTIGATION WORKS WILL BE REQUIRED IN ORDER TO IDENTIFY THE IMPROVEMENT WORKS REQUIRED INCLUDING BUT NOT LIMITED TO CARRIAGEWAY WIDENING, EARTHWORKS, DRAINAGE, SERVICES, PEDESTRIAN FACILITIES AND TRAFFIC MANAGEMENT.
4. ANALYSIS BASED ON 75m BLADE DELIVERY VEHICLE
5. ANALYSIS BASED ON OS MASTERMAP. WHERE REQUIRED TOPOGRAPHICAL SURVEY TO BE UNDERTAKEN AND USED AS A BASIS FOR DETAILED DESIGN.
6. A 0.75m MAX BUFFER IS INDICATED OUTSIDE OVERRUN AND OVERSAIL AREAS FROM THE EXTENT OF VEHICLE SWEPT PATH WHERE LAND OWNERSHIP ALLOWS. THIS IS TO PROVIDE A FACTOR OF SAFETY AND TO INDICATE THE AREA WHICH SHOULD BE ALLOWED FOR, IN ORDER TO PROVIDE A MARGIN OF ERROR DURING DELIVERY.



Project Title: CLOICH WIND FARM EIA	Drawing Title: ALV SWEPT PATH ANALYSIS VESTAS V136 66.6m BLADE PC 20 BEND ON A6094, NEWBIGGING FARM	Purpose of issue: FOR INFORMATION	THIS DOCUMENT HAS BEEN PREPARED IN ACCORDANCE WITH THE SCOPE OF ARCUS' APPOINTMENT WITH ITS CLIENT AND IS SUBJECT TO THE TERMS OF THAT APPOINTMENT. ARCUS ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS CLIENT AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED
Client: EDF ENERGY RENEWABLES LTD		Designed: – ; Drawn: GR ; Checked: KL ; Approved: TAT	Drawing Number: 3439_DR_ALR_0020
		Arcus Internal Project No.: 3439 ; Date: 05/03/2021	Rev: -
		Scale @ A3: 1:500	

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

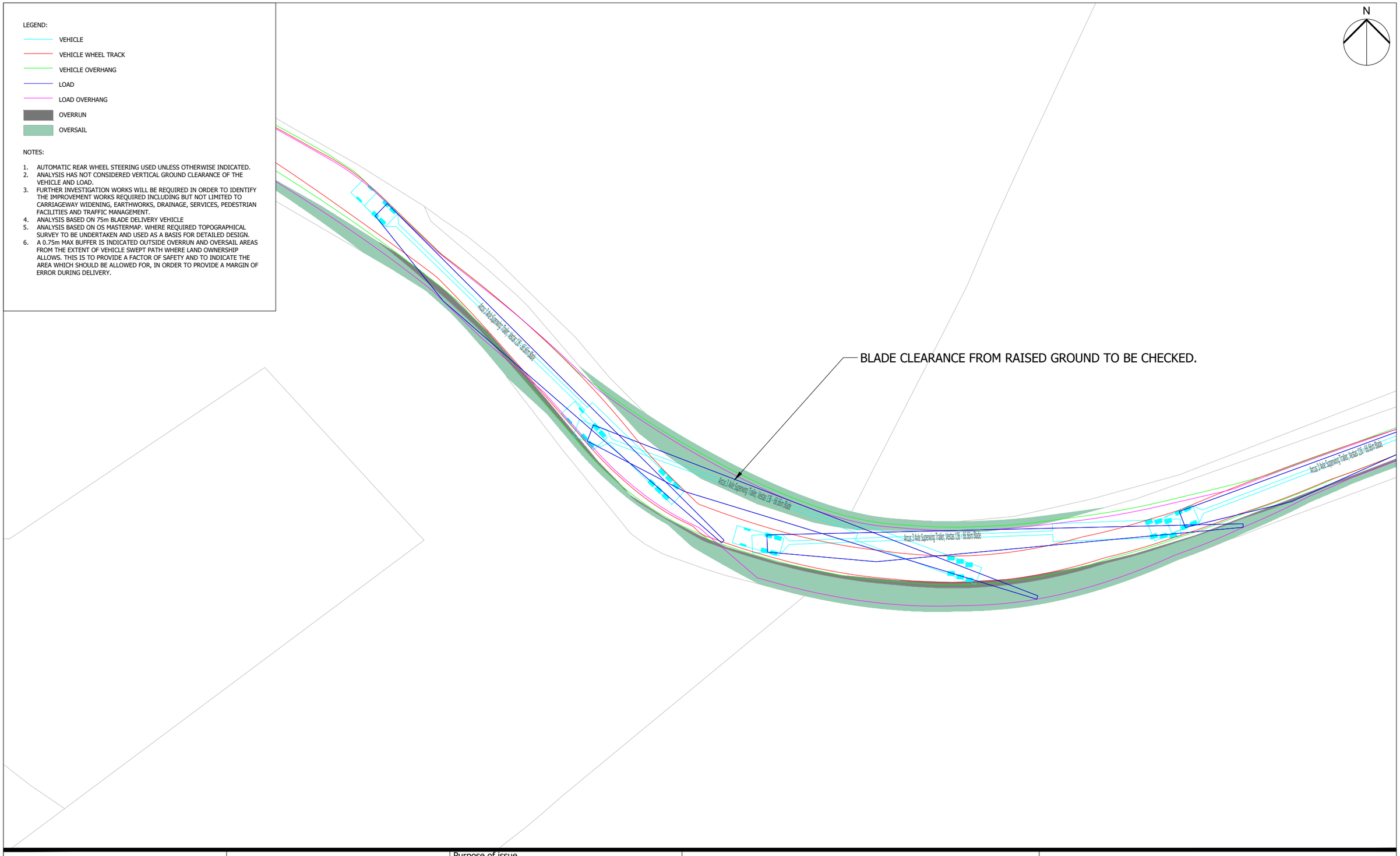
ARCUS

LEGEND:

- VEHICLE
- VEHICLE WHEEL TRACK
- VEHICLE OVERHANG
- LOAD
- LOAD OVERHANG
- OVERRUN
- OVERSAIL

NOTES:

1. AUTOMATIC REAR WHEEL STEERING USED UNLESS OTHERWISE INDICATED.
2. ANALYSIS HAS NOT CONSIDERED VERTICAL GROUND CLEARANCE OF THE VEHICLE AND LOAD.
3. FURTHER INVESTIGATION WORKS WILL BE REQUIRED IN ORDER TO IDENTIFY THE IMPROVEMENT WORKS REQUIRED INCLUDING BUT NOT LIMITED TO CARRIAGEWAY WIDENING, EARTHWORKS, DRAINAGE, SERVICES, PEDESTRIAN FACILITIES AND TRAFFIC MANAGEMENT.
4. ANALYSIS BASED ON 75m BLADE DELIVERY VEHICLE
5. ANALYSIS BASED ON OS MASTERMAP. WHERE REQUIRED TOPOGRAPHICAL SURVEY TO BE UNDERTAKEN AND USED AS A BASIS FOR DETAILED DESIGN.
6. A 0.75m MAX BUFFER IS INDICATED OUTSIDE OVERRUN AND OVERSAIL AREAS FROM THE EXTENT OF VEHICLE SWEPT PATH WHERE LAND OWNERSHIP ALLOWS. THIS IS TO PROVIDE A FACTOR OF SAFETY AND TO INDICATE THE AREA WHICH SHOULD BE ALLOWED FOR, IN ORDER TO PROVIDE A MARGIN OF ERROR DURING DELIVERY.

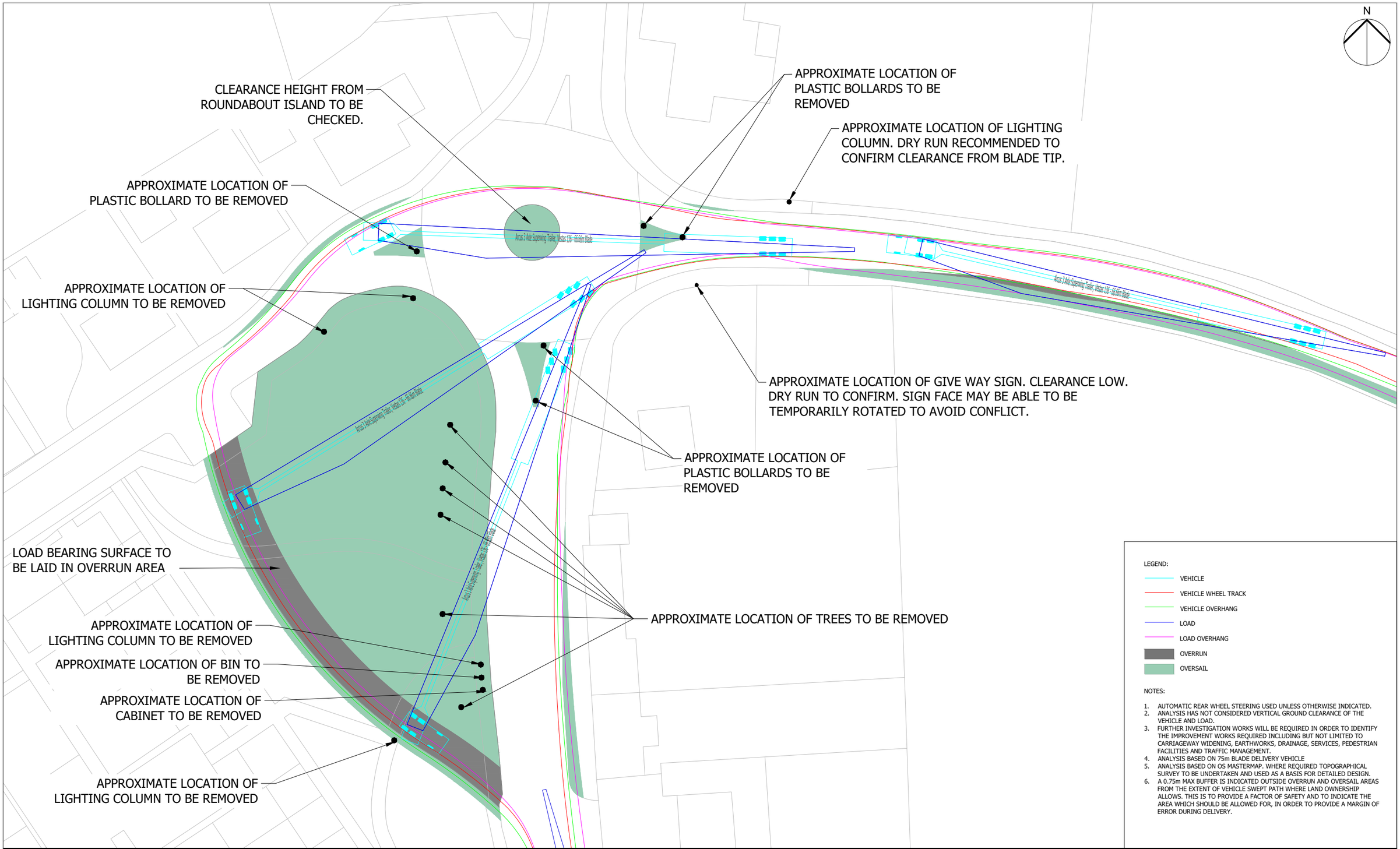


Project Title: CLOICH WIND FARM	Drawing Title: ALV SWEPT PATH ANALYSIS VESTAS V136 66.6m PC 21 A6094 BEND BEFORE HOWGATE	Purpose of issue: FOR INFORMATION		
Client: EDF ENERGY RENEWABLES LTD		Designed:	Drawn: GR	Checked: KL / Approved: TAT
		Arcus Internal Project No.: 3439	Date: 21/04/2021	
		Scale @ A3: 1:500		

Drawing Number	Rev
3439_DR_ALR_0034	-

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

ARCUS

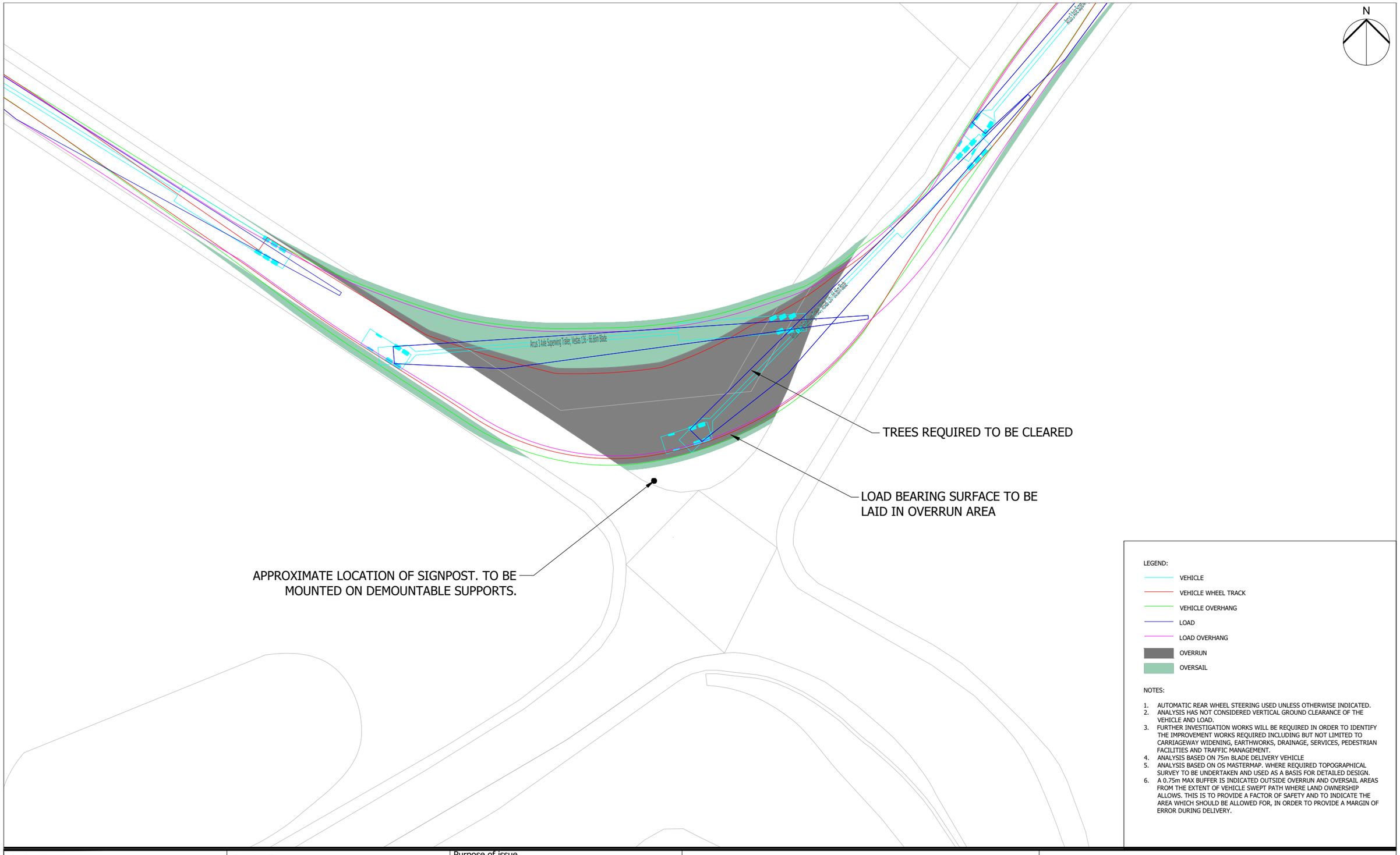


Project Title: CLOICH WIND FARM EIA	Drawing Title: ALV SWEPT PATH ANALYSIS VESTAS V136 66.6m BLADE PC 22 A6094/B7026 ROUNDABOUT	Purpose of issue: FOR INFORMATION	
Client: EDF ENERGY RENEWABLES LTD		Designed:	Drawn: GR
		Checked: KL	Approved: TAT
		Arcus Internal Project No.: 3439	Date: 05/03/2021
		Scale @ A3: 1:500	

Drawing Number	Rev
3439_DR_ALR_0021	-

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

ARCUS



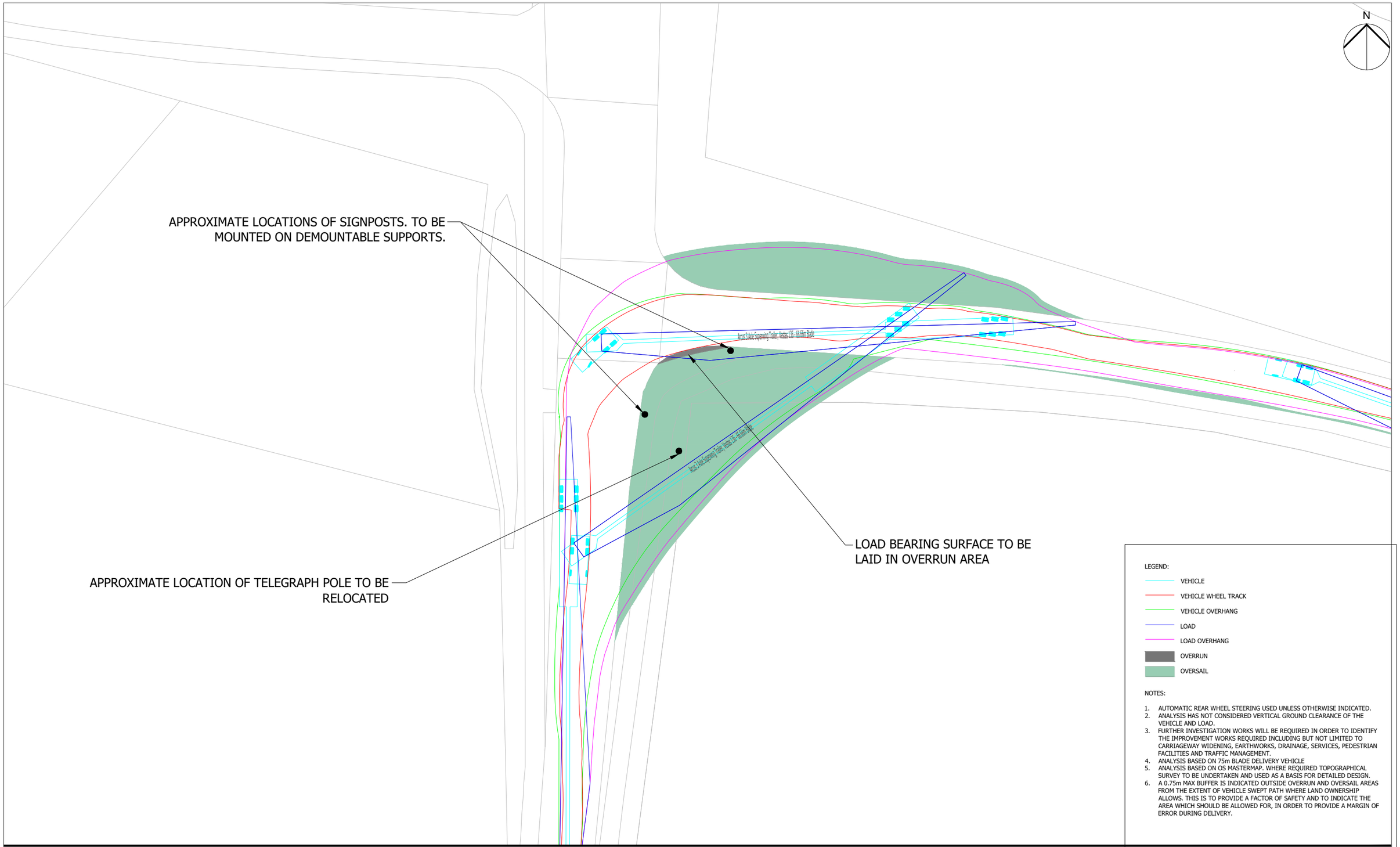
NOTES:

1. AUTOMATIC REAR WHEEL STEERING USED UNLESS OTHERWISE INDICATED.
2. ANALYSIS HAS NOT CONSIDERED VERTICAL GROUND CLEARANCE OF THE VEHICLE AND LOAD.
3. FURTHER INVESTIGATION WORKS WILL BE REQUIRED IN ORDER TO IDENTIFY THE IMPROVEMENT WORKS REQUIRED INCLUDING BUT NOT LIMITED TO CARRIAGEWAY WIDENING, EARTHWORKS, DRAINAGE, SERVICES, PEDESTRIAN FACILITIES AND TRAFFIC MANAGEMENT.
4. ANALYSIS BASED ON 75m BLADE DELIVERY VEHICLE
5. ANALYSIS BASED ON OS MASTERMAP. WHERE REQUIRED TOPOGRAPHICAL SURVEY TO BE UNDERTAKEN AND USED AS A BASIS FOR DETAILED DESIGN.
6. A 0.75m MAX BUFFER IS INDICATED OUTSIDE OVERRUN AND OVERSAIL AREAS FROM THE EXTENT OF VEHICLE SWEPT PATH WHERE LAND OWNERSHIP ALLOWS. THIS IS TO PROVIDE A FACTOR OF SAFETY AND TO INDICATE THE AREA WHICH SHOULD BE ALLOWED FOR, IN ORDER TO PROVIDE A MARGIN OF ERROR DURING DELIVERY.

Project Title: CLOICH WIND FARM EIA	Drawing Title: ALV SWEPT PATH ANALYSIS VESTAS V136 66.6m BLADE PC B01 A6094 / B6372 JUNCTION	Purpose of issue: FOR INFORMATION	THIS DOCUMENT HAS BEEN PREPARED IN ACCORDANCE WITH THE SCOPE OF ARCUS' APPOINTMENT WITH ITS CLIENT AND IS SUBJECT TO THE TERMS OF THAT APPOINTMENT. ARCUS ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS CLIENT AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED
Client: EDF ENERGY RENEWABLES LTD		Designed: — Drawn: GR Checked: KL Approved: TAT Arcus Internal Project No.: 3439 Scale @ A3: 1:500 Date: 05/03/2021	Drawing Number: 3439_DR_ALR_0022 Rev: -

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

ARCUS

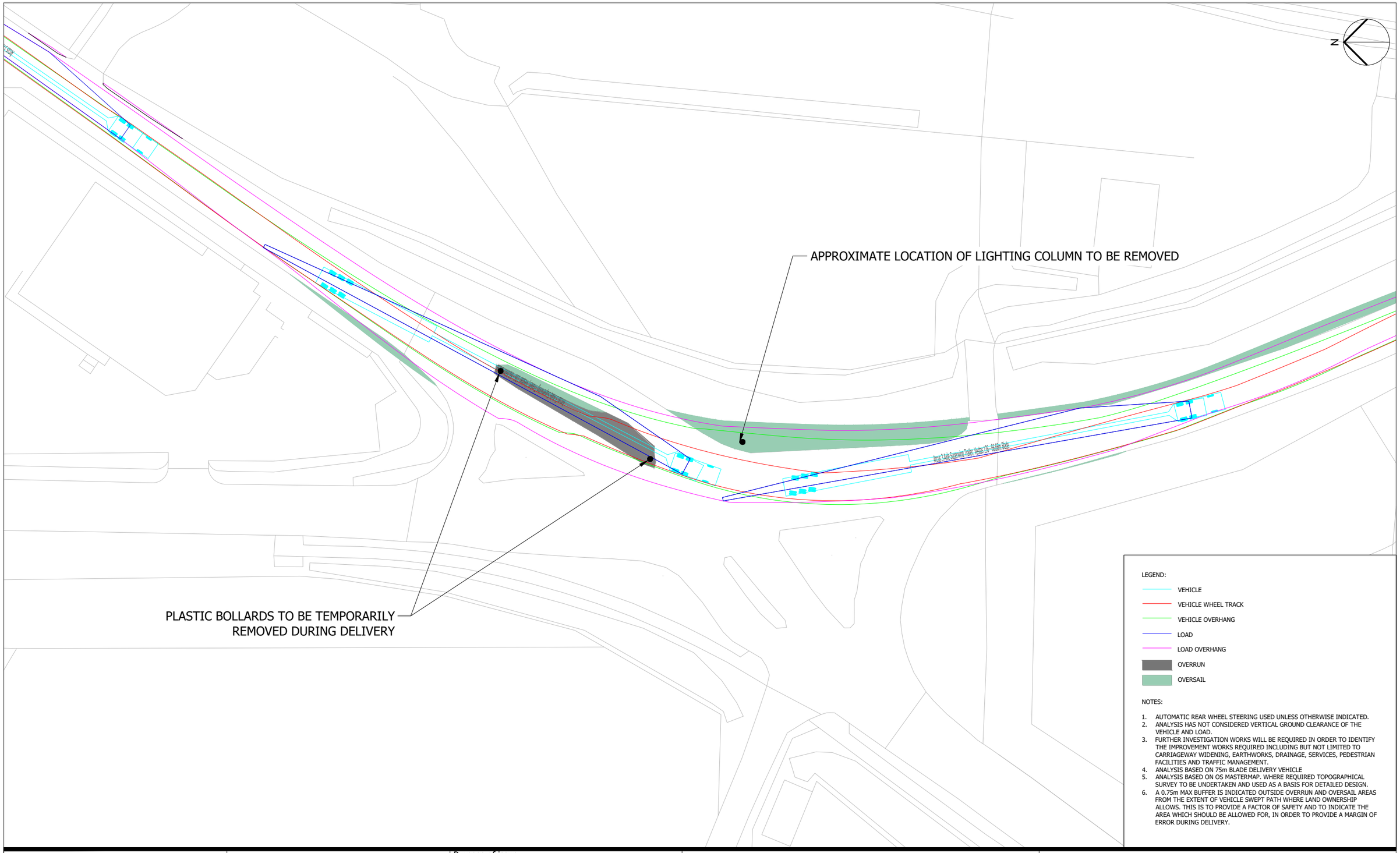


Project Title: CLOICH WIND FARM EIA	Drawing Title: ALV SWEPT PATH ANALYSIS VESTAS V136 66.6m BLADE PC B02 B6372 / B7026 JUNCTION	Purpose of issue: FOR INFORMATION	
Client: EDF ENERGY RENEWABLES LTD		Designed:	Drawn: GR
		Checked: KL	Approved: TAT
		Arcus Internal Project No.: 3439	Date: 05/03/2021
		Scale @ A3: 1:500	

Drawing Number	Rev
3439_DR_ALR_0023	-

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

ARCUS



Project Title: CLOICH WIND FARM EIA	Drawing Title: ALV SWEPT PATH ANALYSIS VESTAS V136 66.6m BLADE PC 23 A6094 / A703 JUNCTION	Purpose of issue: FOR INFORMATION		
Client: EDF ENERGY RENEWABLES LTD		Designed:	Drawn: KB	Checked: KL / Approved: TAT
		Arcus Internal Project No.: 3439	Date: 05/03/2021	
		Scale @ A3: 1:500		

Drawing Number	Rev
3439_DR_ALR_0024	-

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

ARCUS

LEGEND:

- VEHICLE
- VEHICLE WHEEL TRACK
- VEHICLE OVERHANG
- LOAD
- LOAD OVERHANG
- OVERRUN
- OVERSAIL

NOTES:

1. AUTOMATIC REAR WHEEL STEERING USED UNLESS OTHERWISE INDICATED.
2. ANALYSIS HAS NOT CONSIDERED VERTICAL GROUND CLEARANCE OF THE VEHICLE AND LOAD.
3. FURTHER INVESTIGATION WORKS WILL BE REQUIRED IN ORDER TO IDENTIFY THE IMPROVEMENT WORKS REQUIRED INCLUDING BUT NOT LIMITED TO CARRIAGEWAY WIDENING, EARTHWORKS, DRAINAGE, SERVICES, PEDESTRIAN FACILITIES AND TRAFFIC MANAGEMENT.
4. ANALYSIS BASED ON 75m BLADE DELIVERY VEHICLE
5. ANALYSIS BASED ON OS MASTERMAP. WHERE REQUIRED TOPOGRAPHICAL SURVEY TO BE UNDERTAKEN AND USED AS A BASIS FOR DETAILED DESIGN.
6. A 0.75m MAX BUFFER IS INDICATED OUTSIDE OVERRUN AND OVERSAIL AREAS FROM THE EXTENT OF VEHICLE SWEPT PATH WHERE LAND OWNERSHIP ALLOWS. THIS IS TO PROVIDE A FACTOR OF SAFETY AND TO INDICATE THE AREA WHICH SHOULD BE ALLOWED FOR, IN ORDER TO PROVIDE A MARGIN OF ERROR DURING DELIVERY.

N

SIGNPOSTS TO BE RELOCATED

CLEARANCE HEIGHT FROM POST & WIRE FENCE TO BE CHECKED

TREES TO BE CLEARED

Project Title: CLOICH WIND FARM	Drawing Title: ALV SWEPT PATH ANALYSIS VESTAS V136 66.6m BLADE PC 24 A703 / D17 JUNCTION	Purpose of issue: FOR INFORMATION	THIS DOCUMENT HAS BEEN PREPARED IN ACCORDANCE WITH THE SCOPE OF ARCUS' APPOINTMENT WITH ITS CLIENT AND IS SUBJECT TO THE TERMS OF THAT APPOINTMENT. ARCUS ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS CLIENT AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED
Client: EDF ENERGY RENEWABLES LTD		Designed: — / Drawn: GR / Checked: KL / Approved: TAT	
		Arcus Internal Project No.: 3439	Drawing Number: 3439_DR_ALR_0025
		Scale @ A3: 1:500	Rev: 5
		Date: 08/03/2021	

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

ARCUS

LEGEND:

- VEHICLE
- VEHICLE WHEEL TRACK
- VEHICLE OVERHANG
- LOAD
- LOAD OVERHANG
- OVERRUN
- OVERSAIL

NOTES:

1. AUTOMATIC REAR WHEEL STEERING USED UNLESS OTHERWISE INDICATED.
2. ANALYSIS HAS NOT CONSIDERED VERTICAL GROUND CLEARANCE OF THE VEHICLE AND LOAD.
3. FURTHER INVESTIGATION WORKS WILL BE REQUIRED IN ORDER TO IDENTIFY THE IMPROVEMENT WORKS REQUIRED INCLUDING BUT NOT LIMITED TO CARRIAGEWAY WIDENING, EARTHWORKS, DRAINAGE, SERVICES, PEDESTRIAN FACILITIES AND TRAFFIC MANAGEMENT.
4. ANALYSIS BASED ON 75m BLADE DELIVERY VEHICLE
5. ANALYSIS BASED ON OS MASTERMAP. WHERE REQUIRED TOPOGRAPHICAL SURVEY TO BE UNDERTAKEN AND USED AS A BASIS FOR DETAILED DESIGN.
6. A 0.75m MAX BUFFER IS INDICATED OUTSIDE OVERRUN AND OVERSAIL AREAS FROM THE EXTENT OF VEHICLE SWEPT PATH WHERE LAND OWNERSHIP ALLOWS. THIS IS TO PROVIDE A FACTOR OF SAFETY AND TO INDICATE THE AREA WHICH SHOULD BE ALLOWED FOR, IN ORDER TO PROVIDE A MARGIN OF ERROR DURING DELIVERY.

N

LOAD BEARING SURFACE TO BE LAID IN OVERRUN AREA

CLEARANCE HEIGHT FROM UPWARD SLOPING GROUND TO BE CONFIRMED PRIOR TO DELIVERY

CLEARANCE HEIGHT FROM GABION BASKET TO BE CONFIRMED PRIOR TO DELIVERY

LOAD BEARING SURFACE TO BE LAID IN OVERRUN AREAS

CLEARANCE HEIGHT FROM STONE WALL TO BE CONFIRMED PRIOR TO DELIVERY

CLEARANCE HEIGHT FROM POST AND WIRE FENCE TO BE CONFIRMED PRIOR TO DELIVERY

CLEARANCE HEIGHT FROM GABION BASKET TO BE CONFIRMED PRIOR TO DELIVERY

APPROXIMATE LOCATION OF TELEGRAPH POLE TO BE REMOVED

Project Title: CLOICH WIND FARM	Drawing Title: ALV SWEPT PATH ANALYSIS VESTAS V136 66.6m BLADE PC 25 D17 BEYOND EDDLESTON WATER	Purpose of issue: FOR INFORMATION	
Client: EDF ENERGY RENEWABLES LTD		Designed:	Drawn: GR
		Checked: KL	Approved: TAT
		Arcus Internal Project No.: 3439	Date: 08/03/2021
		Scale @ A3: 1:1000	

Drawing Number	Rev
3439_DR_ALR_0026	4

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

ARCUS

LEGEND:

- VEHICLE
- VEHICLE WHEEL TRACK
- VEHICLE OVERHANG
- LOAD
- LOAD OVERHANG
- OVERRUN
- OVERSAIL

NOTES:

1. AUTOMATIC REAR WHEEL STEERING USED UNLESS OTHERWISE INDICATED.
2. ANALYSIS HAS NOT CONSIDERED VERTICAL GROUND CLEARANCE OF THE VEHICLE AND LOAD.
3. FURTHER INVESTIGATION WORKS WILL BE REQUIRED IN ORDER TO IDENTIFY THE IMPROVEMENT WORKS REQUIRED INCLUDING BUT NOT LIMITED TO CARRIAGEWAY WIDENING, EARTHWORKS, DRAINAGE, SERVICES, PEDESTRIAN FACILITIES AND TRAFFIC MANAGEMENT.
4. ANALYSIS BASED ON VESTAS 136 BLADE DELIVERY VEHICLE
5. ANALYSIS BASED ON OS MASTERMAP. WHERE REQUIRED TOPOGRAPHICAL SURVEY TO BE UNDERTAKEN AND USED AS A BASIS FOR DETAILED DESIGN.
6. A 0.75m FACTOR OF SAFETY INDICATED OUTSIDE OVERRUN AND OVERSAIL AREAS FROM THE EXTENT OF VEHICLE SWEPT PATH. THIS IS TO PROVIDE A FACTOR OF SAFETY AND TO INDICATE THE AREA WHICH SHOULD BE ALLOWED FOR IN ORDER TO PROVIDE A MARGIN OF ERROR DURING DELIVERY.

Project Title: CLOICH WIND FARM	Drawing Title: ALV SWEPT PATH ANALYSIS VESTAS V136 BLADE 66.6m PC 26 BEYOND SHIPLAW EMBANKMENT	Purpose of issue: FOR INFORMATION	
Client: EDF ENERGY RENEWABLES LTD		Designed:	Drawn: GR
		Checked: KL	Approved: TAT
		Arcus Internal Project No.: 3439	Date: 08/03/2021
		Scale @ A3: 1:1000	

Drawing Number	Rev
3439_DR_ALR_0027	3

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

ARCUS

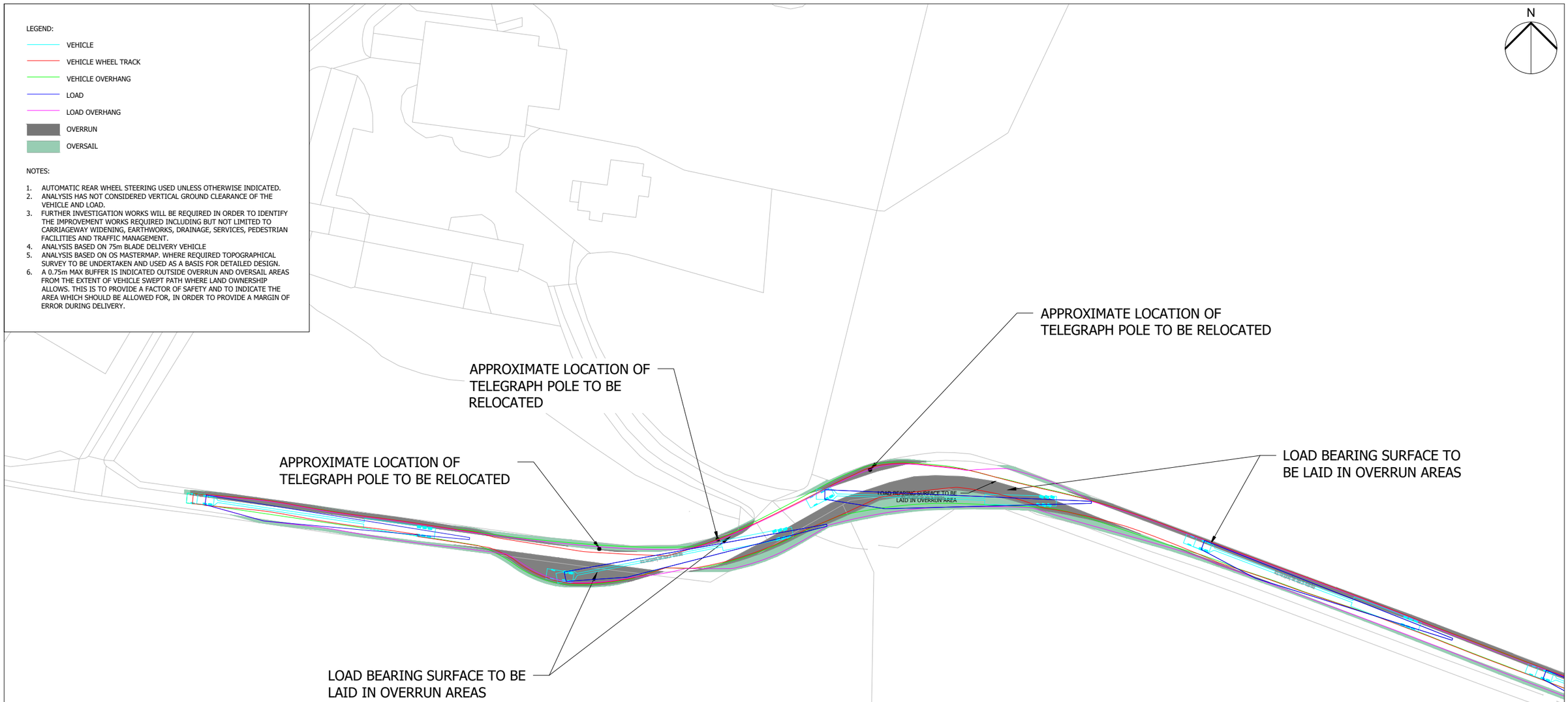
LEGEND:

- VEHICLE
- VEHICLE WHEEL TRACK
- VEHICLE OVERHANG
- LOAD
- LOAD OVERHANG
- OVERRUN
- OVERSAIL

NOTES:

1. AUTOMATIC REAR WHEEL STEERING USED UNLESS OTHERWISE INDICATED.
2. ANALYSIS HAS NOT CONSIDERED VERTICAL GROUND CLEARANCE OF THE VEHICLE AND LOAD.
3. FURTHER INVESTIGATION WORKS WILL BE REQUIRED IN ORDER TO IDENTIFY THE IMPROVEMENT WORKS REQUIRED INCLUDING BUT NOT LIMITED TO CARRIAGEWAY WIDENING, EARTHWORKS, DRAINAGE, SERVICES, PEDESTRIAN FACILITIES AND TRAFFIC MANAGEMENT.
4. ANALYSIS BASED ON 75m BLADE DELIVERY VEHICLE
5. ANALYSIS BASED ON OS MASTERMAP. WHERE REQUIRED TOPOGRAPHICAL SURVEY TO BE UNDERTAKEN AND USED AS A BASIS FOR DETAILED DESIGN.
6. A 0.75m MAX BUFFER IS INDICATED OUTSIDE OVERRUN AND OVERSAIL AREAS FROM THE EXTENT OF VEHICLE SWEPT PATH WHERE LAND OWNERSHIP ALLOWS. THIS IS TO PROVIDE A FACTOR OF SAFETY AND TO INDICATE THE AREA WHICH SHOULD BE ALLOWED FOR, IN ORDER TO PROVIDE A MARGIN OF ERROR DURING DELIVERY.

N



Project Title: CLOICH WIND FARM	Drawing Title: ALV SWEPT PATH ANALYSIS VESTAS V136 66.6m BLADE PC 27 D17 - BEND BY SHIPLAW FARM	Purpose of issue: FOR INFORMATION		
Client: EDF ENERGY RENEWABLES LTD		Designed	Drawn: KB	Checked: KL / Approved: TAT
		Arcus Internal Project No.: 3439	Date: 18/09/20	
		Scale @ A3: 1:1000		

Drawing Number	Rev
3439_DR_ALR_0028	3

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

ARCUS

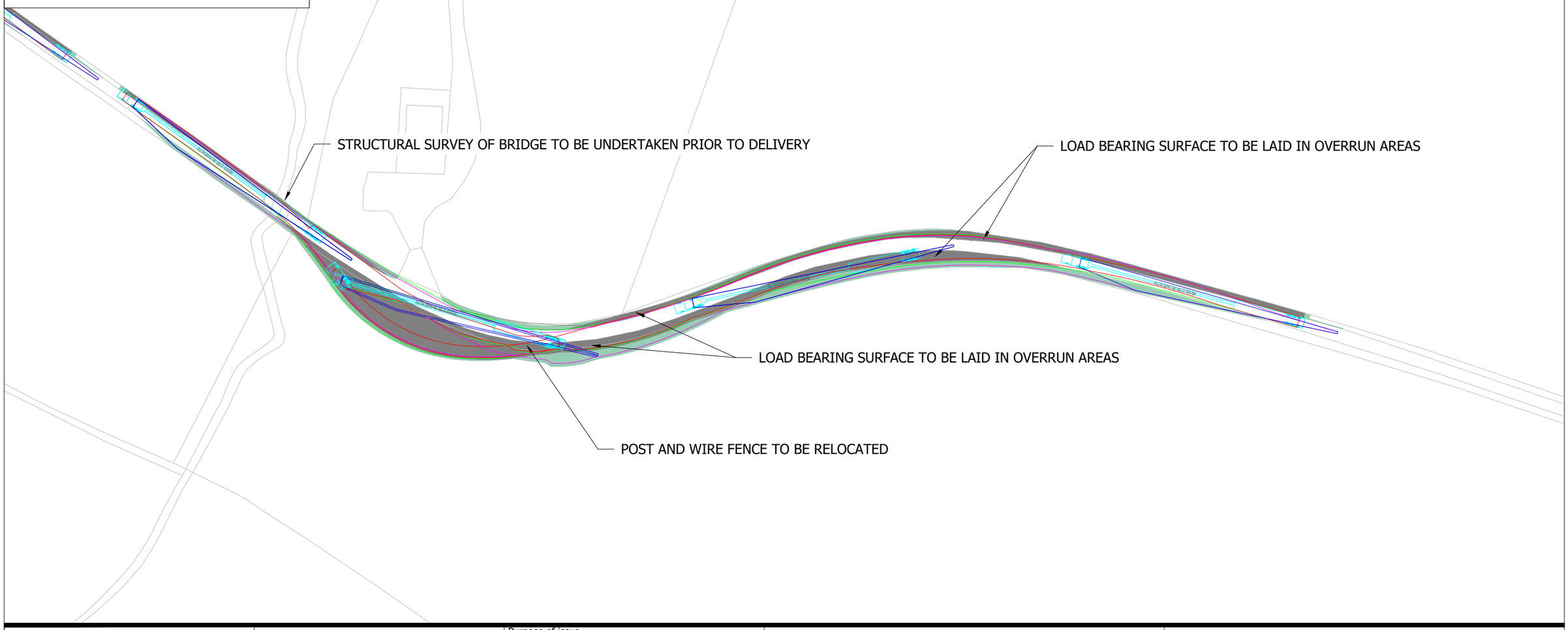
LEGEND:

- VEHICLE
- VEHICLE WHEEL TRACK
- VEHICLE OVERHANG
- LOAD
- LOAD OVERHANG
- OVERRUN
- OVERSAIL

NOTES:

1. AUTOMATIC REAR WHEEL STEERING USED UNLESS OTHERWISE INDICATED.
2. ANALYSIS HAS NOT CONSIDERED VERTICAL GROUND CLEARANCE OF THE VEHICLE AND LOAD.
3. FURTHER INVESTIGATION WORKS WILL BE REQUIRED IN ORDER TO IDENTIFY THE IMPROVEMENT WORKS REQUIRED INCLUDING BUT NOT LIMITED TO CARRIAGEWAY WIDENING, EARTHWORKS, DRAINAGE, SERVICES, PEDESTRIAN FACILITIES AND TRAFFIC MANAGEMENT.
4. ANALYSIS BASED ON 75m BLADE DELIVERY VEHICLE
5. ANALYSIS BASED ON OS MASTERMAP. WHERE REQUIRED TOPOGRAPHICAL SURVEY TO BE UNDERTAKEN AND USED AS A BASIS FOR DETAILED DESIGN.
6. A 0.75m MAX BUFFER IS INDICATED OUTSIDE OVERRUN AND OVERSAIL AREAS FROM THE EXTENT OF VEHICLE SWEPT PATH WHERE LAND OWNERSHIP ALLOWS. THIS IS TO PROVIDE A FACTOR OF SAFETY AND TO INDICATE THE AREA WHICH SHOULD BE ALLOWED FOR, IN ORDER TO PROVIDE A MARGIN OF ERROR DURING DELIVERY.

N



Project Title: CLOICH WIND FARM	Drawing Title: ALV SWEPT PATH ANALYSIS VESTAS V136 66.6m BLADE PC 28 D18 - BEND BEFORE SHIPLAW BURN	Purpose of issue: FOR INFORMATION		
		Designed:	Drawn: KB	Checked: KL / Approved: TAT
Client: EDF ENERGY RENEWABLES LTD		Arcus Internal Project No.: 3439	Date: 18/09/20	
		Scale @ A3: 1:1000		

Drawing Number	Rev
3439_DR_ALR_0029	3

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

ARCUS

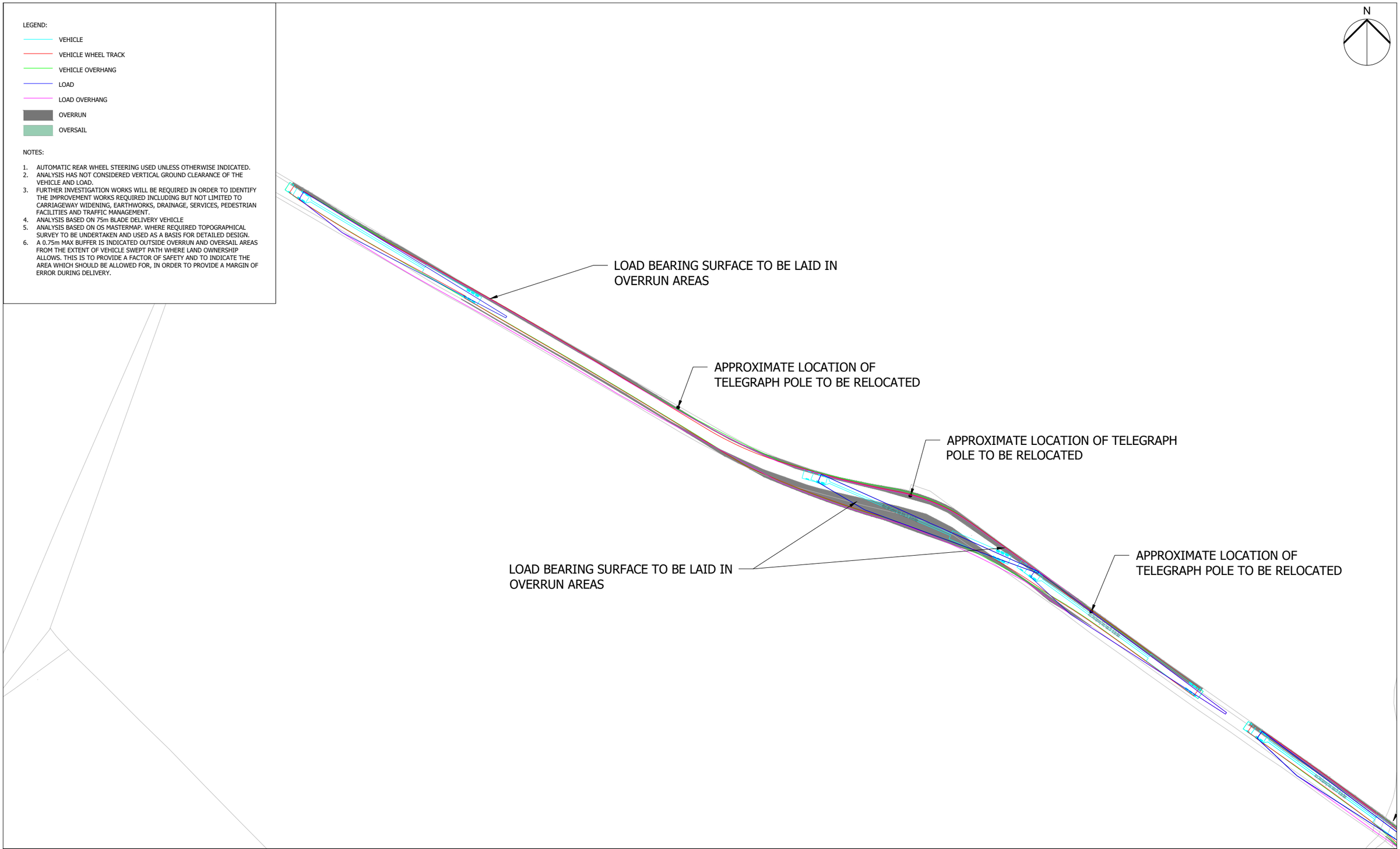
LEGEND:

- VEHICLE
- VEHICLE WHEEL TRACK
- VEHICLE OVERHANG
- LOAD
- LOAD OVERHANG
- OVERRUN
- OVERSAIL

NOTES:

1. AUTOMATIC REAR WHEEL STEERING USED UNLESS OTHERWISE INDICATED.
2. ANALYSIS HAS NOT CONSIDERED VERTICAL GROUND CLEARANCE OF THE VEHICLE AND LOAD.
3. FURTHER INVESTIGATION WORKS WILL BE REQUIRED IN ORDER TO IDENTIFY THE IMPROVEMENT WORKS REQUIRED INCLUDING BUT NOT LIMITED TO CARRIAGEWAY WIDENING, EARTHWORKS, DRAINAGE, SERVICES, PEDESTRIAN FACILITIES AND TRAFFIC MANAGEMENT.
4. ANALYSIS BASED ON 75m BLADE DELIVERY VEHICLE
5. ANALYSIS BASED ON OS MASTERMAP. WHERE REQUIRED TOPOGRAPHICAL SURVEY TO BE UNDERTAKEN AND USED AS A BASIS FOR DETAILED DESIGN.
6. A 0.75m MAX BUFFER IS INDICATED OUTSIDE OVERRUN AND OVERSAIL AREAS FROM THE EXTENT OF VEHICLE SWEPT PATH WHERE LAND OWNERSHIP ALLOWS. THIS IS TO PROVIDE A FACTOR OF SAFETY AND TO INDICATE THE AREA WHICH SHOULD BE ALLOWED FOR, IN ORDER TO PROVIDE A MARGIN OF ERROR DURING DELIVERY.

N



Project Title: CLOICH WIND FARM	Drawing Title: ALV SWEPT PATH ANALYSIS VESTAS V136 66.6m BLADE PC 29 D18 - BEND AFTER SHIPLAW BURN	Purpose of issue: FOR INFORMATION	
Client: EDF ENERGY RENEWABLES LTD		Designed:	Drawn: KB
		Checked: KL	Approved: TAT
		Arcus Internal Project No.: 3439	Date: 18/09/20
		Scale @ A3: 1:1000	

Drawing Number: 3439_DR_ALR_0030	Rev: 3

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

ARCUS

LEGEND:

- VEHICLE
- VEHICLE WHEEL TRACK
- VEHICLE OVERHANG
- LOAD
- LOAD OVERHANG
- OVERRUN
- OVERSAIL

NOTES:

1. AUTOMATIC REAR WHEEL STEERING USED UNLESS OTHERWISE INDICATED.
2. ANALYSIS HAS NOT CONSIDERED VERTICAL GROUND CLEARANCE OF THE VEHICLE AND LOAD.
3. FURTHER INVESTIGATION WORKS WILL BE REQUIRED IN ORDER TO IDENTIFY THE IMPROVEMENT WORKS REQUIRED INCLUDING BUT NOT LIMITED TO CARRIAGEWAY WIDENING, EARTHWORKS, DRAINAGE, SERVICES, PEDESTRIAN FACILITIES AND TRAFFIC MANAGEMENT.
4. ANALYSIS BASED ON 75m BLADE DELIVERY VEHICLE
5. ANALYSIS BASED ON OS MASTERMAP. WHERE REQUIRED TOPOGRAPHICAL SURVEY TO BE UNDERTAKEN AND USED AS A BASIS FOR DETAILED DESIGN.
6. A 0.75m MAX BUFFER IS INDICATED OUTSIDE OVERRUN AND OVERSAIL AREAS FROM THE EXTENT OF VEHICLE SWEPT PATH WHERE LAND OWNERSHIP ALLOWS. THIS IS TO PROVIDE A FACTOR OF SAFETY AND TO INDICATE THE AREA WHICH SHOULD BE ALLOWED FOR, IN ORDER TO PROVIDE A MARGIN OF ERROR DURING DELIVERY.

N

LOAD BEARING SURFACE TO BE LAID IN OVERRUN AREAS

APPROXIMATE LOCATION OF TELEGRAPH POLE TO BE RELOCATED

APPROXIMATE LOCATION OF TELEGRAPH POLE TO BE RELOCATED

Project Title: CLOICH WIND FARM	Drawing Title: ALV SWEPT PATH ANALYSIS VESTAS V136 66.6m BLADE PC 30 BEND ONTO FARM ACCESS ROAD	Purpose of issue: FOR INFORMATION	THIS DOCUMENT HAS BEEN PREPARED IN ACCORDANCE WITH THE SCOPE OF ARCUS' APPOINTMENT WITH ITS CLIENT AND IS SUBJECT TO THE TERMS OF THAT APPOINTMENT. ARCUS ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS CLIENT AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED
Client: EDF ENERGY RENEWABLES LTD		Designed: — Drawn: GR Checked: KL Approved: TAT	
		Arcus Internal Project No.: 3439 Date: 03/11/2020	Drawing Number: 3439_DR_ALR_0031 Rev: -
		Scale @ A3: 1:1000	

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

ARCUS

LEGEND:

- VEHICLE
- VEHICLE WHEEL TRACK
- VEHICLE OVERHANG
- LOAD
- LOAD OVERHANG
- OVERRUN
- OVERSAIL

NOTES:

1. AUTOMATIC REAR WHEEL STEERING USED UNLESS OTHERWISE INDICATED.
2. ANALYSIS HAS NOT CONSIDERED VERTICAL GROUND CLEARANCE OF THE VEHICLE AND LOAD.
3. FURTHER INVESTIGATION WORKS WILL BE REQUIRED IN ORDER TO IDENTIFY THE IMPROVEMENT WORKS REQUIRED INCLUDING BUT NOT LIMITED TO CARRIAGEWAY WIDENING, EARTHWORKS, DRAINAGE, SERVICES, PEDESTRIAN FACILITIES AND TRAFFIC MANAGEMENT.
4. ANALYSIS BASED ON 75m BLADE DELIVERY VEHICLE
5. ANALYSIS BASED ON OS MASTERMAP. WHERE REQUIRED TOPOGRAPHICAL SURVEY TO BE UNDERTAKEN AND USED AS A BASIS FOR DETAILED DESIGN.
6. A 0.75m MAX BUFFER IS INDICATED OUTSIDE OVERRUN AND OVERSAIL AREAS FROM THE EXTENT OF VEHICLE SWEPT PATH WHERE LAND OWNERSHIP ALLOWS. THIS IS TO PROVIDE A FACTOR OF SAFETY AND TO INDICATE THE AREA WHICH SHOULD BE ALLOWED FOR, IN ORDER TO PROVIDE A MARGIN OF ERROR DURING DELIVERY.

N

LOAD BEARING SURFACE TO BE LAID IN OVERRUN AREA

Project Title: CLOICH WIND FARM	Drawing Title: ALV SWEPT PATH ANALYSIS VESTAS V136 66.6m BLADE PC 31 BEND AT CLOICH FARM	Purpose of issue: FOR INFORMATION	
Client: EDF ENERGY RENEWABLES LTD		Designed:	Drawn: GR
		Checked: KL	Approved: TAT
		Arcus Internal Project No.: 3439	Date: 03/11/2020
		Scale @ A3: 1:1000	

Drawing Number	Rev
3439_DR_ALR_0032	-

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

ARCUS

LEGEND:

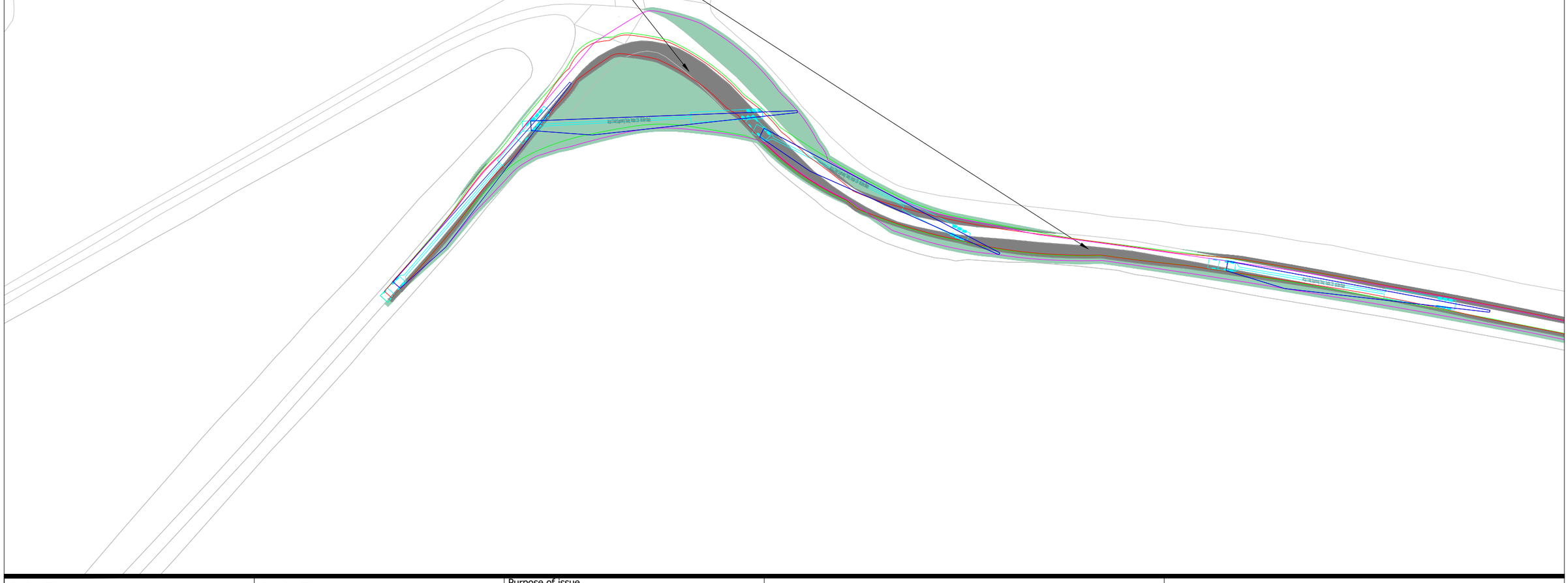
- VEHICLE
- VEHICLE WHEEL TRACK
- VEHICLE OVERHANG
- LOAD
- LOAD OVERHANG
- OVERRUN
- OVERSAIL

NOTES:

1. AUTOMATIC REAR WHEEL STEERING USED UNLESS OTHERWISE INDICATED.
2. ANALYSIS HAS NOT CONSIDERED VERTICAL GROUND CLEARANCE OF THE VEHICLE AND LOAD.
3. FURTHER INVESTIGATION WORKS WILL BE REQUIRED IN ORDER TO IDENTIFY THE IMPROVEMENT WORKS REQUIRED INCLUDING BUT NOT LIMITED TO CARRIAGEWAY WIDENING, EARTHWORKS, DRAINAGE, SERVICES, PEDESTRIAN FACILITIES AND TRAFFIC MANAGEMENT.
4. ANALYSIS BASED ON 75m BLADE DELIVERY VEHICLE
5. ANALYSIS BASED ON OS MASTERMAP. WHERE REQUIRED TOPOGRAPHICAL SURVEY TO BE UNDERTAKEN AND USED AS A BASIS FOR DETAILED DESIGN.
6. A 0.75m MAX BUFFER IS INDICATED OUTSIDE OVERRUN AND OVERSAIL AREAS FROM THE EXTENT OF VEHICLE SWEPT PATH WHERE LAND OWNERSHIP ALLOWS. THIS IS TO PROVIDE A FACTOR OF SAFETY AND TO INDICATE THE AREA WHICH SHOULD BE ALLOWED FOR, IN ORDER TO PROVIDE A MARGIN OF ERROR DURING DELIVERY.

N

LOAD BEARING SURFACE TO BE LAID IN OVERRUN AREAS



Project Title: CLOICH WIND FARM	Drawing Title: ALV SWEPT PATH ANALYSIS VESTAS V136 66.6m BLADE PC 32 BEND AT WESTERN TRACK	Purpose of issue: FOR INFORMATION	
Client: EDF ENERGY RENEWABLES LTD		Designed:	Drawn: GR
		Checked: KL	Approved: TAT
		Arcus Internal Project No.: 3439	Date: 03/11/2020
		Scale @ A3: 1:1000	

Drawing Number	Rev
3439_DR_ALR_0033	-

Arcus Consultancy Services
7th Floor
144 West George Street
Glasgow, G2 2HG
Tel: +44 (0)141 221 9997
Fax: +44 (0)141 221 5610
www.arcusconsulting.co.uk

ARCUS

CLOICH FOREST WIND FARM

VOLUME 3: TECHNICAL APPENDICES

TECHNICAL APPENDIX A12.2: CONSTRUCTION DEVELOPMENT PROGRAMME

JUNE 2021

Prepared By:

Arcus Consultancy Services

7th Floor
144 West George Street
Glasgow
G2 2HG

T +44 (0)141 221 9997 l **E** info@arcusconsulting.co.uk
w www.arcusconsulting.co.uk

Registered in England & Wales No. 5644976

Appendix 12.2 - Construction Development Programme

Activity	Month																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
	HGV Excluding Concrete																		Total
Site Mobilistation/Demobilisation	60																	60	120
Forestry	545	545	545	545	545	547													3272
Access Track and Hardstanding Construction			662	662	662	668	662												3316
Control Building and Substation, BESS Delivery.				46	24	24													94
Steel Imports etc. for Turbine Foundations				22	22	66	66												176
Electrical Cabling Delivery											9	9	9	9					36
Crane Delivery												27					27		54
Turbine Erection													72	72	72	72			288
Fuel Delivery	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	144
Sub-Total	613	553	1215	1283	1261	1313	736	8	8	8	17	44	89	89	80	80	35	68	**7500**
	Concrete Delivery																		
Concrete Delivery for Turbine Foundations					144	144	144	288	288	144	144	144	144	144					
Sub-Total					144	144	144	288	288	144	144	144	144	144					**1728**
	Staff Cars and Vans																		
Site Mobilisation/Demobilisation	16																	16	32
Substation Escort				8															8
Crane Delivery Escort													4			4			8
WTG Escort													132	132	132	132			528
Staff	2496	2496	2496	2496	2496	2496	2496	2496	2496	2496	2496	2496	2496	2496	2496	2496	2496	2496	44928
Sub-Total	2512	2496	2496	2504	2496	2496	2496	2496	2496	2496	2496	2496	2632	2628	2628	2632	2496	2512	**45504**
Total Excluding Concrete Delivery	3125	3049	3711	3787	3757	3809	3232	2504	2504	2504	2513	2540	2721	2717	2708	2712	2531	2580	53004
Overall Total	3125	3049	3711	3787	3901	3953	3376	2792	2792	2648	2657	2684	2865	2861	2708	2712	2531	2580	54732
Daily Average (26 Day Month) excluding concrete delivery	120	117	143	146	145	147	124	96	96	96	97	98	105	105	104	104	97	99	
Additional 144 HGVs per day for 12 non-consecutive days (total) of concrete delivery					289	291	268	240	240	240	241	242	249	249					

CLOICH FOREST WIND FARM

VOLUME 3: TECHNICAL APPENDICES

TECHNICAL APPENDIX A13.1: CURRENT TREE SPECIES STOCKING WITHIN THE SITE

JUNE 2021

Appendix A13.1: Current tree species stocking within The Site.

Compartment	Species	Planting Year	Yield Class	Area (Ha)
3308	OL	0	0	0.15
3308	OG	0	0	0.89
3308	SS	1975	16	1.98
3308	OG	0	0	3.78
3308	SS	2010	18	3.52
3308	NS	2016	14	4.32
3308	JL	1975	6	0.31
3308	SS	1975	16	10.23
3308	SS	1975	16	2.63
3308	OG	0	0	3.15
3308	OG	0	0	2.37
3308	JL	2010	16	0.35
3308	JL	2010	16	0.17
3308	OK	2010	6	1.03
3309	OG	0	0	0.27
3309	SS	2016	16	16.04
3309	UP	0	0	8.19
3309	OG	0	0	1.82
3309	OG	0	0	0.52
3309	UP	0	0	5.24
3309	UP	0	0	0.89
3309	OG	0	0	0.28
3309	OG	0	0	1.62
3310	OG	0	0	2.22
3310	SS	2010	18	27.09
3310	NS	1975	14	3.59
3310	OG	0	0	5.13
3310	NS	1975	14	0.92
3311	SS	1976	0	8.85
3311	MB	2005	2	3.59
3311	JL	1976	8	3.63
3311	OG	0	0	4.55
3311	OG	0	0	0.03
3311	OG	0	0	0.77
3311	OG	0	0	0.08
3311	MB	2005	2	0.11
3311	OG	0	0	0.14
3311	MB	2005	2	0.18
3311	OG	0	0	0.11
3311	OG	0	0	3.21
3312	OG	0	0	0.91
3312	UP	0	0	1.50
3312	SS	2016	16	3.18

Compartment	Species	Planting Year	Yield Class	Area (Ha)
3312	UP	0	0	11.21
3312	UP	0	0	0.31
3313	OG	0	0	0.01
3313	HL	1973	6	0.23
3313	SP	2015	10	3.02
3313	SP	1974	6	0.19
3313	MB	2015	2	7.75
3313	SS	1973	18	0.21
3313	OG	0	0	0.78
3313	OG	0	0	0.01
3313	OG	0	0	0.03
3313	OG	0	0	0.00
3313	OG	0	0	0.62
3313	OG	0	0	0.42
3313	OG	0	0	0.13
3313	OG	0	0	0.01
3313	OG	0	0	0.13
3313	OG	0	0	0.08
3313	OG	0	0	0.10
3313	SS	2015	14	17.97
3313	SS	2015	14	3.49
3313	SS	2015	14	1.19
3313	HL - Windblow	1973	6	0.11
3313	SS	2015	0	0.13
3313	Windblow	0	0	0.18
3313	SS	2015	14	0.15
3313	SS	2015	14	0.36
3313	MB	2015	2	0.10
3313	SP	1974	6	0.08
3313	SS	1973	18	0.08
3313	OG	0	0	0.16
3313	SS	0	0	0.91
3313	SS	0	0	0.08
3314	OG	0	0	4.34
3314	OG	0	0	0.14
3314	OG	0	0	0.53
3314	OG	0	0	0.18
3314	MB	2006	2	0.43
3314	SP	1974	2	0.43
3314	MB	1900	0	0.44
3314	NS	2005	12	10.61
3314	UP	0	0	8.30
3314	UP	0	0	0.84
3314	SS	2005	16	3.76

Compartment	Species	Planting Year	Yield Class	Area (Ha)
3314	SS	2005	16	0.80
3314	UP	0	0	4.03
3314	UP	0	0	2.35
3314	UP	0	0	0.61
3314	UP	0	0	0.29
3314	UP	0	0	6.80
3314	UP	0	0	0.66
3314	MB/OG	0	0	0.09
3314	UP	0	0	0.07
3314	NS	2005	12	0.19
3314	UP	0	0	0.04
3314	OG	0	0	0.19
3314	SP	0	0	0.04
3314	NS	2005	12	0.10
3314	NS	2005	12	0.13
3315	MB	2006	2	1.02
3315	SS	2006	16	19.16
3315	MB	2006	2	0.54
3315	SS	1992	16	1.56
3315	OG	0	0	0.00
3315	OG	0	0	0.00
3315	OG	0	0	0.00
3315	OG	0	0	0.11
3315	OG	0	0	0.02
3315	OG	0	0	0.00
3315	OG	0	0	0.00
3315	OG	0	0	11.15
3315	OG	0	0	0.03
3315	OL	0	0	0.44
3315	SS	2006	16	0.17
3315	SS	1992	16	0.25
3315	OL	0	0	1.59
3315	MB	2006	2	0.09
3315	SS	1992	16	0.01
3315	OG	0	0	0.16
3315	OL	0	0	0.38
3315	OG	1992	16	0.08
3315	OG	1992	16	0.96
3315	OG	0	0	0.14
3315	OG	0	0	0.53
3315	OG	0	0	0.24
3315	MB	0	0	0.05
3316	OG	0	0	0.22
3316	SS	2002	14	0.18

Compartment	Species	Planting Year	Yield Class	Area (Ha)
3317	JL	1974	6	0.26
3317	UP	0	0	2.02
3317	SS	1982	20	4.28
3317	OG	0	0	0.68
3317	SS	1974	16	13.93
3317	UP	0	0	9.76
3318	UP	0	0	0.71
3318	NS	2005	12	0.60
3318	SS	2005	16	5.50
3318	SS	1974	12	12.76
3318	SS	1974	12	0.01
3318	SS	1974	16	1.98
3318	UP	0	0	2.66
3318	OG	0	0	3.55
3318	OG	0	0	0.09
3318	OG	0	0	0.32
3318	HL	1973	6	1.23
3318	HL	1973	6	0.83
3318	HL	1973	6	0.19
3318	HL	1973	6	0.11
3318	UP	0	0	10.10
3318	UP	0	0	1.15
3318	HL	1973	6	0.01
3318	OL	0	6	4.36
3318	SS	1974	12	0.06
3318	SS	1974	12	0.10
3318	SS	1974	12	0.13
3318	SS	2005	0	0.17
3318	SS	2005	0	0.29
3318	SS	1974	12	0.08
3318	OG	0	0	0.18
3319	OG	0	0	0.44
3319	OG	0	0	1.64
3319	SS	1974	14	0.00
3319	SS	1974	14	2.51
3319	SS	1974	14	4.30
3319	SS	1974	14	1.71
3319	SS	1974	14	0.97
3319	SS	1974	14	12.27
3319	SS	1974	14	0.15
3319	SS	1974	14	3.66
3319	SS	1974	14	0.22
3319	SS	1974	14	16.37
3319	SS	1974	14	1.52

Compartment	Species	Planting Year	Yield Class	Area (Ha)
3320	SS	1989	20	5.83
3320	OG	0	0	0.23
3320	OG	0	0	0.12
3320	OG	0	0	0.12
3320	OG	0	0	0.04
3320	OG	0	0	0.67
3320	OG	0	0	0.01
3320	OG	0	0	2.41
3320	MC	1974	10	0.01
3320	MC	1974	10	0.00
3320	MC	1974	10	0.02
3320	MC	1974	10	2.00
3320	MC	1974	10	1.17
3320	MC	1974	10	0.65
3320	MC	1974	10	0.00
3320	MC	1974	10	0.36
3320	MC	1974	10	0.10
3320	OG	1974	10	1.07
3320	SS	1989	20	0.05
3320	MC	0	0	0.02
3320	MC	1974	10	1.58
3320	MC	1974	10	0.31
3320	MC	1974	10	0.03
3320	OG	1974	10	0.03
3320	MC	1974	10	0.06
3320	MC	1974	10	0.11
3320	MC	1974	10	0.15
3320	MC	1974	10	0.17
3320	MC	1974	10	0.49
3320	SS	1989	20	0.05
3320	MC	1974	10	0.13
3320	MC	1974	10	0.20
3320	MC	1974	10	0.16
3320	MC	1974	10	1.32
3320	MC	1974	10	0.77
3320	MC	1974	10	0.25
3320	MC	1974	10	0.31
3320	MC	1974	10	0.07
3320	MC	1974	10	0.04
3320	MC	1974	10	0.07
3320	MC	1974	10	0.01
3320	MC	1974	10	0.03
3321	OG	0	0	2.37
3321	OG	0	0	0.88

Compartment	Species	Planting Year	Yield Class	Area (Ha)
3321	OG	0	0	2.84
3321	OG	0	0	0.89
3321	SS	2010	18	2.58
3321	SS	2010	18	1.80
3321	SS	2010	18	0.66
3321	SS	2010	18	5.17
3321	SS	2010	18	3.03
3321	OG	0	0	0.06
3321	OG	0	0	0.26
3321	SS	1974	14	1.59
3321	SS	1974	14	5.35
3321	SS	1974	14	0.53
3322	SS	2006	16	7.80
3322	SS	1972	12	5.49
3322	SS	1972	12	0.51
3322	DF	1972	12	1.19
3322	SS	1982	20	2.61
3322	OG	0	0	15.47
3322	OG	0	0	0.00
3322	NS	1982	14	6.17
3322	NS	1982	14	4.91
3322	MB	2006	2	2.31
3322	MB	2006	2	1.52
3322	DF	1972	12	0.26
3322	NS	1982	14	0.22
3322	MB	2006	2	0.28
3323	MB	1890	0	0.49
3323	UP	0	0	9.60
3323	SS	1972	12	5.06
3323	UP	0	0	0.59
3323	UP	0	0	1.56
3323	UP	0	0	1.26
3323	HL	1974	10	0.75
3323	HL	1974	10	0.24
3323	SS	0	0	0.21
3323	SS	1974	12	0.71
3323	HL	1974	10	0.08
3323	SS	1972	12	0.32
3323	SS	1972	12	0.02
3323	OG	1974	12	0.42
3323	SS	0	0	0.05
3323	LAR	0	0	0.05
3323	SS	1974	12	10.21
3323	SS	1974	12	0.97

Compartment	Species	Planting Year	Yield Class	Area (Ha)
3324	OG	0	0	1.03
3324	OG	0	0	0.83
3324	OG	0	0	0.00
3324	OG	0	0	0.52
3324	SS	1974	14	1.52
3324	SS	1974	14	1.20
3324	SS	1974	14	2.31
3324	OG	1974	14	0.02
3324	OG	1974	14	0.05
3324	SS	1974	14	0.02
3324	SS	1974	14	23.73
3324	OG	0	0	0.12
3324	SS	1974	14	1.50
3324	SS	1974	14	0.33
3324	SS	1974	14	2.19
3324	SS	1974	14	5.47
3325	OG	0	0	2.60
3325	SS	0	0	0.83
3325	SS	1975	14	0.25
3325	SS	1975	14	0.07
3325	OG	1975	14	0.07
3325	OG	1975	14	0.06
3325	SS	1975	14	0.16
3325	OG	0	0	0.28
3325	SS	1975	14	0.03
3325	OG	0	0	0.09
3325	SS	1975	14	3.63
3325	SS	1975	14	15.51
3325	SS	1975	14	0.61
3325	SS	1975	14	0.63
3325	SS	1975	14	0.09
3325	SS	1975	14	0.06
3325	SS	1975	14	14.94
3325	SS	1975	14	0.14
3326	DF	1972	12	1.52
3326	DF	1972	12	0.17
3326	NS	1972	16	1.02
3326	NS	1972	16	0.33
3326	DF	1972	12	0.09
3326	SS	1972	14	0.15
3326	SS	1972	14	2.08
3326	SS	1972	14	1.14
3326	SS	1982	16	0.63
3326	SS	1982	16	0.43

Compartment	Species	Planting Year	Yield Class	Area (Ha)
3326	SS	1982	16	0.08
3326	OG	1972	14	0.18
3326	SS	1982	16	2.95
3326	SS	1975	14	11.41
3326	SS	1972	14	4.00
3326	OG	0	0	0.25
3326	SS	1972	14	3.19
3326	SS	1972	14	0.73
3326	SS	1982	16	1.03
3326	SS	1982	16	1.31
3326	SS	1972	14	1.03
3326	SS	1982	16	0.80
3327	OG	0	0	0.86
3327	NS	1972	10	0.85
3327	SS	1972	14	0.04
3327	DF	1972	8	0.67
3327	OG	0	0	1.00
3327	OG	0	0	0.29
3327	OG	0	0	0.11
3327	SS	1972	14	0.01
3327	SS	1972	14	0.15
3327	SS	1972	12	0.17
3327	OG	0	0	0.00
3327	SS	1972	14	1.23
3327	SS	1972	14	2.25
3327	SS	1972	14	1.06
3327	SS	1972	12	1.44
3327	SS	1972	14	17.59
3327	SS	1972	14	1.47
3327	SS	1982	20	0.54
3327	SS	1982	20	0.21
3327	SS	1972	14	2.33
3327	SS	1972	14	2.65
3327	SS	1972	14	0.63
3328	OG	0	0	0.64
3328	OG	0	0	0.04
3328	OG	0	0	0.46
3328	OG	0	0	1.22
3328	NS	1972	12	0.46
3328	OG	0	0	0.33
3328	OG	0	0	0.30
3328	SS	1972	14	0.85
3328	NS	1972	12	0.73
3328	SS	1982	22	0.19

Compartment	Species	Planting Year	Yield Class	Area (Ha)
3328	SS	1972	16	0.75
3328	SS	1972	16	3.19
3328	SS	1972	16	1.99
3328	NS	1972	12	0.01
3328	NS	1972	12	0.04
3328	SS	1972	16	1.97
3328	SS	1972	14	3.48
3328	SS	1972	16	7.55
3328	SS	1972	16	0.36
3328	SS	1972	16	0.30
3328	SS	1972	16	2.58
3328	NS	1972	12	2.07
3328	NS	1972	12	1.61
3328	SS	1982	22	1.86
3328	SS	1982	22	0.14
3328	SS	1982	22	1.31
3328	SS	1972	14	0.10
3329	OG	0	0	3.74
3329	OG	0	0	0.24
3329	OG	0	0	0.44
3329	OG	0	0	0.39
3329	OG	0	0	0.08
3329	OG	0	0	0.11
3329	OG	0	0	0.03
3329	OG	0	0	0.18
3329	MB	2010	4	3.29
3329	SS	2010	18	1.56
3329	SS	2010	18	2.12
3329	SS	2010	18	0.00
3329	SS	2010	18	4.35
3329	SP	2010	12	0.77
3329	SP	2010	12	0.33
3329	OG	0	0	0.48
3329	OG	0	0	0.50
3329	NS	2010	16	1.78
3329	NS	2010	16	0.19
3329	NS	2010	16	0.26
3329	OG	0	0	0.02
3329	OG	0	0	0.01
3329	SS	2010	18	0.29
3329	SS	2010	18	0.00
3329	SP	2010	12	0.10
3329	SP	2010	12	0.50
3329	OG	0	0	0.59

Compartment	Species	Planting Year	Yield Class	Area (Ha)
3329	SS	2010	18	0.29
3329	SS	2010	18	0.02
3329	SS	2010	18	0.02
3329	NS	2010	16	0.02
3329	MC/OG	2010	18	0.18
3329	SS	2010	18	1.28
3329	SP	2010	12	0.17
3329	SP/OG	0	0	0.13
3329	SP	2010	12	0.52
3329	SP	2010	12	0.73
3329	SS	2010	18	0.40
3329	OG	0	0	0.06
3329	SS	2010	18	0.36
3329	SS	2010	18	1.10
3329	SS	2010	18	0.16
3329	OG	2010	18	0.13
3329	SS	2018	0	0.06
3329	OG	2010	18	0.08
3329	OL	0	0	1.13
3329	SS	2010	18	0.58
3330	HL	1962	8	0.06
3330	SS	1962	14	0.01
3330	SS	1962	14	0.03
3330	SS	1962	14	0.03
3330	SS	1962	16	0.08
3330	SS	1962	16	0.02
3330	SS	1962	16	0.01
3330	SS	1962	14	2.90
3330	SS	1962	14	1.66
3330	SS	1962	14	0.39
3330	SS - Windblow	1962	16	0.28
3330	SS	1962	16	0.09
3330	SS	1962	14	3.13
3330	OG	1962	14	0.06
3330	OG	1962	14	0.33
3330	SS - Windblow	1962	14	0.31
3330	SS	1962	14	0.42
3330	SS	1962	16	0.03
3330	SS	1962	14	0.01
3330	HL	1962	8	0.40
3330	SS	1962	14	3.84
3330	SS	1962	14	0.32
3330	SS	1962	14	0.73

Compartment	Species	Planting Year	Yield Class	Area (Ha)
3330	SS	1962	14	2.12
3330	SS	1962	14	4.74
3330	SS	1962	16	1.90
3330	SS	1962	14	0.28
3330	SS	1962	14	0.26
3331	OG	0	0	2.62
3331	SS	1970	16	6.73
3331	SS	1971	16	14.69
3331	HL	1971	8	1.41
3331	HL	1971	8	1.36
3331	SS	1970	16	0.42
3332	SS	1970	12	0.64
3332	OG	0	0	0.46
3332	OG	0	0	0.79
3332	SS	1970	12	2.29
3332	SS	1970	10	9.71
3332	HL	1971	8	1.45
3332	SS	1970	16	10.76
3332	SS	1970	16	12.21
3333	SS	1970	18	5.58
3333	SS	2006	16	10.80
3333	OG	0	0	5.70
3333	SS	1970	12	7.75
3333	SS	1970	6	1.23
3333	SS	1983	20	3.72
3333	MB	2006	2	2.04
3333	MB	2006	2	0.67
3334	SS	1970	16	0.69
3334	UP	0	0	2.67
3334	UP	0	0	7.91
3334	UP	0	0	12.31
3334	UP	0	0	2.26
3334	UP	0	0	0.36
3335	OG	0	0	3.31
3335	OG	0	0	0.31
3335	NS	2012	14	4.19
3335	EL	2012	12	0.27
3335	SS	2012	16	18.37
3335	OG	0	0	0.01
3335	NS	2012	14	0.17
3335	SS	2012	16	2.55
3335	OG	0	0	0.02
3335	SS	2012	16	0.02
3335	OG	0	0	0.08

Compartment	Species	Planting Year	Yield Class	Area (Ha)
3335	SS	2012	16	0.09
3335	SS	2012	16	1.17
3335	OG	2012	16	0.31
3335	OG	0	0	0.21
3335	SS	1962	0	0.06
3336	OG	0	0	13.98
3336	OG	0	0	0.86
3336	MB	2002	2	5.62
3336	SS	2002	16	21.02
3336	SS	2002	16	1.57
3336	SP	1960	10	0.87
3336	MB	2002	2	2.50
3336	SS	2002	16	5.79
3337	SS	1960	2	0.48
3337	OG	0	0	2.07
3337	SS	1960	18	6.28
3337	SS	2012	16	7.09
3337	NMB	2012	6	2.84
3337	SS	1960	18	1.64
3337	EL	2012	12	0.23
3337	EL	2012	12	0.20
3337	SS	1960	8	1.29
3338	SS	1982	16	12.69
3338	SS	1961	14	26.64
3338	NMB	2012	6	1.13
3338	SS	2012	16	4.62
3338	OG	0	0	0.41
3339	UP	0	0	2.98
3339	UP	0	0	0.18
3339	SS	1983	20	8.22
3339	MB	2006	2	3.54
3339	SS	1970	18	0.55
3339	OG	0	0	3.31
				1,080.60

ARCUS

CLOICH FOREST WIND FARM

VOLUME 3: TECHNICAL APPENDICES

TECHNICAL APPENDIX A14.1: CLOICH WIND FARM ESKDALEMUIR DESKTOP BUDGET CALCULATIONS

JUNE 2021

Xi Engineering Consultants

Cloich Wind Farm, Eskdalemuir, Desktop Budget Calculations

Mathematical Analysis re issued with supplementary information

Client: EDF Renewables

21/05/2021
Document number: EDF 501-v11

Xi Engineering Consultants, CodeBase, Argyle House, 3 Lady Lawson Street, Edinburgh, EH3 9DR, United Kingdom. T: +44 (0)131 290 2250, xiengineering.com, Company no. SC386913

Document Summary

EDF Renewables wish to develop the Cloich Wind Farm site within the Eskdalemuir Consultation Zone. This desktop study assesses the vibration impact of the proposed Cloich wind farm on the MoD's Eskdalemuir Seismic Array, for likely use in an EDF EIA.

Two separate candidate machines have been assessed to inform EDF Renewables on the budget requirement. For each of these machines, this report uses the most up to date information available on the subject matter to assess the likely budget requirement for Cloich wind farm for several different scenarios. Based on the data available in report 'SGV 203 Technical report v12.pdf', the budget requirement for Cloich is calculated using differing scenarios.

Based on this mathematical approach EDF would be able to build out Cloich windfarm within the allocated budget of 0.0064902nm, by either using a Turbine with very low seismic vibration levels or by using a measurement before and after installation using a turbine of appropriate seismic vibration levels, to show evidence of operation within budget allocation.

Action	Name	Date	Version	Amendment
Originator	Dr M P Buckingham	23/3/2021	V1	Issue
Checked by	G Cowie	24/03/2021	V2	Review
Checked by	R. Horton	24/03/2021	V3	Review
Checked by	Dr M P Buckingham	25/3/2021	V4	Issue
Revision	Dr M P Buckingham	23/04/2021	V5	Issue
Checked by	G Cowie	26/04/2021	V6	Review
Reviewed by	R Horton	27/04/2021	V7	Review
Checked by	Dr M P Buckingham	27/4/2021	V8	Issue
Review	Dr M P Buckingham	6/5/2021	V9	Issue
Review	Dr M P Buckingham	20/5/2021	V10	Background section addition
Review	G Cowie	21/05/2021	V11	Issue

Matters relating to this document should be directed to:	
Dr Mark-Paul Buckingham	E: mp@xiengineering.com
Managing Director	T: 0131 290 2257
	M: 07747 038 764
Dr Brett Marmo	E: brettmarmo@xiengineering.com
Technical Director	T: 0131 290 2249
Principal contacts at client's organisation	
Richard Fisher	E: richard.fisher@edf-re.uk
Development Engineer	M: 07305 255727

Contents

1. Background to Eskdalemuir

The Eskdalemuir Seismological Recording Station is located in the Scottish Borders and is a monitoring facility where seismological, magnetic and other environmental parameters are monitored.

The seismometer array at Eskdalemuir (EKA) has two arms, each of ten seismometers, and became operational on 19 May 1962. The array is operated by AWE Blacknest (AWE) and is part of the seismic network of the organisation set up to help verify compliance with the Comprehensive Test Ban Treaty (CTBT) which bans nuclear explosions.

Concerns were raised that vibrations from wind turbines might affect the ability of EKA to operate properly, and MoD were advised to set a maximum permissible background vibration budget within a 50km radius of the Eskdalemuir array in order to safeguard its effectiveness in accordance with the CTBT. Beyond 50km it was determined that the vibration contribution from a wind turbine is negligible and is not included in the vibration budget. The maximum vibration budget that was deemed to be acceptable from all wind turbines that might be built within 50km of the array was set at a threshold amplitude of 0.336nm in the 4 to 5 Hz frequency range. This budget was subsequently agreed by the Comprehensive Test Ban Treaty Organisation (CTBTO) in Vienna.

Xi were commissioned by the Eskdalemuir Working Group (EWG) in 2013 to develop a robust physics-based approach to estimating the worst-case ground vibration produced by wind turbines. Xi developed such an algorithm which is currently used by the MoD to calculate the worst-case cumulative effect of all wind turbines on EKA; see “Seismic Vibration produced by wind turbines in the Eskdalemuir region Release 2.0 of Substantial Research Project”. It is this experience that makes Xi uniquely qualified to assess and deliver a solution to mitigate the seismic vibration risk from wind turbines within the Eskdalemuir statutory consultation zone. The Xi algorithm requires the distance to the array, turbine diameter and the tip height to estimate the seismic vibration.

Due to the limited public data available on seismic emissions from wind turbines, a conservative ‘worst-case’ approach was adopted. This worst-case turbine algorithm now used by the MoD to allocate budget is effectively two turbines combined to provide a significant safety factor. The budget algorithm is designed with safety factors such that it over-predicts the output of any single turbine.

Xi’s work: “Seismic Vibration produced by wind turbines in the Eskdalemuir region Release 2.0 of Substantial Research Project” was reviewed by the Ministry of Defence Subject matter experts (Dr D Bowers) who subsequently presented to the CTBTO (Comprehensive Nuclear-Test-Ban Treaty Organization) and was ultimately accepted by the Scottish Government. Adopting the new algorithm opened up over 1GW of onshore wind power within the 50km Eskdalemuir zone compared to the MoD’s earlier approach.

1.2. Current Developments

The algorithm used by the MoD to calculate the budget takes a conservative approach and, by design, over-estimates the seismic contribution of each wind turbine. This conservative approach was taken to protect the functioning of EKA in lieu of measured seismic data from each make and model of wind turbine within the EKA consultation zone.

The Eskdalemuir Working Group (EWG) was reformed in 2018 with a view to reviewing the Eskdalemuir Consultation Zone's vibration budget considering current installed developments and improvements in Wind Turbine Generator Technologies.

Xi Engineering have been engaged by both the Scottish Government and the EWG to audit the turbines within the region to obtain actual seismic measurement data from the wind farms within the Eskdalemuir consultation zone. This measurement campaign being conducted H2 2021 will remove the necessity of the safety-factor built into the algorithm thereby releasing additional budget and allow further exploitation of the regions valuable wind energy resource. The output from the work will feed into the Scottish Government Policy review which is underway at the time of writing. The Scottish Government would like to explore methods for overcoming the current policy, planning and commercial barriers to development within the region.

2. Summary

EDF Energy Renewables wish to develop the Cloich Wind Farm site within the Eskdalemuir Consultation Zone. As seismic budget is required to allow this site to progress, understanding the impact the site would have on the array is critical. The proposed development is situated approximately 42km from the Array, and as such would likely have a minimal seismic signature. This desk top study assesses two candidate machine options, using both the current MoD algorithm, and a multitude of potential seismic levels previously recorded by Xi Engineering Consultants. Based on the data available in report 'SGV 203 Technical report v12.pdf' the budget requirement for the two options is reported. Following this desktop study, empirical evidence will need to be shown to evidence the compliance of the site within its budget allocation.

3. Scope of Work

EDF Energy Renewables have revised the consented Cloich Forest wind turbine site. Originally the site proposed 18 turbines, which had been allocated a seismic budget of 0.0064902nm by the MoD. The revised site plans have reduced the turbine number to 12 turbines at the locations in Table 1. EDF require budget calculations for two candidate machines for the potential site. Two candidate machines have been used for the basis of the calculations (see Table 2)

For each of the candidate machines, seven seismic levels have been calculated to reflect a wide range of options and machines and also capture likely future approach to budget allocation within the region.

The aim of this work is to inform strategy in relation to Eskdalmuir in order to develop the site.

4. Methodology

4.1. Site details

The revised Cloich Forest wind turbine site consists of 12 Turbines located approximately 42Km for the Eskdalemuir Seismic Array. Specific Turbine locations are shown in Table 1.

Turbine No	Easting	Northing
1	319967	646980
2	320015	645991
3	320558	646130
4	320947	646570
5	321167	647062
6	320149	647527
7	320425	646942
8	320616	647950
9	320830	647414
10	320594	648446
11	320190	648389
12	320212	648875

Table 1 Proposed turbine Locations in Easting and Northing

There are two proposed candidate turbines, 1 x Vestas machine and 1 x Nordex machine. Table 2 shows the Two options analysed and includes turbine dimensions as received from EDF.

Option	**Turbine**	**Rotor Diameter (m)**	**Hub Height (m)**	**Tip height (m)**
1	Vestas V136	136	81.9	149.9
2	Nordex N133	133	83.4	149.9

Table 2 Candidate machines for the Cloich Forest Site

4.1.1. Scenarios Assessed

With a view to demonstrating potential required budget several scenarios have been assessed for each candidate machine. The turbine coordinates and turbine options were coded into MatLab and calculations were performed to determine budget levels.

The scenarios modelled are as follows;

1.	Standard EKA algorithm	Using the Current MoD 'worst case' algorithm
2.	Craig	Using a scaled Nordex N80 to represent the site
3.	Middle Muir	Using a scaled Senvion to represent the site.
4.	Clyde	Using a scaled Siemens 2.3 to represent the site
5.	Standard EKA background removed	See Background noise removal section
6.	Craig Background removed	See Background noise removal section
7.	Middlemuir Background removed	See Background noise removal section
8.	Clyde Background removed	See Background noise removal section

4.1.2. Background Noise Removal

Seismic measurements of wind turbines include ambient seismic noise. This noise is not attributed to the wind turbines themselves, rather it is produced by a combination of natural and anthropogenic sources. The ambient noise may, however, mask lower amplitude wind turbine seismicity (i.e., there may be some component of wind turbine noise, but it may be just below the background noise level, so it wasn't detected). For this reason, the EKA algorithm includes a noise floor based on the measurements of Clyde wind farm.

It has been proposed that a background noise measurement could be conducted before wind farms are built and then a subsequent measurement be conducted once the farm is operational. The background noise could then be subtracted from the operational noise giving a truer value of the contribution of the wind farm to seismicity. This approach is common in acoustic measurements of wind farms. To illustrate the affect that such a measurement campaign may have, tables have been provided where the noise floor has been removed from the algorithms such that the seismic contribution of the wind turbines only come from blade pass and structural resonances. This is very much a best-case scenario and is provided for illustrative purposes only. The authors note that the approach of removing all background noise from the algorithm is contrary to the precautionary approach used to design the worst-case EKA algorithm and that it is likely that some turbines generate noise which exists below the noise floor. Working through real world empirical assessments of this will further understanding of how close to this best-case scenario results will be.

5. Results

The following tables (Table 3 and Table 4) show the seismic levels of the site and turbine options. The tables have been colour coded to show when the calculation exceeds the current budget allocation of the site 0.0064902nm in red and where the budget is not exceeded in green.

The required seismic budget is between 0.008896nm and 0.003640nm, with the larger diameter Vestas V136 having a slightly larger budget requirement in comparison to the Nordex 133 as would be expected.

The budget range for measurements including background is between 0.007459nm and 0.005193nm. These levels are further reduced to 0.003640nm for the smallest machine using Clyde with no background included.

Turbine Option	Model	Number of Turbines	Standard EKA	Craig (nm)	Middlemuir (nm)	Clyde (nm)
Option 1	V136	12	0.008896	0.007459	0.006842	0.005306
Option 2	N133	12	0.008681	0.007262	0.006677	0.005193

Table 3 Seismic Results of 4 scenarios modelled including Background Noise

Turbine Option	Model	Number of Turbines	Standard EKA Algorithm (nm)	Standard EKA Algorithm Background Removed (nm)	Craig Background Removed (nm)	Middlemuir Background Removed (nm)	Clyde Background Removed (nm)
Option 1	V136	12	0.008896	0.008056	0.006435	0.004945	0.003731
Option 2	N133	12	0.008681	0.007851	0.006246	0.004800	0.003640

Table 4 Seismic Results of 5 scenarios modelled with Background Noise removed

6. Discussion

The mathematical approach used in this document to determine the level of Seismic budget required to build out Cloich wind farm is that of the standard EKA algorithm that the MoD currently used within the planning process and a further 7 scenarios representing scaled measurement data from a range of turbines deployed in the Eskdalemuir region.

This analysis shows that the maximum budget required is 0.008896nm. Based on data available to Xi, it is believed that the currently allocated budget for Cloich Forest Windfarm by the MoD is 0.0064902nm, and therefore the revised application exceeds this amount.

As can be seen in Table 3 a turbine with a low seismic vibration signature would be able to be constructed on the site without the need for a before and after background noise measurement. In this case it is the Scaled data from a Siemens 2.3Mw as deployed at Clyde windfarm. Table 3 also shows that a turbine with a medium or high level of Seismic vibration signature would exceed the allocated budget of the site. Vibration signature is highly dependent on both make, model and size of turbine. Using solely a low seismic vibration level turbine to build out Cloich windfarm would certainly limit the numbers of candidate machines and would necessitate a measurement of candidate turbines to provide confidence that the seismic budget would not be exceeded.

In order to optimise the site, Xi would recommend: candidate turbine and pre and post construction measurements, which will allow EDF to accurately maximise the output of this site while remaining within budget. Table 4 shows that upon removing background, all three candidate machines could be installed at site without exceeding seismic budget. Again, all turbines vary in seismic signature so care should be taken when choosing a machine. However, if a before and after measurement were conducted onsite, it is likely that most candidate machines could be built out without exceeding allocated seismic budget. It should be noted that the mathematical approach used is very much a 'best case' scenario. However, when a turbine of low seismic vibration can be installed within budget without background noise removed, it is a strong indicator that deploying a before and after measurement methodology with a turbine of appropriate seismic levels will allow the site to be built with most candidate machines.

Recent activity with both the Eskdalemuir Working Group (EWG) and independent legal actions against the MoD on their queueing system for budget allocation means that the use of the current algorithm and queuing process is currently subject to review. Xi Engineering has engaged with the Scottish Government, EWG and independent developers to further the understanding of the seismic levels produced by turbines and increase the potential development with the Eskdalemuir Consultation Zone. The timescale and output from this work is ultimately subject to decisions by the Scottish Government and the MoD, however current estimates suggest mid to late 2022. It is highly likely that some form of before and after measurement will be adopted to ensure maximum use of the entire seismic budget of 0.336nm for the 50km ring around the Eskdalemuir seismic station.

Xi Engineering work directly with developers to ensure that revised plan can meet the original budget allocated by the MoD. Fundamentally this work requires providing empirical evidence of candidate machine seismic emissions to the MoD to prove that the originally allocated budget is sufficient to build out the site.

7. Conclusion

- The proposed revised Cloich site seismic levels have been assessed for two candidate turbines and seven scenarios.
- The budget requirement ranges from 0.008896nm and 0.003640nm dependant on the specific turbine chosen.
- EDF require either deployment of a seismically quiet turbine make and model (such as the Siemens S36 for the Clyde data) OR need to be able to remove background noise through performing before and after seismic measurements at site.
- Before and after measurement of site allows for maximum utilisation of the EDF Cloich budget
- Using a before and after approach increases the potential number of candidate machines available to EDF.
- Cloich Wind farm can be built out without exceeding the 0.0064902nm MoD allocated budget when before and after measurement approach is adopted.
- Due to the ~42km distance from the Array, this would represent an extremely good use of budget if MW/nm or nm per turbine were considered.

CLOICH FOREST WIND FARM

VOLUME 3: TECHNICAL APPENDICES

TECHNICAL APPENDIX A16.1: CARBON BALANCE CALCULATIONS

JUNE 2021

Prepared By:

Arcus Consultancy Services

7th Floor
144 West George Street
Glasgow
G2 2HG

T +44 (0)141 221 9997 l **E** info@arcusconsulting.co.uk
w www.arcusconsulting.co.uk

Registered in England & Wales No. 5644976

TABLE OF CONTENTS

PAYBACK TIME AND CO_2 EMISSIONS

1. Windfarm CO2 emission saving over...	Exp.	Min.	Max.
...coal-fired electricity generation (t CO2 / yr)	125,337	124,872	125,801
...grid-mix of electricity generation (t CO2 / yr)	34,547	34,419	34,675
...fossil fuel-mix of electricity generation (t CO2 / yr)	61,306	61,079	61,533
Energy output from windfarm over lifetime (MWh)	4,087,066	4,071,928	4,102,203

Total CO2 losses due to wind farm (tCO2 eq.)	Exp.	Min.	Max.
2. Losses due to turbine life (e.g., manufacture, construction, decommissioning)	50,369	50,369	50,370
3. Losses due to backup	19,618	19,618	19,618
4. Losses due to reduced carbon fixing potential	954	252	5,772
5. Losses from soil organic matter	5,673	-5,421	15,670
6. Losses due to DOC & POC leaching	363	3	5,664
7. Losses due to felling forestry	27,966	19,418	36,516
Total losses of carbon dioxide	104,943	84,239	133,611

8. Total CO2 gains due to improvement of site (t CO2 eq.)	Exp.	Min.	Max.
8a. Change in emissions due to improvement of degraded bogs	0	0	0
8b. Change in emissions due to improvement of felled forestry	0	0	0
8c. Change in emissions due to restoration of peat from borrow pits	0	0	-1
8d. Change in emissions due to removal of drainage from foundations & hardstanding	425	221	-1,747
Total change in emissions due to improvements	425	221	-1,748

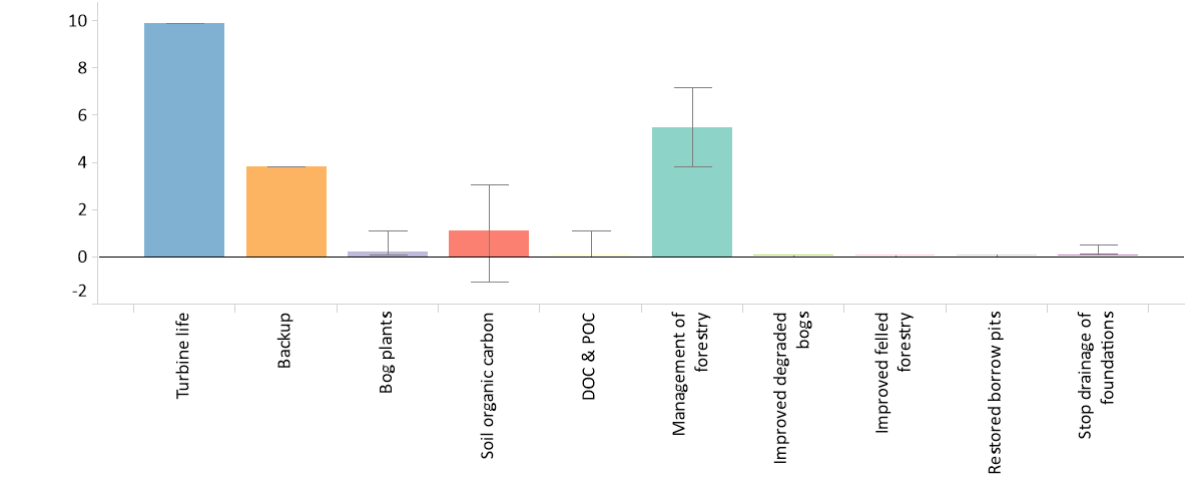
RESULTS	Exp.	Min.	Max.
Net emissions of carbon dioxide (t CO2 eq.)	105,368	82,491	133,831
Carbon Payback Time			
...coal-fired electricity generation (years)	0.8	0.7	1.1
...grid-mix of electricity generation (years)	3.1	2.4	3.9
...fossil fuel-mix of electricity generation (years)	1.7	1.3	2.2
Ratio of soil carbon loss to gain by restoration (not used in Scottish applications)	No gains!	-3.1	No gains!
Ratio of CO2 eq. emissions to power generation (g/kWh) (for info. only)	25.78	20.11	32.87

PAYBACK TIME CHARTS

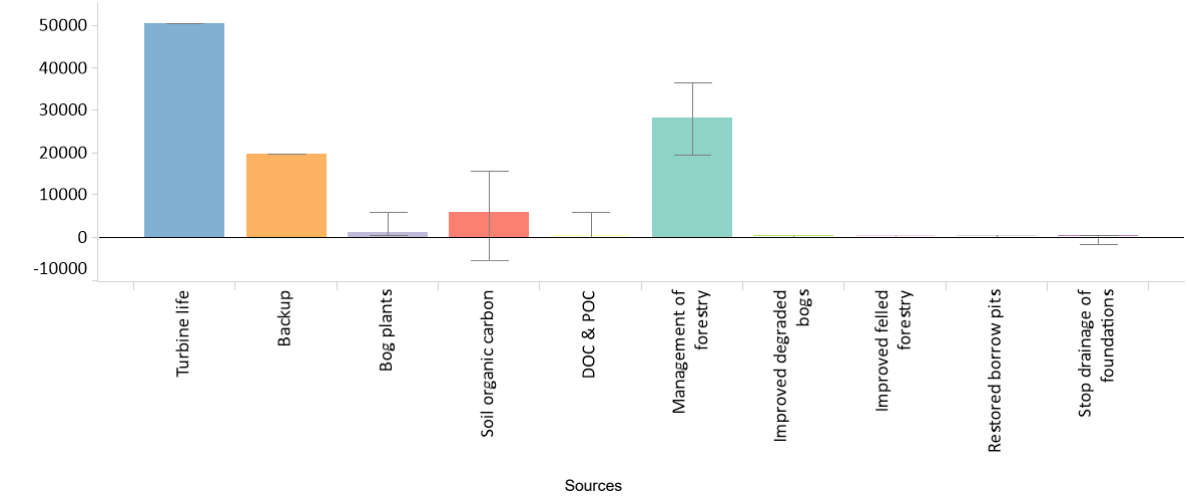
Payback Time - Charts

Payback Time
Payback Time - ChartsInput Data

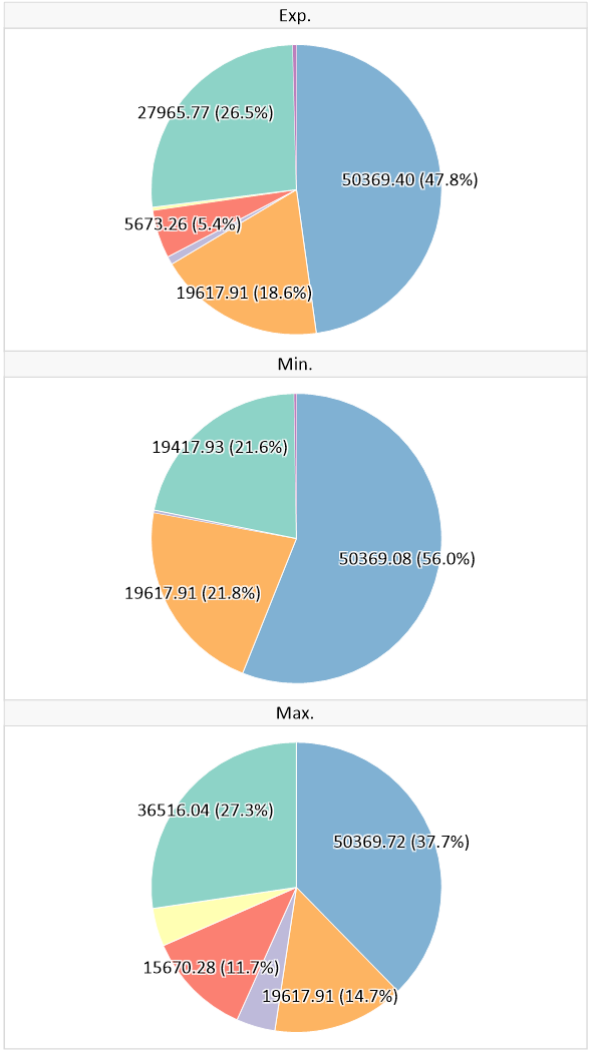
Carbon payback time (months) using fossil-fuel mix as conterfactual



Greenhouse gas emissions (t CO2 eq.)



Proportions of greenhouse gas emissions from different sources



INPUT DATA

Carbon Calculator v1.6.1
Cloich Forest Wind Farm Location: 55.71783 -3.264701
EDF Renewables

Core input data

Input data	Expected value	Minimum value	Maximum value	Source of data
Windfarm characteristics				
Dimensions				
No. of turbines	12	12	12	EIA Report Chapter 3 - Project Description
Duration of consent (years)	30	30	30	EIA Report Chapter 3 - Project Description
Performance				
Power rating of 1 turbine (MW)	4.8	4.8	4.8	EIA Report Candidate Turbine = up to 4.8 MW
Capacity factor	27	26.9	27.1	DUKES 5 year average load factor.
Backup				
Fraction of output to backup (%)	2.88	2.88	2.88	Calculating Potential Carbon Losses & Savings from Wind Farms on Scottish peatlands, technical note, Version 2.10.0, Para 19.
Additional emissions due to reduced thermal efficiency of the reserve generation (%)	10	10	10	Fixed
Total CO2 emission from turbine life (tCO2 MW^{-1}) (eg. manufacture, construction, decommissioning)	Calculate wrt installed capacity	Calculate wrt installed capacity	Calculate wrt installed capacity	
Characteristics of peatland before windfarm development				
Type of peatland	Acid bog	Acid bog	Acid bog	Professional judgement following surveys.
Average annual air temperature at site (°C)	8.15	4.8	11.5	Met Office Climate Averages of nearby Observing Station (Galasheils) https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/gcvurvzxs
Average depth of peat at site (m)	0.26	0.25	0.27	EIA Report - Chapter 9 Geology, Soils & Peat
C Content of dry peat (% by weight)	53.23	19.57	53.24	Scottish Government guidance - Guidance on Developments on Peatland - Site surveys
Average extent of drainage around drainage features at site (m)	10	5	50	Not measured in field directly. Have used guidance values:https://informatics.sepa.org.uk/CarbonCalculator/assets/Carbon_calculator_User_Guidance.pdf
Average water table depth at site (m)	0.1	0.05	0.3	Not measured in field directly. Have used guidance values:https://informatics.sepa.org.uk/CarbonCalculator/assets/Carbon_calculator_User_Guidance.pdf
Dry soil bulk density (g cm^{-3})	0.132	0.072	0.293	Scottish Government guidance - Guidance on Developments on Peatland - Site surveys
Characteristics of bog plants				
Time required for regeneration of bog plants after restoration (years)	5	2	10	Technical estimation - not expected to deviate from standard regeneration timescales
Carbon accumulation due to C fixation by bog plants in undrained peats (tC ha^{-1} yr^{-1})	0.25	0.12	0.31	NatureScot Guidance - Carbon Payback Calculator: Guidelines on Measurements
Forestry Plantation Characteristics				
Area of forestry plantation to be felled (ha)	70.62	70.61	70.63	Chapter 13: Forestry of this EIA

Input data	Expected value	Minimum value	Maximum value	Source of data
Average rate of carbon sequestration in timber (tC ha^{-1} yr^{-1})	3.6	2.5	4.7	Scottish Government and NatureScot Guidance
Counterfactual emission factors				
Coal-fired plant emission factor (t CO2 MWh^{-1})	0.92	0.92	0.92	
Grid-mix emission factor (t CO2 MWh^{-1})	0.25358	0.25358	0.25358	
Fossil fuel-mix emission factor (t CO2 MWh^{-1})	0.45	0.45	0.45	
Borrow pits				
Number of borrow pits	2	2	2	EIA Report - Chapter 3 Project Description
Average length of pits (m)	140	110	170	TA3.1 Borrow Pit Assessment
Average width of pits (m)	92.5	65	120	TA3.1 Borrow Pit Assessment
Average depth of peat removed from pit (m)	0.26	0.26	0.26	EIA Report - Chapter 9 Geology, Soils & Peat
Foundations and hard-standing area associated with each turbine				
Average length of turbine foundations (m)	24	24	24	EIA Report - Chapter 3 Project Description
Average width of turbine foundations (m)	24	24	24	EIA Report - Chapter 3 Project Description
Average depth of peat removed from turbine foundations(m)	0.2	0.2	0.2	EIA Report - Chapter 9 Geology, Soils & Peat
Average length of hard-standing (m)	50	50	50	EIA Report - Chapter 3 Project Description
Average width of hard-standing (m)	25	25	25	EIA Report - Chapter 3 Project Description
Average depth of peat removed from hard-standing (m)	0.26	0.26	0.26	EIA Report - Chapter 9 Geology, Soils & Peat
Volume of concrete used in construction of the ENTIRE windfarm				
Volume of concrete (m^3)	6840	6839	6841	EIA Report - Chapter 3 Project Description
Access tracks				
Total length of access track (m)	15800	15798	15802	EIA Report - Chapter 3 Project Description
Existing track length (m)	7600	7600	7600	EIA Report - Chapter 3 Project Description
Length of access track that is floating road (m)	0	0	0	N/A to the Development
Floating road width (m)	5	5	5	N/A to the Development
Floating road depth (m)	0	0	0	N/A to the Development
Length of floating road that is drained (m)	0	0	0	N/A to the Development
Average depth of drains associated with floating roads (m)	0	0	0	N/A to the Development

Input data	Expected value	Minimum value	Maximum value	Source of data
Length of access track that is excavated road (m)	4500	4499	4501	EIA Report - Chapter 3 Project Description
Excavated road width (m)	5	5	5	EIA Report - Chapter 3 Project Description
Average depth of peat excavated for road (m)	0.26	0.26	0.26	EIA Report - Chapter 9 Geology, Soils & Peat
Length of access track that is rock filled road (m)	3700	3699	3701	EIA Report - Chapter 3 Project Description
Rock filled road width (m)	5	5	5	EIA Report - Chapter 3 Project Description
Rock filled road depth (m)	0.65	0.64	0.67	EIA Report - Chapter 3 Project Description
Length of rock filled road that is drained (m)	3700	3699	3701	EIA Report - Chapter 3 Project Description
Average depth of drains associated with rock filled roads (m)	0.5	0.4	0.6	EIA Report - Chapter 3 Project Description
Cable trenches				
Length of any cable trench on peat that does not follow access tracks and is lined with a permeable medium (eg. sand) (m)	0	0	0	EIA Report - Chapter 3 Project Description
Average depth of peat cut for cable trenches (m)	0.26	0.26	0.26	EIA Report - Chapter 9 Geology, Soils & Peat
Additional peat excavated (not already accounted for above)				
Volume of additional peat excavated (m^3)	0	0	0	N/A for this Development
Area of additional peat excavated (m^2)	0	0	0	N/A for this Development
Peat Landslide Hazard				
Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments	negligible	negligible	negligible	Fixed
Improvement of C sequestration at site by blocking drains, restoration of habitat etc				
Improvement of degraded bog				
Area of degraded bog to be improved (ha)	0	0	0	None proposed at this stage; however, to be refined post-completion of any Habitat Management Plan.
Water table depth in degraded bog before improvement (m)	0.5	0.49	0.51	Technical estimation
Water table depth in degraded bog after improvement (m)	0	0	0	N/A to the Development

Input data	Expected value	Minimum value	Maximum value	Source of data
Time required for hydrology and habitat of bog to return to its previous state on improvement (years)	5	4.9	5.1	Technical estimation
Period of time when effectiveness of the improvement in degraded bog can be guaranteed (years)	5	4.9	5.1	Technical estimation
Improvement of felled plantation land				
Area of felled plantation to be improved (ha)	0	0	0	None proposed at this stage; however, to be refined post-completion of any Habitat Management Plan.
Water table depth in felled area before improvement (m)	0.5	0.49	0.51	Technical estimation
Water table depth in felled area after improvement (m)	0	0	0	N/A for the Development
Time required for hydrology and habitat of felled plantation to return to its previous state on improvement (years)	5	4.9	5.1	Technical estimation
Period of time when effectiveness of the improvement in felled plantation can be guaranteed (years)	5	4.9	5.1	Technical estimation
Restoration of peat removed from borrow pits				
Area of borrow pits to be restored (ha)	2.25	2.249	2.251	Borrow Pit Assessment TA3.1
Depth of water table in borrow pit before restoration with respect to the restored surface (m)	0.1	0.05	0.3	Technical estimation
Depth of water table in borrow pit after restoration with respect to the restored surface (m)	0	0	0	N/A for the Development
Time required for hydrology and habitat of borrow pit to return to its previous state on restoration (years)	5	4.9	5.1	Technical estimation

Input data	Expected value	Minimum value	Maximum value	Source of data
Period of time when effectiveness of the restoration of peat removed from borrow pits can be guaranteed (years)	5	4.9	5.1	Technical estimation
Early removal of drainage from foundations and hardstanding				
Water table depth around foundations and hardstanding before restoration (m)	0.1	0.09	0.3	Technical estimation
Water table depth around foundations and hardstanding after restoration (m)	0	0	0	N/A for the Development
Time to completion of backfilling, removal of any surface drains, and full restoration of the hydrology (years)	5	5	5	Technical estimation
Restoration of site after decomissioning				
Will the hydrology of the site be restored on decommissioning?	Yes	Yes	Yes	
Will you attempt to block any gullies that have formed due to the windfarm?	Yes	Yes	Yes	Details on gullies will be further refined during restoration.
Will you attempt to block all artificial ditches and facilitate rewetting?	Yes	Yes	Yes	Details on artificial ditches and rewetting will be further refined during restoration.
Will the habitat of the site be restored on decommissioning?	Yes	Yes	Yes	
Will you control grazing on degraded areas?	n/a	n/a	n/a	N/A to the Development.
Will you manage areas to favour reintroduction of species	n/a	n/a	n/a	N/A to the Development.
Methodology				
Choice of methodology for calculating emission factors	Site specific (required for planning applications)			

Forestry input data

N/A

Construction input data

N/A

1 WINDFARM CO_2 EMISSION SAVING

Capacity Factor - Direct Input	Exp.	Min.	Max.
Capacity factor (%)	27	26.9	27.1

Emissions due to turbine life	Exp.	Min.	Max.
Annual energy output from windfarm (MW/yr)			
RESULTS			
Emissions saving over coal-fired electricity generation (tCO2/yr)	125,337	124,872	125,801
Emissions saving over grid-mix of electricity generation (tCO2/yr)	34,547	34,419	34,675
Emissions saving over fossil fuel - mix of electricity generation (tCO2/yr)	61,306	61,079	61,533

2 CO_2 LOSS DUE TO TURBINE LIFE

Calculation of emissions with relation to installed capacity	**Exp.**	**Min.**	**Max.**
Emissions due to turbine from energy output (t CO2)	4017	4017	4017
Emissions due to cement used in construction (t CO2)	2161	2161	2162

REUSLTS	**Exp.**	**Min.**	**Max.**
Losses due to turbine life (manufacture, construction, etc.) (t CO2)	50369	50369	50370
Additional CO2 payback time of windfarm due to turbine life			
...coal-fired electricity generation (months)	5	5	5
...grid-mix of electricity generation (months)	17	18	17
...fossil fuel - mix of electricity generation (months)	10	10	10

3 CO_2 LOSS DUE TO BACKUP

Emissions due to backup power generation	**Exp.**	**Min.**	**Max.**
Reserve energy (MWh/yr)	14,532	14,532	14,532
Annual emissions due to backup from fossil fuel-mix of electricity generation (tCO2/yr)	654	654	654
RESULTS			
Total emissions due to backup from fossil fuel-mix of electricity generation (tCO2)	19,618	19,618	19,618

4 LOSS OF CO_2 FIXING POTENTIAL

Emissions due to loss of bog plants	**Exp.**	**Min.**	**Max.**
Area where carbon accumulation by bog plants is lost (ha)	29.72	17.88	126.95
Total loss of carbon accumulation up to time of restoration (tCO2 eq./ha)	32	14	45
RESULTS			
Total loss of carbon fixation by plants at the site (t CO2)	954	252	5772
Additional CO2 payback time of windfarm due to loss of CO2 fixing potential			
...coal-fired electricity generation (months)	0	0	1
...grid-mix of electricity generation (months)	0	0	2
...fossil fuel - mix of electricity generation (months)	0	0	1

5 LOSS OF SOIL CO_2

5. Loss of Soil CO2	Exp.	Min.	Max.
CO2 loss from removed peat (t CO2 equiv.)	5601.96	-1085.81	15670.28
CO2 loss from drained peat (t CO2 equiv.)	71.3	-4334.95	0
RESULTS			
Total CO2 loss from peat (removed + drained) (t CO2 equiv.)	5673.26	-5420.76	15670.28
Additional CO2 payback time of windfarm due to loss of soil CO2			
...coal-fired electricity generation (months)	0.54	-0.52	1.49
...grid-mix of electricity generation (months)	1.97	-1.89	5.42
...fossil fuel - mix of electricity generation (months)	1.11	-1.07	3.06

5a. Volume of peat removed	Exp.	Min.	Max.
Peat removed from borrow pits			
Area of land lost in borrow pits (m2)	25900	14300	40800
Volume of peat removed from borrow pits (m3)	6734	3718	10608
Peat removed from turbine foundations			
Area of land lost in foundation (m2)	6912	6912	6912
Volume of peat removed from foundation area (m3)	1382.4	1382.4	1382.4
Peat removed from hard-standing			
Area of land lost in hard-standing (m2)	15000	15000	15000
Volume of peat removed from hard-standing area (m3)	3900	3900	3900
Peat removed from access tracks			
Area of land lost in floating roads (m2)	0	0	0
Volume of peat removed from floating roads (m3)	0	0	0
Area of land lost in excavated roads (m2)	22500	22495	22505
Volume of peat removed from excavated roads (m3)	5850	5848.7	5851.3
Area of land lost in rock-filled roads (m2)	18500	18495	18505
Volume of peat removed from rock-filled roads (m3)	12025	11836.8	12398.35
Total area of land lost in access tracks (m2)	41000	40990	41010
Total volume of peat removed due to access tracks (m3)	17875	17685.5	18249.65
RESULTS			
Total area of land lost due to windfarm construction (m2)	88812	77202	103722
Total volume of peat removed due to windfarm construction (m3)	29891.4	26685.9	34140.05

5b. CO2 loss from removed peat	Exp.	Min.	Max.
CO2 loss from removed peat (t CO2)	7701.09	1378.73	19527.43
CO2 loss from undrained peat left in situ (t CO2)	2099.13	2464.54	3857.16
RESULTS			
CO2 loss attributable to peat removal only (t CO2)	5601.96	-1085.81	15670.28

5c. Volume of peat drained	Exp.	Min.	Max.
Total area affected by drainage around borrow pits (m2)	10100	3700	78000
Total volume affected by drainage around borrow pits (m3)	1313	481	10140
Peat affected by drainage around turbine foundation and hardstanding			
Total area affected by drainage of foundation and hardstanding area (m2)	34320	15960	267600
Total volume affected by drainage of foundation and hardstanding area (m3)	4461.6	2074.8	34788
Peat affected by drainage of access tracks			
Total area affected by drainage of access track(m2)	164000	81980	820200
Total volume affected by drainage of access track(m3)	30200	13246.7	169543
Peat affected by drainage of cable trenches			
Total area affected by drainage of cable trenches(m2)	0	0	0
Total volume affected by drainage of cable trenches(m3)	0	0	0
Drainage around additional peat excavated			
Total area affected by drainage (m2)	0	0	0
Total volume affected by drainage (m3)	0	0	0
RESULTS			
Total area affected by drainage due to windfarm (m2)	208420	101640	1165800
Total volume affected by drainage due to windfarm (m3)	35974.6	15802.5	214471

5d. CO2 loss from drained peat	Exp.	Min.	Max.
Calculations of C Loss from Drained Land if Site is NOT Restored after Decommissioning			
Total GHG emissions from Drained Land (t CO2 equiv.)	9268.34	816.44	122673.18
Total GHG emissions from Undrained Land (t CO2 equiv.)	9136.11	816.44	136302.27
Calculations of C Loss from Drained Land if Site IS Restored after Decommissioning			
Losses if Land is Drained			
CH4 emissions from drained land (t CO2 equiv.)	1152.35	-73.75	7945.42
CO2 emissions from drained land (t CO2)	3845.08	3318.43	31072.79
Total GHG emissions from Drained Land (t CO2 equiv.)	4997.43	3244.69	39018.21
Losses if Land is Undrained			
CH4 emissions from undrained land (t CO2 equiv.)	2092.11	-73.75	23157.91
CO2 emissions from undrained land (t CO2)	2834.02	3318.43	20195.25
Total GHG emissions from Undrained Land (t CO2 equiv.)	4926.13	3244.69	43353.16
RESULTS			
Total GHG emissions due to drainage (t CO2 equiv.)	71.3	-4334.95	0

5e. Emission rates from soils	**Exp.**	**Min.**	**Max.**
Calculations following IPCC default methodology			
Flooded period (days/year)	178	178	178
Annual rate of methane emission (t CH4-C/ha year)	0.04	0.04	0.04
Annual rate of carbon dioxide emission (t CO2/ha year)	35.2	35.2	35.2
Calculations following ECOSSE based methodology			
Total area affected by drainage due to wind farm construction (ha)	20.84	10.16	116.58
Average water table depth of drained land (m)	0.17	0.3	0.18
Selected emission characteristics following site specific methodology			
Rate of carbon dioxide emission in drained soil (t CO2/ha year)	5.27	10.2	6.66
Rate of carbon dioxide emission in undrained soil (t CO2/ha year)	2.43	10.2	1.88
Rate of methane emission in drained soil (t CH4-C/ha year)	0.05	-0.01	0.06
Rate of methane emission in undrained soil (t CH4-C/ha year)	0.14	-0.01	0.27
RESULTS			
Selected rate of carbon dioxide emission in drained soil (t CO2/ha year)	5.27	10.2	6.66
Selected rate of carbon dioxide emission in undrained soil (t CO2/ha year)	2.43	10.2	1.88
Selected rate of methane emission in drained soil (t CH4-C/ha year)	0.05	-0.01	0.06
Selected rate of methane emission in undrained soil (t CH4-C/ha year)	0.14	-0.01	0.27

6 CO_2 LOSS BY DOC AND POC LOSS

Emissions due to loss of DOC and POC	Exp.	Min.	Max.
Gross CO2 loss from restored drained land (t CO2)	1011.05	0	10877.5
Gross CH4 loss from restored drained land (t CO2 equiv.)	0	0	0
Gross CO2 loss from improved land (t CO2)	0	0	0
Gross CH4 loss from improved land (t CO2 equiv.)	631.43	286.58	5045.08
Total gaseous loss of C (t C)	291.16	7.01	3089.69
Total C loss as DOC (t C)	75.7	0.49	1235.88
Total C loss as POC (t C)	23.29	0.28	308.97
RESULTS			
Total CO2 loss due to DOC leaching (t CO2)	277.57	1.8	4531.59
Total CO2 loss due to POC leaching (t CO2)	85.41	1.03	1132.9
Total CO2 loss due to DOC & POC leaching (t CO2)	362.98	2.83	5664.48
Additional CO2 payback time of windfarm due to DOC & POC			
...coal-fired electricity generation (months)	0	0	1
...grid-mix of electricity generation (months)	0	0	2
...fossil fuel - mix of electricity generation (months)	0	0	1

7 FORESTRY CO_2 LOSS

Emissions due to forest felling	**Exp.**	**Min.**	**Max.**
Area of forestry plantation to be felled (ha)	70.62	70.61	70.63
Carbon sequestered (t C ha-1 yr-1)	3.6	2.5	4.7
Lifetime of windfarm (years)	30	30	30
Carbon sequestered over the lifetime of the windfarm (t C ha-1)	108	75	141
RESULTS			
Total carbon loss due to felling of forestry (t CO2)	27965.8	19417.9	36516
Additional CO2 payback time of windfarm due to management of forestry			
...coal-fired electricity generation (months)	2.68	1.87	3.48
...grid-mix of electricity generation (months)	9.71	6.77	12.64
...fossil fuel - mix of electricity generation (months)	5.47	3.81	7.12

8 CO_2 GAIN – SITE IMPROVEMENT

Degraded Bog	**Exp.**	**Min.**	**Max.**
1. Description of site			
Area to be improved (ha)	0	0	0
Depth of peat above water table before improvement (m)	0.26	0.25	0.27
Depth of peat above water table after improvement (m)	0	0	0
2. Losses with improvement			
Improved period (years)	0	0.2	0
Selected annual rate of methane emissions (t CH4-C ha-1 yr-1)	0.492	0.48	0.504
CH4 emissions from improved land (t CO2 equiv.)	0	0	0
Selected annual rate of carbon dioxide emissions (t CO2 ha-1 yr-1)	0.043	-0.848	0.934
CO2 emissions from improved land (t CO2 equiv.)	0	0	0
Total GHG emissions from improved land (t CO2 eqiv.)	0	0	0
3. Losses without improvement			
Improved period (years)	0	0.2	0
Selected annual rate of methane emissions (t CH4-C ha-1 yr-1)	0.012	0.003	0.022
CH4 emissions from improved land (t CO2 equiv.)	0	0	0
Selected annual rate of carbon dioxide emissions (t CO2 ha-1 yr-1)	9.274	7.919	10.626
CO2 emissions from unimproved land (t CO2 equiv.)	0	0	0
Total GHG emissions from unimproved land (t CO2 eqiv.)	0	0	0
RESULTS			
4. Reduction in GHG emissions due to improvement of site			
Reduction in GHG emissions due to improvement (t CO2 equiv.)	0	0	0

Felled Forestry	**Exp.**	**Min.**	**Max.**
1. Description of site			
Area to be improved (ha)	0	0	0
Depth of peat above water table before improvement (m)	0.26	0.25	0.27
Depth of peat above water table after improvement (m)	0	0	0
2. Losses with improvement			
Improved period (years)	0	0.2	0
Selected annual rate of methane emissions (t CH4-C ha-1 yr-1)	0.492	0.48	0.504
CH4 emissions from improved land (t CO2 equiv.)	0	0	0
Selected annual rate of carbon dioxide emissions (t CO2 ha-1 yr-1)	0.043	-0.848	0.934
CO2 emissions from improved land (t CO2 equiv.)	0	0	0
Total GHG emissions from improved land (t CO2 eqiv.)	0	0	0
3. Losses without improvement			

Improved period (years)	0	0.2	0
Selected annual rate of methane emissions (t CH4-C ha-1 yr-1)	0.012	0.003	0.022
CH4 emissions from improved land (t CO2 equiv.)	0	0	0
Selected annual rate of carbon dioxide emissions (t CO2 ha-1 yr-1)	9.274	7.919	10.626
CO2 emissions from unimproved land (t CO2 equiv.)	0	0	0
Total GHG emissions from unimproved land (t CO2 eqiv.)	0	0	0
RESULTS			
4. Reduction in GHG emissions due to improvement of site			
Reduction in GHG emissions due to improvement (t CO2 equiv.)	0	0	0

Borrow Pits	**Exp.**	**Min.**	**Max.**
1. Description of site			
Area to be improved (ha)	2.25	2.249	2.251
Depth of peat above water table before improvement (m)	0.1	0.05	0.26
Depth of peat above water table after improvement (m)	0	0	0
2. Losses with improvement			
Improved period (years)	0	0.2	0
Selected annual rate of methane emissions (t CH4-C ha-1 yr-1)	0.492	0.48	0.504
CH4 emissions from improved land (t CO2 equiv.)	0	0	3.393
Selected annual rate of carbon dioxide emissions (t CO2 ha-1 yr-1)	0.043	-0.848	0.934
CO2 emissions from improved land (t CO2 equiv.)	0	0	0.215
Total GHG emissions from improved land (t CO2 eqiv.)	0	0	3.608
3. Losses without improvement			
Improved period (years)	0	0.2	0
Selected annual rate of methane emissions (t CH4-C ha-1 yr-1)	0.138	0.25	0.024
CH4 emissions from improved land (t CO2 equiv.)	0	0	0
Selected annual rate of carbon dioxide emissions (t CO2 ha-1 yr-1)	2.429	0.098	10.165
CO2 emissions from unimproved land (t CO2 equiv.)	0	0	4.576
Total GHG emissions from unimproved land (t CO2 eqiv.)	0	0	4.576
RESULTS			
4. Reduction in GHG emissions due to improvement of site			
Reduction in GHG emissions due to improvement (t CO2 equiv.)	0	0	0.968

Foundations and Hardstandings	**Exp.**	**Min.**	**Max.**
1. Description of site			
Area to be improved (ha)	3.432	1.596	26.76
Depth of peat above water table before improvement (m)	0.1	0.09	0.27
Depth of peat above water table after improvement (m)	0	0	0
2. Losses with improvement			
Improved period (years)	25	25	25
Selected annual rate of methane emissions (t CH4-C ha-1 yr-1)	0.492	0.48	0.504
CH4 emissions from improved land (t CO2 equiv.)	631.433	286.584	5041.69
Selected annual rate of carbon dioxide emissions (t CO2 ha-1 yr-1)	0.043	-0.848	0.934
CO2 emissions from improved land (t CO2 equiv.)	1.88	-17.34	320.059
Total GHG emissions from improved land (t CO2 eqiv.)	633.313	269.243	5361.75
3. Losses without improvement			
Improved period (years)	25	25	25
Selected annual rate of methane emissions (t CH4-C ha-1 yr-1)	0.138	0.145	0.022
CH4 emissions from improved land (t CO2 equiv.)	0	0	0
Selected annual rate of carbon dioxide emissions (t CO2 ha-1 yr-1)	2.429	1.211	10.626
CO2 emissions from unimproved land (t CO2 equiv.)	208.404	48.336	7108.92
Total GHG emissions from unimproved land (t CO2 eqiv.)	208.404	48.336	7108.92
RESULTS			
4. Reduction in GHG emissions due to improvement of site			
Reduction in GHG emissions due to improvement (t CO2 equiv.)	-424.91	-220.908	1747.17