

Bat Survey Report

APPENDIX 9.2

GLENVERNOCH WIND FARM

Wildlife Consulting



Bat Survey Report

Version No	Author	Checker	Verifier	Date issued
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1 INTRODUCTION

- 1.1.1 Cairn Ecology Ltd was appointed on behalf of Wildlife Consulting to undertake ground-level static surveys for bats at the Site, located at Glenvernoch near Newton Stewart, Dumfries and Galloway (central Ordnance Survey Grid Reference: NX 350 737), hereafter referred to as 'the Site'.
- 1.1.2 The Site has a sloping topography, sloping downwards from north to south. The Site consists of a range of habitats, with areas of well grazed dry grassland to the north, raised bog to the south and areas of dense bracken, heathland with immature plantation woodland and seasonally wet grassland throughout the Site. In addition there are several small burns throughout the Site. These are valuable habitats for foraging and commuting bats and the forestry bordering the Site to the west and south may provide potential roosting opportunities.
- 1.1.3 The aim of these surveys is to determine how the Site is utilised by bats and identify any constraints to and impacts of the proposed development.
- 1.1.4 This report describes the methods used to gather and record data for the Site and provides details of the results.

2 LEGISLATION AND PLANNING POLICY

2.1 Legislation

2.1.1 All bat species within the UK are fully protected by law. Within Scotland, bats are primarily protected under the conservation (Natural Habitat &c) Regulations 1994 (as amended) which transposes the Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora (The Habitats Directive) into domestic law. Together with the Wildlife and Countryside Act 1981 (as amended) and the Nature Conservation (Scotland) Act 2004, it is an offence to intentionally and/or recklessly:

- Deliberately capture, injure or kill a wild bat;
- Harass a wild bat or group of wild bats;
- Disturb a wild bat in a roost (any structure or place it uses for shelter or protection);
- Disturb a wild bat while it is rearing or otherwise caring for its young (this would be a 'maternity' roost);
- obstruct access to a bat roost or to otherwise deny the animal use of the roost
- disturb such a wild bat in a manner that is, or in circumstances which are, likely to significantly affect the local distribution or abundance of that species;
- to disturb a wild bat in a manner that is, or in circumstances which are, likely to impair its ability to survive, breed or reproduce, or rear or otherwise care for its young; and,
- possess, control, transport, exchange or sell a bat or parts of a bat, alive or dead

3 METHODS

3.1 Ground-level Static Surveys

- 3.1.1 Static detectors were placed throughout the Site at ground level to record bat activity.
- 3.1.2 In line with NatureScot's (2021) guidance, 11 static detectors were deployed, with one detector for each of the first 10 turbine locations and a further detector as a thirds of the remaining number of turbines (3) (Figure1). The location of the detectors was designed to coincide with a draft design of the wind farm.
- 3.1.3 Song Meter Minis (SM minis) were used to record the data, set to record 30 minutes before sunset and 30 minutes after sunrise. On the third iteration of surveys for the autumn survey period AudioMoth (v1.2.) were also used due to technical faults in two of the SM minis.
- 3.1.4 The detectors were attached to 1m wooden stakes which were placed into the ground at each turbine location. The detectors recorded for 12 consecutive nights, which is compliant with the minimum requirement of 10 nights.
- 3.1.5 Table 1 provides details of the survey dates.

Table 1. Survey Dates

Season	Date deployed	Date retrieved	Nights of survey	Statics Detectors
Spring	17.05.2023	29.05.2023	12	11
Summer	13.07.2023	25.07.2023.	12	11
Autumn	18.10.2023	30.10.23	12	11

- 3.1.6 Table 2 details Static detector locations and statics used for the spring survey period.

Table 2. Static detector location locations and statics (spring)

Turbine	Static
1	SM3
2	SM1
3	SM9
4	SM5
5	MC3-01
6	MC3-02
7	SM7
8	SM2
9	SM8
10	SM10

11	SM4
----	-----

3.1.7 Table 3 details static detector locations and statics used for the summer survey period.

Table 3. Static detector locations and statics (summer).

Turbine	Static
1	SM5
2	SM6
3	SM4
4	SM7
5	SM3
6	SM8
7	SM9
8	SM2
9	SM IKM1
10	SM1
11	SM10

3.1.8 Table 4 details static detector locations and statics used for the autumn survey period.

Table 4. Static detector locations and statics (autumn)

Turbine	Static
1	SM1
2	SM8
3	SM3
4	SM6
5	AM2
6	SM2
7	SM7
8	SM4
9	SM9
10	AM3
11	SM5

3.2 Data Analysis

- 3.2.1 Following collection of the data, it was analysed in office by a Suitably Qualified Ecologists using Wildlife Acoustics Kaleidoscope v.5.4.9. software package.
- 3.2.2 It should be noted that every effort was made to identify bats to species level. However, with sound recordings it may only be possible to identify to the level of genus, especially for bats within the genus *Myotis* and the species brown long-eared bat (*Plecotus auritus*), due to the similar nature of the echolocation sonograms. It may also be difficult to distinguish between common pipistrelle (*Pipistrellus pipistrellus*) and soprano pipistrelle (*Pipistrellus pygmaeus*) locating around 50kHz; in this instance they are classed as unidentified pipistrelle species ('Upip').
- 3.2.3 The primary aim of these surveys is to identify the level of bat activity throughout the Site, specifically at each turbine location, therefore, if it is not possible to identify to genus level, this is not considered a limitation.
- 3.2.4 It was not possible to utilise the online tool 'Ecobat' (Mammal Society, 2017) as this tool remains offline for maintenance at the time of writing preventing the production of a Ecobats report; NatureScot was aware of this. As such, it is not possible to compare the Site with other and as such it is not possible to quantify comparative the activity level of the Site. An intra site comparison of relative bat activity at turbine location has therefore been presented in the absence of the inter site comparison.

3.3 Limitations

- 3.3.1 The autumn survey period was undertaken in October which experienced periods of adverse weather conditions such as heavy rain and strong winds. This likely resulted in the detector failures. Bats are also unlikely to be active during such weather conditions. Autumn surveys should be completed by the end of October (NatureScot, 2021); statics were collected on 30 October 2023 and, therefore, the survey could not be repeated.
- 3.3.2 The final design of the project has resulted in the static detector deployment locations no longer corresponding exactly to the now proposed turbine locations. It is considered that the sample location of the static detectors remains representative of the turbine locations and habitats on the Site.

4 RESULTS

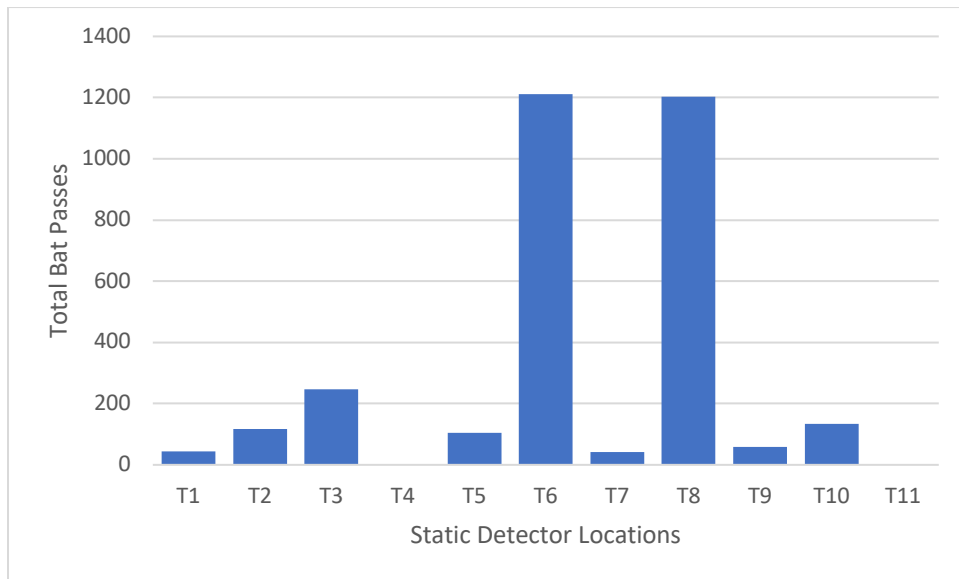
4.1 Total bat passes and relative abundance

4.1.1 Statics were deployed at each of the eleven turbine locations in the three seasons in line with best practice guidance. Table 5, details the dates of deployment and table 6 provides details of total number of bat passes recorded at each detector location.

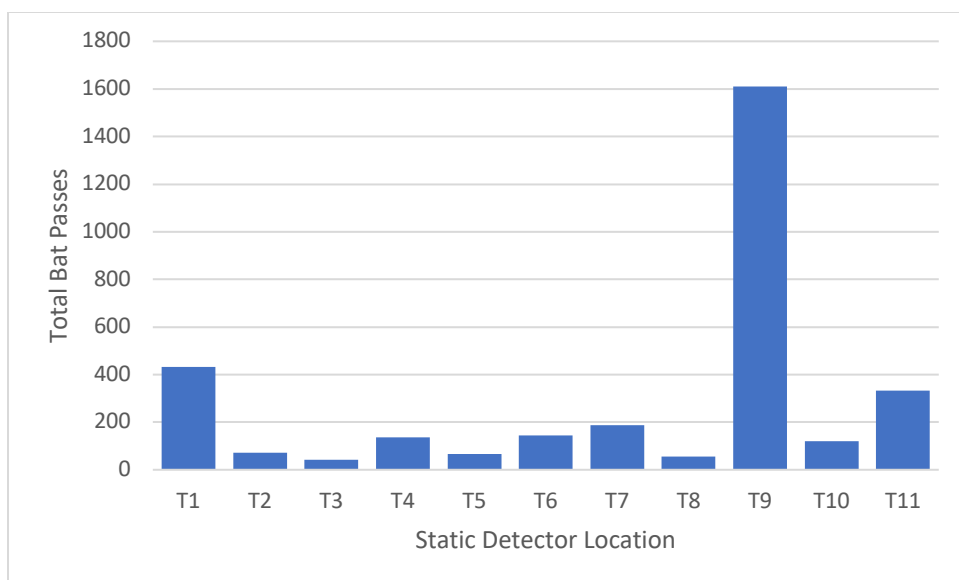
Table 5. Turbine locations, statics and total number of bat passes in spring.

Static detector	Spring Total Bat Passes	Summer Total bat passes	Autumn Total bat passes
1	44	431	56
2	118	71	29
3	247	41	29
4	-	135	-
5	104	67	-
6	1212	144	3
7	41	187	42
8	1202	55	1
9	59	1610	20
10	134	120	-
11	-	332	-

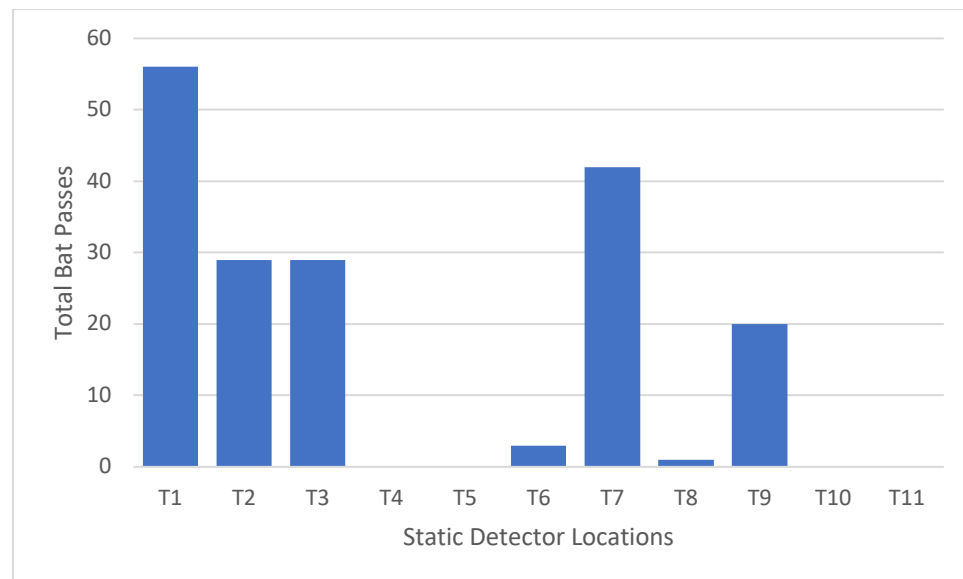
4.1.2 The graphs below shows the distribution of bat passes recorded at each turbine in each of the three survey seasons.



Graph 1. Total bat passes per static detector (spring).



Graph 2. Total bat passes per static detector location (summer).



Graph 3. Total bat passes per static detector location (autumn).

4.2 Total bat passes per bat species.

4.2.1 All sound files were analysed using Wildlife Acoustics Kaleidoscope v.5.4.9. software package. This identified three genera within the Site (*Myotis sp.*, *Nyctalus sp.*, and *Pipistrellus sp.*) and of these nine species of bats were present.

- Common pipistrelle (*Pipistrellus pipistrellus*);
- Soprano pipistrelle (*Pipistrellus pygmaeus*);
- Brown long eared bat (*Plecotus auritus*);
- Daubenton's bat (*Myotis daubentonii*);
- Natterer's bat (*Myotis nattereri*);
- Whiskered bat (*Myotis mystacinus*);
- Noctule (*Nyctalus noctula*); and
- Leisler's bat (*Nyctalus leisleri*).

- 4.2.2 Of the species recorded the highest number of bat passes was that of soprano pipistrelle (n=3029) followed by common pipistrelle (n=1326).
- 4.2.3 The turbine location with the most bat passes recorded was Static Location No.9 (n=1686), followed by Static location No.6 (n=1359) and Static location No.8 (n=1299). The least frequented location was static location No.4 (n=135).
- 4.2.4 The season with the most number of bat passes was summer (n=3193). The season with the most number of bat passes was summer (n=3193).
- 4.2.5 The Appendix A below detail the number of passes per species at each location in each of the seasons of survey.

4.3 Site level risk.

- 4.3.1 The site level risk is determined by project size and habitat risk. The proposed development consists of 13 turbines and therefore falls in the category of a 'medium' sized project (NatureScot, et al., 2021). The Site has low potential for bats, with no potential roost features being located within the site and open exposed surrounding habitat. The site has therefore been categorised as low risk in accordance with the best practice guidelines (NatureScot, et al., 2021). Using the matrix from the best practice guidelines, the medium project size combined with the low-risk habitat results in an overall Site risk level of Low (2) (Table 6).

Table 6. Initial site risk assessment (reproduced from NatureScot, et al, 2021).

Site risk level (1-5)	Project size	Project size	Project size	Project size
Habitat risk	=	Small	Medium	Large
Habitat risk	Low	1	2	3
Habitat risk	Moderate	2	3	4
Habitat risk	High	3	4	5

Key: 1-2 = low site risk, 3 = medium site risk, 4-5 = high site risk.

4.4 Collision risk, population relative abundance and potential vulnerability

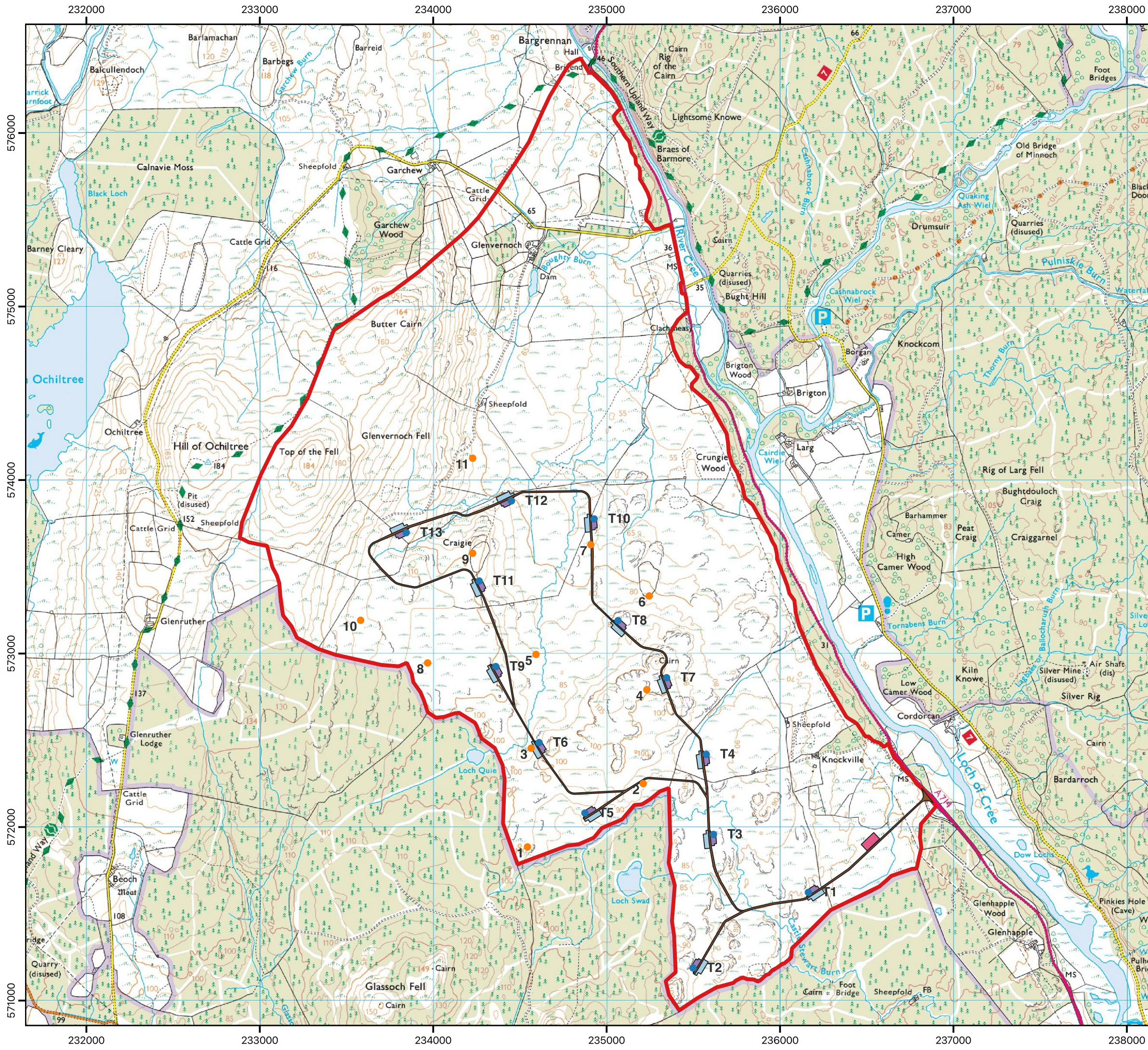
- 4.4.1 The collision risk, relative abundance and potential vulnerability for each bat species recorded on Site (Table 7) is detailed below. These have been estimated using matrix within the best practice guidance (NatureScot, et al, 2021).

Table 7. collision risk, population abundance and potential vulnerability for each species recorded.

Bat Species	Relative abundance	Collision Risk	Potential Vulnerability
Common pipistrelle (Pipistrellus pipistrellus)	Common	High	Medium

Soprano pipistrelle (<i>Pipistrellus pygmaeus</i>);	Common	High	Medium
Brown long eared bat (<i>Plecotus auritus</i>)	Rarer	Low	Low
Daubenton's bat (<i>Myotis daubentonii</i>)	Rarer	Low	Low
Natterer's bat (<i>Myotis nattereri</i>)	Rarer	Low	Low
Whiskered bat (<i>Myotis mystacinus</i>)	Rarest	Low	Low
Noctule (<i>Nyctalus noctula</i>)	Rarest	High	High
Leisler's bat (<i>Nyctalus leisleri</i>).	Rarest	High	High

5 FIGURES



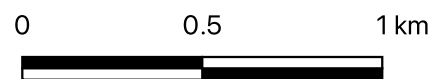
Glenvernoch Wind Farm

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Figure 1: Static Detector Locations

Key:

- Static Detector Location
- WTG Locations
- Access Tracks
- Component Storage Area
- Construction Compound
- Planning Application Area



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6 REFERENCES

1. NatureScot (Scottish Natural Heritage), Natural England, Natural Resources Wales, RenewableUK, Scottish Power Renewables, Ecotricity Ltd, The University of Exeter & Bat Conservation Trust (BCT)(2021). Bats and onshore wind turbines-survey, assessment, and mitigation [online] Available at:<
<https://www.nature.scot/doc/bats-and-onshore-wind-turbines-survey-assessment-and-mitigation#Contents>>.
2. Mammal Society (2017). Ecobat. Available at: <http://www.ecobat.org.uk>

APPENDIX A

DATA TABLES

Table 1. Spring static detector locations, statics, species and number of passes per species.

Detector	Species	Number of passes
1	Spip	19
	Cpip	11
	BLE	1
	Daubenton's	5
	Leisler's	5
	Noctule	3
2	Spip	41
	Cpip	59
	Daubenton's	7
	Leisler's	5
	Noctule	6
3	Spip	54
	Cpip	39
	Daubenton's	10
	Leisler's	16
	Noctule	128
5	Spip	55
	Cpip	29
	Daubenton's	3
	Leisler's	7
	Noctule	10
6	Spip	147
	Cpip	1032
	Daubenton's	17
	Leisler's	7
	Natterer's	3
	Noctule	6
7	Spip	18
	Cpip	16
	Noctule	6
	Whiskered	1
8	Spip	57

	Cpip	1119
	BLE	1
	Daubenton's	8
	Leisler's	11
	Noctule	6
9	Spip	21
	Cpip	35
	BLE	1
	Daubenton's	1
	Noctule	1
10	Spip	74
	Cpip	30
	BLE	3
	Daubenton's	14
	Leisler's	6
	Natterer's	1
	Noctule	4
	Nyctalus sp.	2

Table 2. Summer static detector locations, species and number of passes per species.

Detector	Species	Number of passes
1	Spip	332
	Cpip	47
	Upip	15
	BLE	1
	BLE/Myotis sp.	7
	Myotis sp.	5
	Noctule	3
	Nyctalus sp.	21
2	Spip	42
	Cpip	4
	Upip	3
	Nyctalus sp.	22
3	Spip	16
	Cpip	14
	Upip	2
	Myotis sp.	2
	Nyctalus sp.	7
4	Spip	33
	Cpip	44
	Upip	5
	Myotis sp.	3
	Nyctalus sp.	50
5	Spip	21
	Cpip	17
	Upip	5
	BLE/Myotis sp.	1
	Myotis sp.	2
	Nycalus sp.	21
6	Spip	58
	Cpip	35
	Upip	1
	BLE	2
	BLE/Myotis sp.	2
	Myotis sp.	2
	Nyctalus sp.	44
7	Spip	58

	Cpip	82
	Upip	1
	BLE/Myotis sp.	3
	Leisler's	2
	Myotis sp.	3
	Nyctalus sp.	38
8	Spip	15
	Cpip	16
	Upip	5
	BLE	1
	BLE/Myotis sp.	2
	Myotis sp.	3
	Nyctalus sp.	13
9	Spip	225
	Cpip	1272
	Upip	36
	BLE	2
	BLE/Myotis sp.	7
	Myotis sp.	33
	Nyctalus sp.	35
10	Spip	70
	Cpip	25
	Upip	5
	BLE/Myotis sp.	1
	Myotis sp.	1
	Nyctalus sp.	18
11	Spip	60
	Cpip	111
	Upip	7
	BLE/Myotis sp.	2
	Leisler's	6
	Myotis sp.	3
	Nyctalus sp.	143

Table 3. Autumn static detector positions, statics, species and number of passes per species.

Detector	Species	Number of passes
1	Spip	25
	Cpip	5
	Daubenton's	5
	Noctule	21
2	Spip	12
	Cpip	4
	Daubenton's	7
	Leisler's	5
	Noctule	1
3	Spip	10
	Cpip	6
	BLE	2
	Daubenton's	5
	Leisler's	5
	Natterer's	1
6	Spip	1
	Daubenton's	2
7	Spip	8
	Cpip	6
	Daubenton's	20
	Leisler's	6
	Noctule	2
8	Spip	1
9	Spip	
	Cpip	3
	Daubenton's	13
	Noctule	1



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Watercourse Crossing Assessment - Fisheries

Glenvernoch Wind Farm

October 2024

EnergieKontor



Client	EnergieKontor
Project Name	Glenvernoch Wind Farm
Project Number	23450
Report Type	Fisheries Habitat Assessment
Version	V2

	Name	Position	Date
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Amended	James Streets	Director	October 2024

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1. Introduction

- 1.1 OS Ecology Ltd were commissioned by EnergieKontor in 2024 to undertake a Fisheries habitat Assessment of proposed watercourse crossings at the proposed Glenvernoch Wind Farm site.

Site Location

- 1.2 The site is located to the north of Newton Stewart, Dumfries and Galloway at an approximate central grid reference of NX349739. The site location is illustrated within figure 1 in the appendices.

Site Description

- 1.3 The site comprises an area of rough, grazed pasture used for grazing sheep in the main.

Objectives of the Study

- 1.4 The objectives of this report are:
- To present the results of a desktop assessment in relation to aquatic ecology
 - To detail the results of a fish habitat survey assessment
 - To provide an impact assessment of the potential development
 - To detail mitigation and compensation measures to minimise impacts.

Development Proposals

- 1.5 The development will comprise the construction of a windfarm which will require the construction of a number of crossings across watercourses present on site.

2. Methodology

Scope of Study

- 2.1 The site was surveyed to identify whether the following were present for legislative and planning purposes specifically in relation to fisheries.
- 2.2 A summary of relevant planning policy is provided within Appendix 2.
- 2.3 The ecological characteristics of the watercourses site were reviewed to identify the scope of the assessment, with the zone of influence determined through professional judgement.
- 2.4 The survey area comprised the “site” defined within figure 2 (Appendix 4). The desktop study included a data search covering the site and a 2km buffer zone while habitats within the local area were reviewed via aerial imagery.

Planning Policy

- 2.5 Planning policy relevant to this site, specifically the National Planning Framework 4 and the Dumfries and Galloway Local Development Plan, can be found within Appendix 2.

Legislation

- 2.6 The legislation specific to fish includes:
 - Salmon and Freshwater Fisheries Act (Consolidation) (Scotland) Act 2003
 - Water Environment (Controlled Activities) (Scotland) Regulations 2011

Desk Study

- 2.7 Desk study was undertaken to assess the nature of the surrounding habitats and included:
 - Assessment of aerial imagery and Ordnance Survey mapping.
 - A search of the SiteLink website¹ for statutorily designated sites for nature conservation, related to fisheries within 2km of the survey area.

¹ SiteLink - Map Search (nature.scot)

Field Survey

Fisheries Habitat

- 2.8 The site was subject to a walk over, during which the watercourses were assessed based on their habitats. In addition, a drone was used in order to assess up and downstream habitats from each watercourse reviewing features which may prevent migration.
- 2.9 Survey was undertaken by Gemma Cone ACIEEM and James Streets CEcol MCIEEM, both experienced surveyors who hold protected species licences for a range of species.
- 2.10 The following equipment was utilised during survey:
- DJI Drone
 - GPS
 - Android Tablet
- 2.11 The surveys were undertaken on the 15th August and 4th September 2024 in the following weather conditions:

Table 2.1: Survey Conditions				
Date	Temperature	Cloud Cover	Precipitation	Wind Conditions
15 th August 2024	13°C	100%	Light rain	F1
4 th September 2024	14°C	100%	None to light rain	F1-2

Limitations to Survey

- 2.12 There were considered to be no major constraints to survey.

Assessment Methodology

- 2.13 Guidance from the Chartered Institute of Ecology and Environmental Management (CIEEM) is utilised to provide habitat valuations.
- 2.14 The level of value of specific ecological receptors is assigned using a geographic frame of reference. For, example international value being most important (SACs, SPAs and pSPAs), then national (SSSIs), regional, county (LWS), district (LNR), local and lastly, within the immediate zone of influence of the site only (low).
- 2.15 Examples of ecological receptors at various levels of value are provided within the Appendices.

3. Results

Desk Study

General Land Use

- 3.1 A review of aerial imagery and Ordnance Survey mapping highlighted that the general land use in the surrounding area is dominated by sheep grazed pasture and moorland.

Designated Sites

- 3.2 A search of the SiteLink² indicated that there are no fish-related designated sites for nature conservation lie within 2km of the site.
- 3.3 The downstream extent of the River Cree Estuary is designated for the presence of smelt as well as bird populations and botanical species.

Cree Fisheries Management Plan

- 3.4 The Cree Fisheries Management Plan confirms the presence of a range of species within the catchment including:
- Atlantic Salmon (migratory)
 - Brown Trout (non-migratory)
 - Sea Trout (migratory)
 - European Eel (migratory)
 - Three Spined Stickleback
 - Sea Lamprey (migratory)
 - Brook Lamprey (non-migratory)
 - River Lamprey (migratory)
 - Minnow
 - Stone loach
- 3.5 Based on the habitats present, they have the potential to be present on site although it is considered that due to the size of the watercourse the presence of migratory species in some of the smaller burns on site is unlikely.

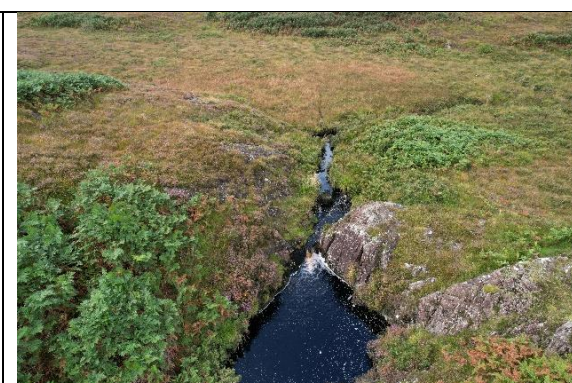
² SiteLink.nature.scot (Accessed October 2024)

Field Survey

Watercourse Crossing Points

Crossing Point 1	
Approximate Width	<1m
Approximate Depth	<0.1m
Substrate	Earth
Flow regime	Smooth/ not perceptible
Siltation	Silt present throughout
Compaction	N/A
Instream vegetation	Yes, rushes and grasses throughout
Surrounding land use	Rushy pasture used for grazing
Upstream Connectivity	Poor – this is a small watercourse considered unsuitable for significant fish migration
Downstream connectivity	Poor – the small scale of the watercourse and the limited depth and flow restricts movement into the crossing point location
	
	
Fisheries assessment Due to the small nature and likely ephemeral flow within this watercourse, its value to migratory fish is considered to be low.	

Crossing Point 2 – Castle Stewart Burn	
Approximate Width	1.5m
Approximate Depth	<0.2m
Substrate	Cobble dominated 80% with smaller area of pebble 15% and gravel 5%
Flow regime	Broken and unbroken waves with rippled flow types
Siltation	Limited siltation due to high flows
Compaction	No
Instream vegetation	No
Surrounding land use	Rushy pasture used for grazing as well as areas of bracken.
Upstream Connectivity	Upstream of the water crossing point the connectivity to other areas of suitable habitat for salmonids is present with areas of pools and runs present in these areas.
Downstream connectivity	The watercourse is a tributary of the River Cree, and downstream of the site, between the main river and the crossing point, the watercourse passes over a weir. The course of the burn passes under the A714 and then into the Castle Stewart Loch where it then passes through forestry before entering the wider site. As such connectivity is relatively good due to the size of the site and there is potential for the Loch to support a resident population of trout.



Fisheries assessment

The watercourse is likely to provide habitat suitable for use by trout and suitable mitigation and compensation measures should be put in place for the crossing in this location.

Crossing Point 3 – Tributary of the Castle Stewart Burn	
Approximate Width	0.5m
Approximate Depth	<0.1m
Substrate	Cobble dominated 75% with smaller area of pebble 20% and gravel 5%
Flow regime	Smooth
Siltation	Some siltation
Compaction	No
Surrounding land use	Rushy pasture used for grazing as well as areas of bracken.
Instream vegetation	No
Upstream Connectivity	This is a tributary of the Castle Stewart Burn and is small in size with flow being regulated by an upstream loch, Loch Swad. The watercourse appear to have been modified with a straight path in places.
Downstream connectivity	As with crossing point 2, the watercourse is a tributary of the River Cree, and downstream of the site, between the main river and the crossing point, the watercourse passes over a weir. The course of the burn passes under the A714 and then into the Castle Stewart Loch where it then passes through forestry before entering the wider site. As such, connectivity is relatively good due to the size of the site and there is potential for the Loch to support a resident population of trout.



Fisheries assessment

The watercourse is likely to provide linkages between the Castle Stewart Burn and the upstream Loch Swad, which may provide habitats for resident trout however given its small size is it not considered important in a local context other than for connectivity.

Crossing Point 4 – Castle Stewart Burn	
Approximate Width	<0.3m
Approximate Depth	<0.2m
Substrate	Peat dominated with occasional areas of cobble and pebble
Flow regime	Smooth
Siltation	Some siltation
Compaction	No
Surrounding land use	Rushy pasture used for grazing as well as areas of bracken.
Instream vegetation	No
Upstream Connectivity	This is within an upstream reach of the Castle Stewart Burn and is small in size with flow being compounded by the topography. It is located within an incised channel in peat.
Downstream connectivity	As with crossing point 2, the watercourse is a tributary of the River Cree, and downstream of the site, between the main river and the crossing point, the watercourse passes over a weir. The course of the burn passes under the A714 and then into the Castle Stewart Loch where it then passes through forestry before entering the wider site. As such connectivity is relatively good due to the size of the site and there is potential for the Loch to support a resident population of trout.
 	
 	
Fisheries assessment The watercourse is likely to provide linkages between the Castle Stewart Burn and the upstream areas of the watercourse which may provide habitats for resident trout.	

Crossing Point 5 – Unnamed Tributary of the River Cree	
Approximate Width	<0.5m
Approximate Depth	<0.2m
Substrate	Cobble and pebble dominated with sections of peat
Flow regime	Smooth, rippled, unbroken and broken standing waves
Siltation	Some siltation
Compaction	No
Surrounding land use	Rushy pasture used for grazing as well as areas of bracken.
Instream vegetation	No, although some small areas of rush which has been inundated
Upstream Connectivity	This is within an upstream reach of an unnamed Burn which is a tributary of the River Cree. It is small in size and appears to have a natural route through the landscape. Upstream there is the small Loch Quie which may provide habitat for fish.
Downstream connectivity	Between the main river and the crossing point, the watercourse passes over a weir. The course of the burn passes under the A714 under an open bridge which is unlikely to restrict access for migratory fish. As such, connectivity is relatively good due to the size of the site and the potential for the Loch to support a resident population of trout.



Fisheries assessment

The watercourse is likely to provide linkages between the upstream loch as well as the River Cree and is likely to provide habitats for trout.

Crossing Point 6 – Unnamed Tributary of the River Cree	
Approximate Width	<0.2m
Approximate Depth	<0.1m
Substrate	Peat and earth dominated
Flow regime	Not visible across much of the reach, with vegetated covering the watercourse, but considered to comprise shallow rippled and smooth flow types.
Siltation	Some siltation
Compaction	No
Surrounding land use	Rushy pasture used for grazing as well as areas of bracken and occasional scrub.
Instream vegetation	No, but significant levels of overhanging vegetation.
Upstream Connectivity	Due to the small size of the watercourse and limited catchment, the value of this watercourse to upstream fish movement is considered to be limited.
Downstream connectivity	Due to the small size of the watercourse and limited catchment, the value of this watercourse to fish movement is considered to be limited however fish could reach this area if the watercourse was in spate.
  Downstream section where the water was visible	
Fisheries assessment The watercourse is likely to provide only very limited linkages for fish within the local area, being at the head of the catchment.	

Crossing Point 7 – Unnamed Tributary of the River Cree	
Approximate Width	<0.3m
Approximate Depth	<0.2m
Substrate	Peat and earth dominated
Flow regime	Rippled dominated with unbroken standing waves and smooth flow recorded.
Siltation	Limited siltation
Compaction	No
Surrounding land use	Rushy pasture used for grazing as well as areas of bracken and occasional scrub.
Instream vegetation	No
Upstream Connectivity	Due to the small size of the watercourse and limited catchment, the value of this watercourse to upstream fish movement is considered to be limited.
Downstream connectivity	Due to the small size of the watercourse and limited catchment, the value of this watercourse to fish movement is considered to be limited however fish could reach this area if the watercourse was in spate.
	
Fisheries assessment The watercourse is likely to provide only very limited linkages for fish within the local area, being at the head of the catchment.	

Crossing Point 8 – Unnamed Tributary of the River Cree	
Approximate Width	<0.5m
Approximate Depth	<0.2m
Substrate	Cobble and pebble dominated (90% with some small area of gravel)
Flow regime	Rippled dominated areas of smooth flow recorded.
Siltation	Limited siltation
Compaction	No
Surrounding land use	Rushy pasture used for grazing as well as areas of bracken and occasional scrub.
Instream vegetation	No
Upstream Connectivity	Due to the small size of the watercourse and limited catchment, the value of this watercourse to upstream fish movement is considered to be limited with only 600m of the watercourse present upstream.
Downstream connectivity	Due to the small size of the watercourse and limited catchment, the value of this watercourse to fish movement is considered to be limited however fish could reach this area if the watercourse was in spate.
	
Fisheries assessment The watercourse is likely to provide only very limited linkages for fish within the local area, being at the head of the catchment.	

Crossing Point 9 – Unnamed Tributary of the River Cree	
Approximate Width	<0.5m
Approximate Depth	<0.2m
Substrate	Cobble and pebble dominated (90% with some small areas of gravel)
Flow regime	Rippled dominated areas of smooth flow recorded as well as small areas of broken and unbroken standing waves.
Siltation	Limited siltation
Compaction	No
Surrounding land use	Rushy pasture and heath used for grazing as well as areas of bracken and occasional scrub
Instream vegetation	No
Upstream Connectivity	This is within an upstream reach of an unnamed Burn which is a tributary of the River Cree. It is small in size and appears to have a natural route through the landscape. It is located downstream of crossing point 5 and there are no significant barriers to movement between these locations. Upstream there is the small Loch Quie which may provide habitat for fish.
Downstream connectivity	Between the main river and the crossing point, the watercourse passes over a weir. The course of the burn passes under the A714 under an open bridge which is unlikely to restrict access for migratory fish. As such, connectivity is relatively good due to the size of the site and the potential for the Loch to support a resident population of trout.
	
Fisheries assessment The watercourse is likely to provide linkages between the upstream loch as well as the River Cree and is likely to provide habitats for trout.	

Crossing Point 10 – Unnamed Tributary of the River Cree	
Approximate Width	<0.5m
Approximate Depth	<0.2m
Substrate	Silt and peat dominated with small areas of pebbles and cobbles <10%
Flow regime	Smooth or not non perceptible flow
Siltation	Areas of the watercourse have a limited flow speed and as such
Compaction	No
Surrounding land use	Rushy pasture used for grazing as well as areas of bracken and occasional scrub.
Instream vegetation	No
Upstream Connectivity	The crossing point is near to the upstream extent of the watercourse with the source of the watercourse being an area of wet grassland of limited value to fisheries with shallow depth.
Downstream connectivity	Between the main river and the crossing point, the watercourse passes under the A714 through a culvert which is likely to restrict access for migratory fish. As such connectivity is relatively poor to moderate due to the size of the watercourse and connectivity issues.
	
Fisheries assessment The watercourse is likely to provide limited habitats for fish due to its small size and the limited habitats available.	

4. Site Assessment

Assessment of Survey Findings

- 4.1 Habitats on site are considered to be of generally low to moderate value to local fish populations, with some of the larger watercourses providing potential habitats for salmonid and other fish species whereas there are also a number of smaller burns likely to provide only limited opportunities.
- 4.2 There are a small number of watercourses linked to crossing points which are within the survey area which have the potential to support salmonids these are referenced as watercourses 2, 3, 4, 5 and 9. They could support breeding habitat for resident and migratory fish in small numbers based on the habitats present and connectivity. They are not considered to provide habitats which are considered important in anything more than a local context, based on the extent of habitat within these areas and upstream, and with large numbers of similar, and larger watercourses present within the catchment and the wider district that are likely to be more important to the sustenance of the populations.
- 4.3 Other fish species present are likely to be limited to small numbers of three spined stickleback, stone loach, bullhead and minnow.

5. Impacts

- 5.1 The following impacts are based on the survey work to date and the understanding that the Client wishes to construct a windfarm on site, including the creation of access tracks which will involve the crossing of a number of watercourses. These watercourses are to be crossed by access routes to be constructed over these features with culverts likely to be used.
- 5.2 As a result of the assessment completed and the nature of the proposed works, the likely impacts, without appropriate avoidance measures, mitigation and/or compensation scheme, are:
- Causing severance of watercourses for both migratory and resident fish species moving into and out of breeding and foraging areas;
 - Causing harm to fish during works;
 - Causing pollution to downstream habitats as a result of the works, including increased siltation of habitats.

6. Recommendations

Avoidance Measures

6.1 The following measures should be incorporated into the design of the scheme to avoid impacts on fisheries on site:

- Where possible the crossing points will be located in areas of lower value for fisheries such as existing crossing points, areas where livestock cross the watercourse or other modified features, to minimise impacts.

Mitigation Strategy

6.2 The following is recommended:

- The diameters of any culverts or pipes used should be as large as feasible in order to maintain flow and depth of water as much as possible, and to allow light into the channel. Where possible bridging rather than culverting should be used.
- Culverts should be over deepened into the channel to ensure that flow persists at depth through the channel and to allow natural substrate to be deposited within the channel over time.
- All works on site should take place to a Construction Environmental Management Plan (CEMP) in order to minimise the risk of causing harm or damage to fisheries and their environment. The CEMP should include:
 - Methods to ensure that no silt is released during works or operation including the use of silt mats;
 - Ensuring that all equipment to be used is checked, clean and dry prior to entry to the site and prior to leaving the site in order to ensure that there is no introduction of invasive species or disease to the catchment;
 - All pollutants to be stored appropriately and at least 10m from any watercourse with appropriate bunds in place.
 - If substantial replacement works are required for watercourse 8 on site, then no works will take place until a fish rescue has taken place in order to ensure that no fish are harmed during works.
 - Works on site to the watercourses on site will only take place following a fish rescue.
 - Works on watercourses 2-5 and 9 will only take place between June and October in order to minimise the risk of disturbance to redds unless a suitable survey has confirmed the absence of salmonids from the watercourse.

Compensation Scheme

6.3 The following is recommended:

- Where possible, enhancements of the watercourses on site will take place in order to provide additional habitats for these species including the planting of native trees along the watercourses where possible in small clusters, as well as the enhancement of the culvert.

Monitoring

- 6.4 It is recommended that post development a survey is completed up and downstream of the crossing points to ensure that the above measures have been successful.

Appendix 1 – Policy

Planning Policy

National Planning Framework 4 (NPF4)³

The revised National Planning Framework sets out the Scottish government's planning policies for England and how these are expected to be applied. It provides a framework within which locally prepared plans for housing and other development can be produced. The key policies from the relating to the natural environment are detailed below.

Ecologically Relevant Paragraphs of the NPF 4	
Policy	Detail
3	a) Development proposals will contribute to the enhancement of biodiversity, including where relevant, restoring degraded habitats and building and strengthening nature networks and the connections between them. Proposals should also integrate nature-based solutions, where possible. b) Development proposals for national or major development, or for development that requires an Environmental Impact Assessment will only be supported where it can be demonstrated that the proposal will conserve, restore and enhance biodiversity, including nature networks so they are in a demonstrably better state than without intervention. This will include future management. To inform this, best practice assessment methods should be used. Proposals within these categories will demonstrate how they have met all of the following criteria: i. the proposal is based on an understanding of the existing characteristics of the site and its local, regional and national ecological context prior to development, including the presence of any irreplaceable habitats; ii. wherever feasible, nature-based solutions have been integrated and made best use of; iii. an assessment of potential negative effects which should be fully mitigated in line with the mitigation hierarchy prior to identifying enhancements; iv. significant biodiversity enhancements are provided, in addition to any proposed mitigation. This should include nature networks, linking to and strengthening habitat connectivity within and beyond the development, secured within a reasonable timescale and with reasonable certainty. Management arrangements for their long-term retention and monitoring should be included, wherever appropriate; and v. local community benefits of the biodiversity and/or nature networks have been considered. c) Proposals for local development will include appropriate measures to conserve, restore and enhance biodiversity, in accordance with national and local guidance. Measures should be proportionate to the nature and scale of development. Applications for individual householder development, or which fall within scope of (b) above, are excluded from this requirement. d) Any potential adverse impacts, including cumulative impacts, of development proposals on biodiversity, nature networks and the natural environment will be minimised through careful planning and design. This will take into account the need to reverse biodiversity loss, safeguard the ecosystem services that the natural environment provides, and build resilience by enhancing nature networks and maximising the potential for restoration.

³ National Planning Framework December 2023

https://assets.publishing.service.gov.uk/media/65829e99fc07f3000d8d4529/NPPF_December_2023.pdf

Ecologically Relevant Paragraphs of the NPF 4	
Policy	Detail
4	a) Development proposals which by virtue of type, location or scale will have an unacceptable impact on the natural environment, will not be supported. b) Development proposals that are likely to have a significant effect on an existing or proposed European site (Special Area of Conservation or Special Protection Areas) and are not directly connected with or necessary to their conservation management are required to be subject to an “appropriate assessment” of the implications for the conservation objectives. c) Development proposals that will affect a National Park, National Scenic Area, Site of Special Scientific Interest or a National Nature Reserve will only be supported where: - The objectives of designation and the overall integrity of the areas will not be compromised; or - Any significant adverse effects on the qualities for which the area has been designated are clearly outweighed by social, environmental or economic benefits of national importance. All Ramsar sites are also European sites and/or Sites of Special Scientific Interest and are extended protection under the relevant statutory regimes. d) Development proposals that affect a site designated as a local nature conservation site or landscape area in the LDP will only be supported where: - Development will not have significant adverse effects on the integrity of the area or the qualities for which it has been identified; or - Any significant adverse effects on the integrity of the area are clearly outweighed by social, environmental or economic benefits of at least local importance. e) The precautionary principle will be applied in accordance with relevant legislation and Scottish Government guidance. f) Development proposals that are likely to have an adverse effect on species protected by legislation will only be supported where the proposal meets the relevant statutory tests. If there is reasonable evidence to suggest that a protected species is present on a site or may be affected by a proposed development, steps must be taken to establish its presence. The level of protection required by legislation must be factored into the planning and design of development, and potential impacts must be fully considered prior to the determination of any application. g) Development proposals in areas identified as wild land in the Nature Scot Wild Land Areas map will only be supported where the proposal: - will support meeting renewable energy targets; or, - is for small scale development directly linked to a rural business or croft, or is required to support a fragile community in a rural area. All such proposals must be accompanied by a wild land impact assessment which sets out how design, siting, or other mitigation measures have been and will be used to minimise significant impacts on the qualities of the wild land, as well as any management and monitoring arrangements where appropriate. Buffer zones around wild land will not be applied, and effects of development outwith wild land areas will not be a significant consideration.

Local Planning Policy

The following table details the ecologically relevant policies of the local plan relevant to this site.

Relevant Paragraphs from the Dumfries and Galloway Local Development Plan	
Policy NE4 Sites of International Importance for Biodiversity	Development proposals likely to have a significant effect on an existing or proposed Special Protection Area (SPA), existing or candidate Special Area of Conservation (SAC) or Ramsar Site, including developments outwith the site, will require an appropriate assessment and will only be permitted where: • the development does not adversely affect the integrity of the site; or • there are no alternative solutions; there are imperative reasons of overriding public interest, including those of a social or economic nature; and compensatory measures have been identified and agreed to ensure that the overall coherence of the Natura network is protected.
Policy NE5: Species of International Importance	Development proposals that would be likely to have an adverse effect on a European Protected Species will not be permitted unless it can be shown that: • there is no satisfactory alternative; and • the development is required for preserving public health or public safety or for other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment; and • the development would not be detrimental to the maintenance of the population of the species at a favourable conservation status in its natural range
Policy NE6: Sites of National Importance for Biodiversity and Geodiversity	Development that affects Sites of Special Scientific Interest, not designated as International Sites, and other national nature conservation designations will only be permitted where: • it will not adversely affect the integrity of the area or the qualities for which it has been designated, or • any such adverse effects are clearly outweighed by social, environmental or economic benefits of national importance.
Policy NE11: Supporting the Water Environment	The Council will not permit development which would result in deterioration in the status of a waterbody or which would likely impede the improvements in waterbody status as set out in the Solway Tweed River Basin Management Plan (2015) or any update or adopted review of it, unless there are exceptional justifying circumstances. This includes minor watercourses draining into the waterbodies identified in the Solway Tweed plan. Development proposals should not normally include the culverting of any waterbody. If culverting would be the only way to enable a proposed development, then permission could be granted if the Council is satisfied that there would be acceptable mitigation measures to protect habitats, passage of fauna, and river form and flow. Other physical alterations and changes to waterbodies should, if possible, and in general be avoided. An exception to this is where re-naturalisation or natural flood management is proposed. Thus, existing culverted or canalised watercourses or barriers to fish movement in redevelopment and land rehabilitation schemes should be restored when this is practical, neutral or positive in respect of flood risk elsewhere, and consistent with the relevant Regulations. Development proposals which could adversely affect Drinking Water Protection Areas identified by the Scottish Government will be subject to consultation with SEPA. Where the likely adverse effect cannot be avoided or mitigated against, the development will not be permitted

Appendix 2 - Receptor Valuation

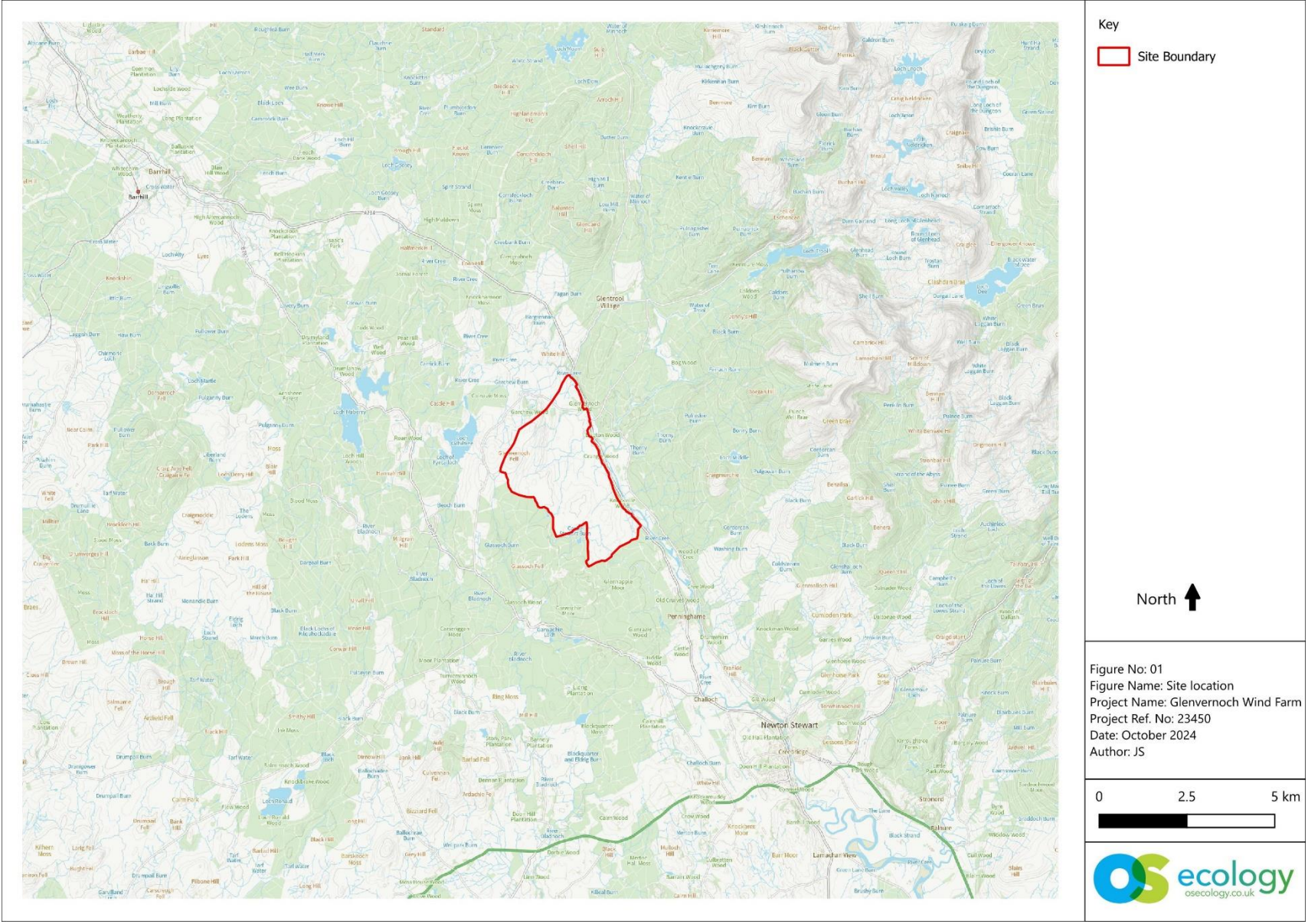
The importance of ecological features is considered within a defined geographic context, examples of which are provided within the table below. The valuation of features is a complex process and, in many cases, requires the application of expert judgement. Valuation considers a range of factors including statutory designations, national biodiversity lists, biodiversity action plan lists and lists of declining, rare or legally protected species. Other factors to be considered include the 'naturalness' of habitats, the functional importance of features and whether habitats are irreplaceable.

Examples of Importance of Ecological Features (Geographic Context)⁴			
Importance	Designated Site	Habitat	Species
International and European	Special Protection Area/Proposed Special Protection Area	A significant area of a Priority Habitat listed on Annex 1 of the Habitats Directive or a smaller area of such habitat that is thought to be functionally linked to a significant area of such habitat	An area that is functionally important to a species listed on Annexes II, IV or V of the Habitats Directive or Annex I of the Birds Directive which is present in internationally significant numbers (>1% of the biogeographic population)
	Special Area of Conservation/Proposed Special Area of Conservation		
	Ramsar Site		
National	Site of Special Scientific Interest	A significant area of a Priority Habitat listed as a habitat of principal importance under Section 41 of the Natural Environment and Rural Communities Act 2006 or a smaller area of such habitat that is thought to be functionally linked to a significant area of such habitat	An area that is functionally important to a species listed as a species of principal importance under Section 41 of the Natural Environment and Rural Communities Act 2006, which is present in nationally significant numbers (>1% of the national population)
Regional	-	An area of a Priority Habitat listed as a habitat of principal importance under Section 41 of the Natural Environment and Rural Communities Act 2006 which is not significant enough in extent to be considered of national importance but is considered to be of greater than metropolitan or county value.	An area that is functionally important to a species which is present in regionally significant numbers (>1% of the regional population)
Metropolitan area or County	Local Wildlife Site designated at a metropolitan area or county level	A significant area of a Priority Habitat listed within the relevant local Biodiversity Action Plan or a smaller area	An area that is functionally important to a species listed as a Priority Species within the relevant local Biodiversity

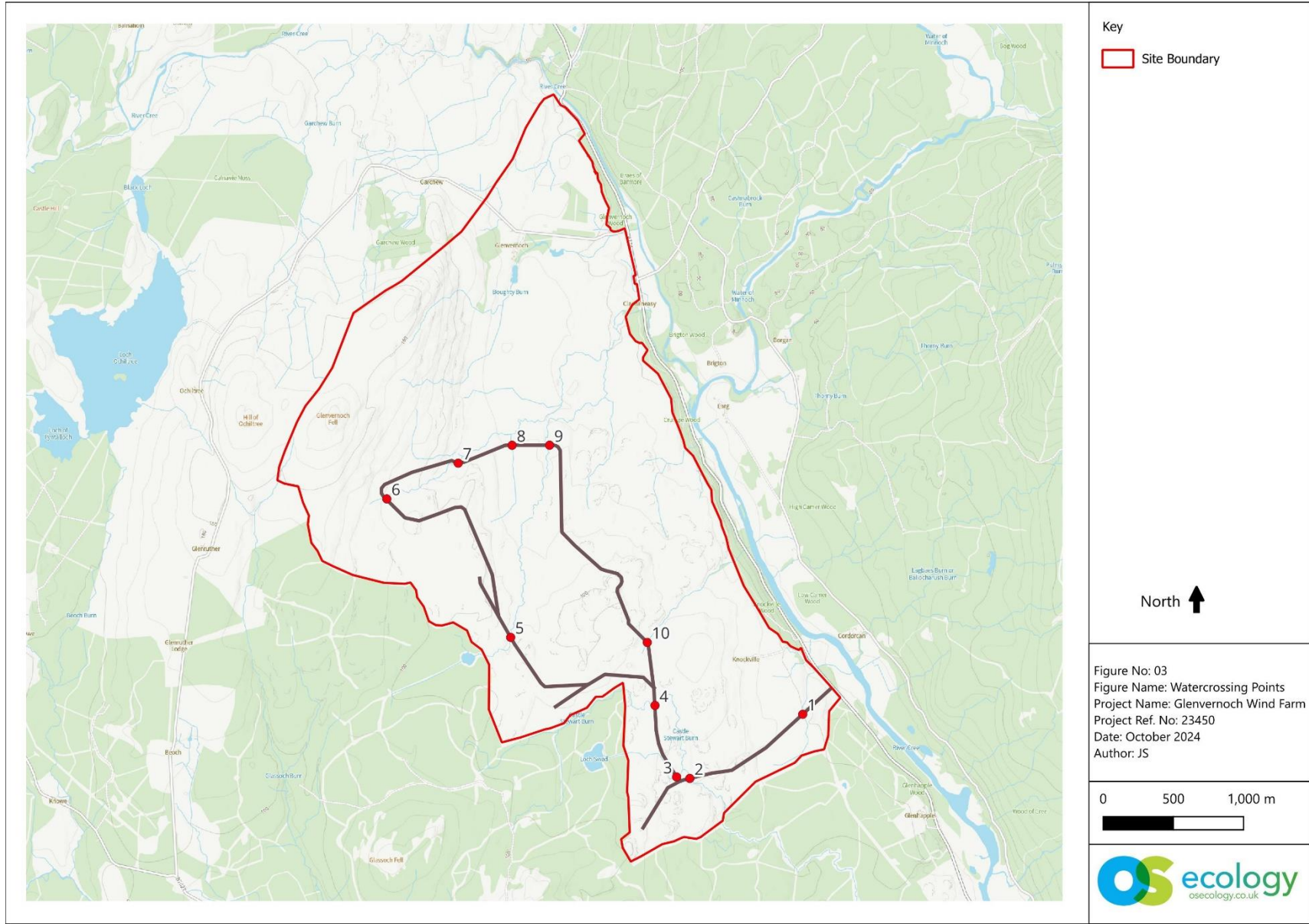
⁴ Based on information provided within Guidelines for Ecological Impact Assessment in the UK and Ireland (2018) CIEEM

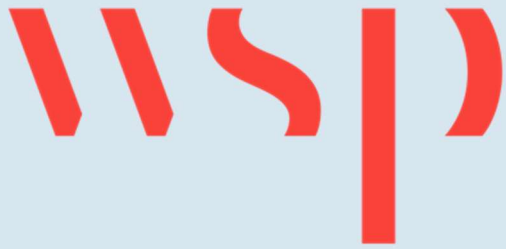
Examples of Importance of Ecological Features (Geographic Context) ⁴			
Importance	Designated Site	Habitat	Species
Local (District/ Borough of Parish)	Local Wildlife Site designated at a district or borough level	of such habitat that is thought to be functionally linked to a significant area of such habitat	Action Plan, which is present in significant numbers within the geographic context.
Low	-	Habitats that are unexceptional in a local context and do not meet the above criteria.	Species populations that are unexceptional in a local context and do not meet the above criteria.

Appendix 3 – Figures





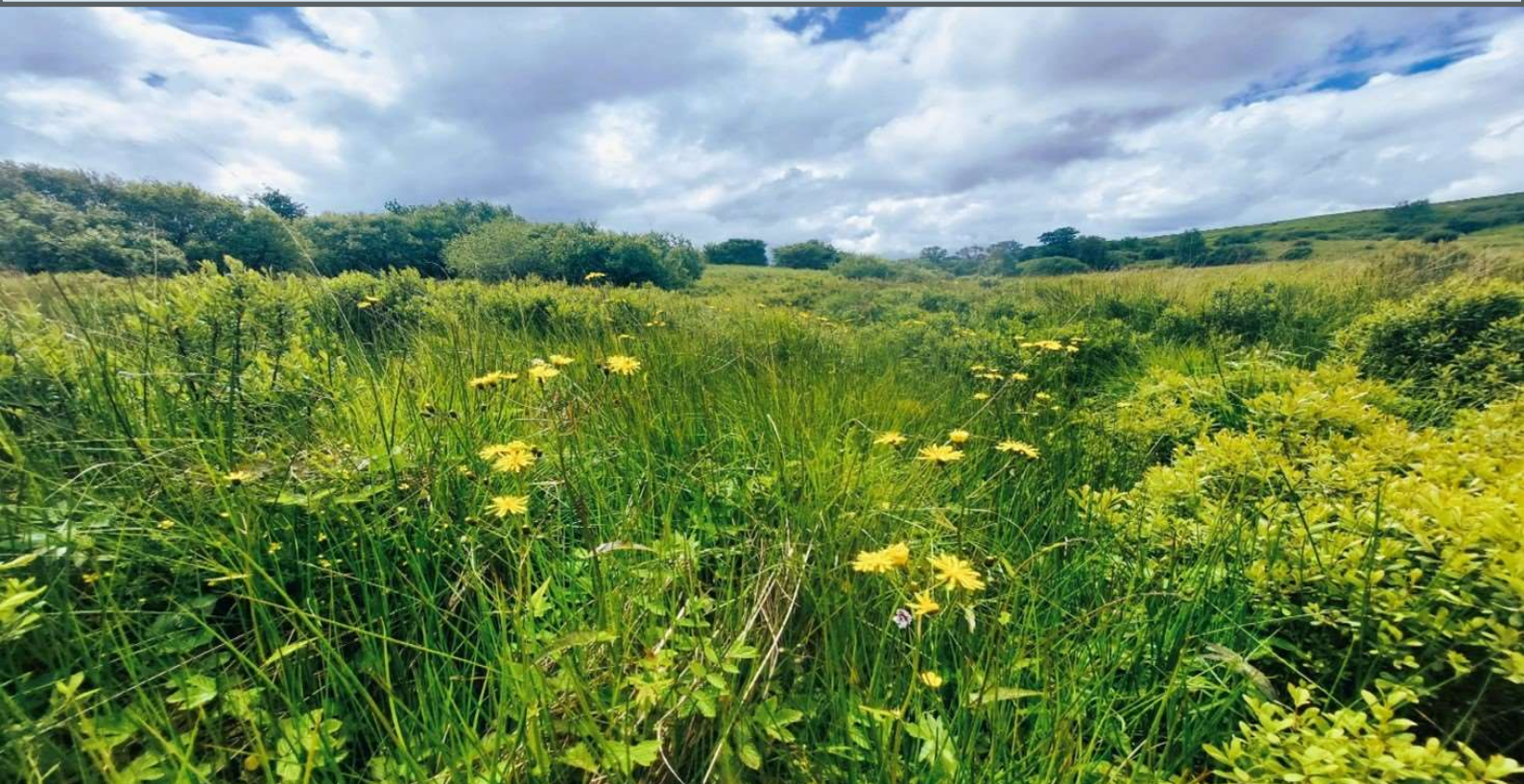




EnergieKontor

GLENVERNOCH WIND FARM EIA REPORT

Appendix 9.4 Outline Biodiversity Restoration and
Enhancement Plan





EnergieKontor

GLENVERNOCH WIND FARM EIA REPORT

Appendix 9.4 Outline Biodiversity Restoration and Enhancement Plan

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1 INTRODUCTION

1.1 PURPOSE OF THE REPORT

- 1.1.1 This outline Biodiversity Restoration & Enhancement Plan (oBREP) forms an Appendix to the proposed Glenvernoch Wind Farm ('the Proposed Development') Environmental Impact Assessment (EIA) Report, **Chapter 9: Ecology**.
- 1.1.2 A detailed BREP, which will include specific prescriptions and confirmation of the peatland restoration location(s), will be agreed with Dumfries & Galloway Council (DGC), in consultation with NatureScot and Scottish Environment Protection Agency (SEPA).
- 1.1.3 This document sets out the strategy the applicant (Energiekontor) proposes to employ to ensure habitat management measures are implemented to mitigate the effects on identified features (including Priority Peatland habitats), as well as delivering additional biodiversity improvements across the Site, mindful of the requirement of National Planning Framework 4 (NPF4)¹, Policy 3 that *"development proposals will contribute to the enhancement of biodiversity, including where relevant, restoring degraded habitats"*.
- 1.1.4 The BREP provides a summary of the rationale, objectives, baseline conditions, restoration opportunities and scope of habitat management works to offset predicted loss of peatland habitats from within the Proposed Development, alongside additional enhancement measures.
- 1.1.5 No significant adverse impacts were predicted for ecological or ornithological features within **Chapter 9: Ecology** or **Chapter 10: Ornithology**.

1.2 RATIONALE

- 1.2.1 During the development phase of the Proposed Development, the applicant has minimised any potential ecological impacts; firstly, by designing the Proposed Development to avoid or limit ecological impacts wherever practicable (see **Chapter 4: Design Evolution**), and secondly, by undertaking to employ industry best environmental practice during wind farm construction and operation (see **Chapter 9: Ecology** and **Chapter 10: Ornithology**).
- 1.2.2 Within the EIA Report assessment, it is predicted that 12.3 hectares (ha) of Priority Peatland habitat would be permanently lost or potentially indirectly affected and altered during the lifespan of the Proposed Development. The following document outlines criteria for identifying and delivering compensatory peatland habitat restoration measures with regard to NatureScot (2023) guidance. The aim would be to contribute a greater area than that which is predicted to be affected by the Proposed Development, providing additional enhancement to the surrounding landscape. This approach aligns with NPF4 policies, which are relevant to development proposals on peatland, carbon-rich soils and priority peatland.

¹ <https://www.gov.scot/publications/national-planning-framework-4/>

- 1.2.3 Based on a combined loss (direct loss and indirect modification) of peatland communities of 12.3 ha and applying NatureScot guidance of a 10:1 offset, it is planned that 130 ha of peatland will be restored across the Site. In addition, as recommended in NatureScot guidance, a further 20 ha will be restored in order to deliver a 'significant level of enhancement' under NPF4, resulting in a restoration total of 150 ha.
- 1.2.4 Peat management and reinstatement during and following construction is detailed separately in a Peat Management Plan (PMP) (**Appendix 12.2**) and a Construction Environmental Management Plan (CEMP) will be submitted prior to construction to DGC and agreed with all necessary consultees. The CEMP will detail the methods and techniques to be employed across the whole of the Proposed Development to ensure compliance with legislation, construction best practice and the mitigation measures.
- 1.2.5 Habitat networks will be improved across the Site, with ditch-blocking and removal of conifer regeneration from peatland habitats, broadleaf riparian planting and low-density broadleaf planting along forestry edges, installation of woody barriers/leaky dams along watercourses, and management for breeding waders within the Site. These interventions will provide additional significant ecological enhancement for a variety of species including black grouse, curlew, snipe and breeding songbirds and will help contribute to improved breeding success of these species.
- 1.2.6 Issues relating specifically to construction of the Proposed Development (e.g. preventing pollution of watercourses, disturbance of protected species or reinstatement/restoration of habitats within the development footprint) are not considered in this document. Further information about the mitigation measures to be employed during the construction, operation and decommissioning periods are included in **Chapter 9: Ecology** and **Chapter 10: Ornithology**.

1.3 OUTLINE BREP AREA

- 1.3.1 It is proposed that the outline BREP area will comprise the extent of the land ownership (See **Plate 1**), comprising land within the redline boundary as well as land to the east of the A714. Within this area, management units have been identified depending on their habitat type, physical characteristics and compatibility for identified species.

1.4 BREP DELIVERY AND THE PLANNING FRAMEWORK

- 1.4.1 A number of stakeholders will be involved in the formulation and agreement of the BREP including (but not necessarily limited to) the applicant, DGC, NatureScot and Royal Society for Protection of Birds (RSPB).
- 1.4.2 It is anticipated that the BREP will be a live document that will be further modified during, pre- and post-construction, taking account of any design changes and priorities within the Site, and in response to ongoing monitoring outcomes. New opportunities for habitat management and enhancement may become apparent during this pre- and post-construction period and during the lifetime of the Proposed Development.
- 1.4.3 The BREP will also include measures that will allow key consultees the opportunity to monitor the success of the plan and require the applicant to take action where necessary. The BREP would operate for the 35-year life span of the Proposed Development. The success of the plan would be monitored over this period, with input from core delivery partners.

- 1.4.4 The BREP will be funded and delivered by the applicant and overseen by a BREP Steering group. The purpose of the Steering group will be to review progress and effectiveness of the BREP on at least an annual basis, and to modify or add to the content of the BREP if necessary. The formal membership and format of the Steering group is yet to be agreed, however, the above organisations will be invited to participate in this process. This Steering group will be chaired by the applicant, or its representative.

1.5 STRUCTURE OF THE OBREP

- 1.5.1 This plan is intended to be a practical, succinct document, as full details pertaining to current Site characteristics, and the Proposed Development can be found in the **Chapter 3: Project Description**.
- 1.5.2 The plan provides:
- A brief baseline summary of the Site characteristics as a general background (**Section 2**);
 - Details of the aims and objectives (**Section 3**);
 - Habitat management measures detailing proposed prescriptions/actions (**Section 4**);
 - Details of implementation including partnership working, funding and duration (**Section 5.1 - 5.3**); and
 - Details of monitoring prescriptions needed to evaluate success or otherwise of the implementation of management; and the programme for delivering BREP activities (**Section 5.4**).

2 BASELINE

2.1 GENERAL SITE DESCRIPTION

2.1.1 The Proposed Development is located in Dumfries and Galloway, Scotland. The Site is centred at approximately easting and northing co-ordinates (E)235247, (N)573276. The closest settlements to the proposed turbines are the village of Glentworth, located approximately 2.8km north of the Site, and the town of Newton Stewart which is located approximately 7km south-east of the Site. The nearest main highway is the A714 which runs adjacent to the eastern boundary of the Site. The Proposed Development is located immediately north of Penninghame Forest and 0.3km east of Loch Ochiltree. The topography of the Site is gently undulating, with the lowest points being located adjacent to the A714 at approximately 50m AOD. There are pockets of small hills within the central areas of the Site rising to 90m AOD, 100m AOD and 105m AOD, before the land rises in the northwest of the site at Butter Cairn (164m AOD) and Top of the Fell (184m AOD). The Site covers an area of approximately 780ha incorporating grassland and modified bog.

2.2 LAND USE AND EXISTING MANAGEMENT

2.2.1 The Site (See **Plate 1**) is situated within agricultural land comprising a mixture of pasture found on the central and eastern edge of the landholding and rough grazing on the southern and western extents on the higher ground. The Site is bordered along the southern and southwestern boundaries by commercial forestry, of which several coupes have been recently felled or are subject to ongoing forestry removal works.

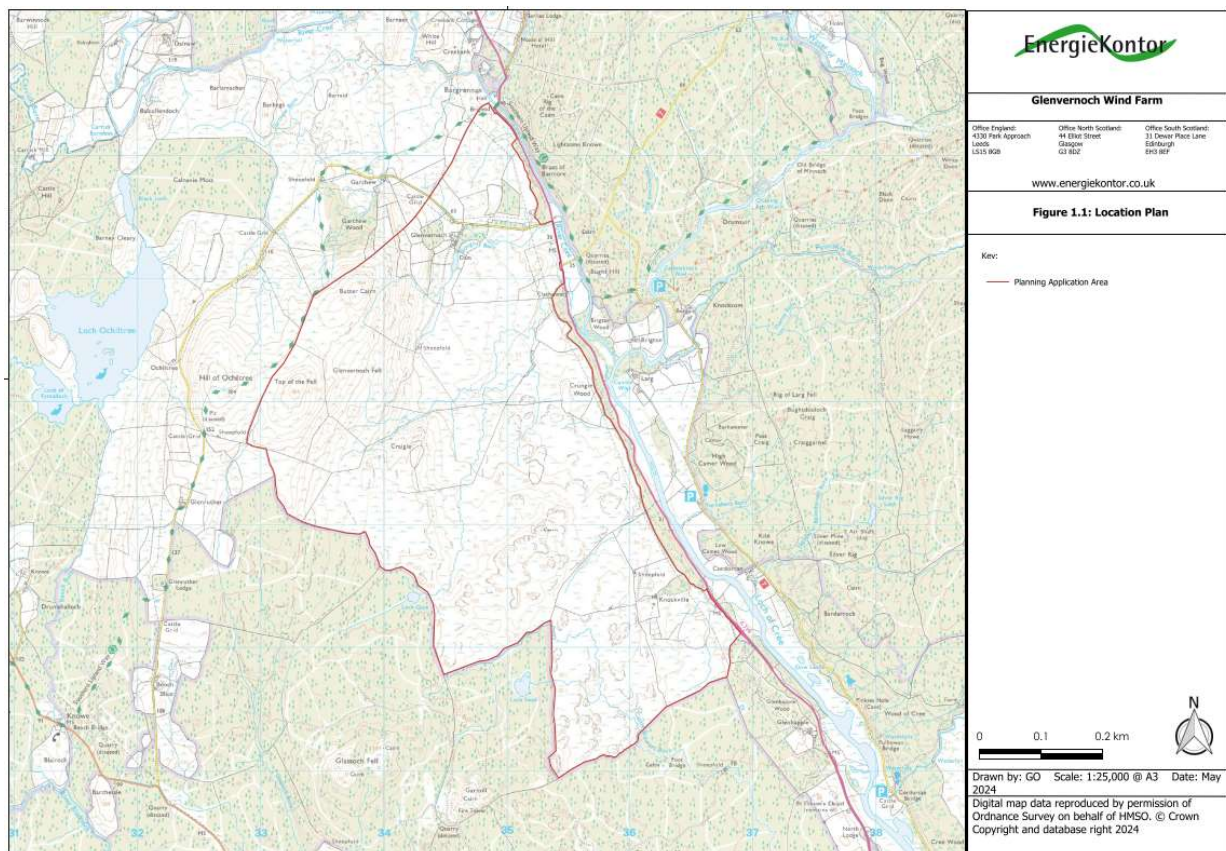


Plate 1 - Site location – landowner boundary plan

2.3 EXISTING CONDITIONS

2.3.1 The identification of candidate management areas, determination of likely habitat types and the suitability for restoration has been informed by the following:

- Aerial imagery and Ordnance survey (OS);
- Peat depth;
- Site walkovers;
- National Vegetation Classification (NVC) survey data (presence of mire communities) (See **EIA Technical Appendix 9.1**);
- Peatland condition (i.e. presence of historical drainage, erosion features, sheep grazing/trampling, self-seeded conifer growth etc.);
- Presence of designated sites; and
- Land ownership boundaries and discussions with landowners.

HABITATS

2.3.2 The Site is dominated by a mosaic of acidic grassland, blanket bog, mire and rush pasture habitats, all on a substrate of varying peat depths. The Site has a sloping topography, sloping downwards from north to south, with areas of well grazed dry grassland to the north, blanket bog to the south and areas of dense bracken, heathland with immature plantation woodland and seasonally wet grassland, in addition to several small burns throughout the Site.

PEATLAND RESOURCE

2.3.3 As stated in **Chapter 9: Ecology** and the **PMP (Appendix 12.2)**, the Proposed Development has been designed to minimise impacts on the Site's peat resource, commensurate with the need to take into account other environmental effects and technical design constraints. Part of the proposed management of peat resource at the Site will involve reuse of peat excavated to allow construction of the Proposed Development (detailed further in **Appendix 12.2**).

TERRESTRIAL SPECIES

2.3.4 No badgers, otters, water voles, pine martens, or field-signs for these species were recorded from within the wider Site during the 2023 ecology surveys, or incidentally during the 2021-2023 ornithology surveys. A small population of common lizard was confirmed as being present within the wider Site, and it is also considered, given the habitats present, that a small population of adder may be present within the wider Site. The great crested newt Habitat Suitability Index, undertaken of all waterbodies within the Site and immediate vicinity, concluded that these waterbodies were of low value for Great Crested Newt.

2.3.5 Further details are provided in **Appendices 9.1 - 9.3**:

BIRDS

2.3.6 A range of bird species was recorded utilising the Site or wider Area (see **Chapter 10: Ornithology**). Species of conservation concern or identified as an important ornithological feature included the following breeding waders: curlew, lapwing, snipe as well as wintering golden plover.

3 AIMS AND OBJECTIVES

3.1 MANAGEMENT AIMS

- 3.1.1 This plan has sought to identify on and off-site biodiversity enhancement opportunities as well as providing the management required to limit the effects of the Proposed Development wherever possible.
- 3.1.2 The four main aims of this OBREP are:
- Aim 1: To restore condition and quality of peatland habitats within the Site;
 - Aim 2: To increase native woodland coverage and enhance connectivity through creation of fenced natural regeneration along riparian corridors and low density non- broadleaf planting;
 - Aim 3: To hold back flow of on-site watercourses, create pools and areas of seasonally inundated marshy grassland within the Site;
 - Aim 4: To improve habitat for breeding wader populations, including curlew, lapwing and snipe

3.2 OBJECTIVES

- 3.2.1 Detailed management objectives are presented in **Table 3.1**.

Table 3.1 Management Objectives

Aim	Ref	Objective
1	1.1	To halt progressive peat drying and erosion through a programme of drain-blocking to raise the water table.
	1.2	To install peat bunds to further raise the water table, reduce vigour of purple moor-grass and reintroduction of Sphagnum
	1.3	To remove self-seeded Sitka spruce, which contributes to drying out of peatland habitats.
2	2.1	To fence riparian habitat along watercourses and existing woody vegetation to encourage mosaic of naturally regenerating broadleaf woodland, alongside supplementary planting.
	2.2	To plant low density native broadleaf trees to provide improved scattered scrub/woodland mosaic habitat for a variety of species including black grouse.
3	3.1	To install leaky dams/ large woody debris along the Craigie Burn. contributing to natural flood management and providing localised wetland habitats.
4	4.1	To undertake targeted rush-cutting in identified management parcels to create varied patches and grassland/rush mosaic to improve nesting habitat for breeding waders.
	4.2	To create wader scrapes to provide feeding sites for the chicks and adults of farmland waders.
	4.3	To undertake predator control of foxes and carrion crows in order to improve egg and chick survival for on-site breeding waders.

4 HABITAT MANAGEMENT MEASURES

4.1 MANAGEMENT UNITS

4.1.1 The proposed habitat management and monitoring measures reflect the different requirements of the variable Site conditions and general land use. The management area is split according to treatment type, underlying habitat and the ecological feature to be benefitted. The proposed Management Units have been defined based on the different types of active management, as shown in **Table 4.1** and illustrated in **Figure 4.1**.

Table 4.1 Proposed Management Units

Unit	Habitat	Size (Ha)	Restoration and enhancement measure	Ecological features likely to benefit
A	Blanket bog/modified bog	98	Ditch-blocking	Blanket bog Breeding waders Black grouse
B i-iv	Blanket bog/modified bog	28	Removal of conifer regeneration	
C i-x	Blanket bog/modified bog	180	Peat bunds and Sphagnum reintroduction	
D i-viii	Rush pasture/ marshy grassland/ neutral grassland	7	Riparian broadleaf planting	Passerines Otter
E	Watercourse (Craigie Burn)	-	Leaky dams	Breeding waders Freshwater fish
F	Rush pasture/ marshy grassland/ neutral grassland	300	Rush cutting, wader scrapes and predator control	Breeding waders

PROPOSED MEASURES

4.1.2 The proposed restoration and enhancement measures reflect the different requirements of the variable Site conditions, general land use and features to be enhanced. The following proposed measures are discussed in further detail:

- Peatland restoration;
 - Blocking artificial drains with peat dams;
 - Installing peat bunds and plug planting/spreading sphagnum;
 - Removal of self-seeded conifer regeneration on peatland;
- Fencing to promote natural scrub/ tree regeneration;
- Low density broadleaf woodland planting;
- Installation of leaky dams/large woody debris;
- Breeding wader management - rush cutting, wader scrapes and predator control

4.2 PEATLAND RESTORATION

4.2.1 The following peatland restoration proposals will provide a variety of benefits to the peatland habitats within the Site, the assemblage of species that depend upon them and the associated ecosystem services benefits e.g. the carbon storage and downstream water quantity and quality. Suitable areas for peatland restoration comprise historically drained peatland across the Site. The extent of these areas would be subject to refinement prior to completion of the final BREP but management proposals will aim to restore the hydrology of peatland habitat across the Site.

4.2.2 Identified drained peatland, candidate areas of modified bog (dominated by purple-moor grass) (**Plate 2**) for installation of surface peat bunds and Sphagnum planting; and areas of encroaching conifer regeneration with opportunity for restoration have been mapped over peat depth data and are illustrated on **Figure 4.2**. These areas are sufficient to deliver in excess of a 10:1 offset of impacted peatland (150 ha) and have the potential for recovery through rewetting, gradual revegetation and halting the negative drying effects of conifer growth on bog.

RESTORATION OF ARTIFICIAL DRAINS WITH PEAT DAMS

4.2.3 There are approximately 14 km of drains within the Site (See **Plates 3 and 4**), which will benefit from being dammed in order to raise the water table and prevent further damage to the hydrological regime of the peat and improve the condition of blanket bog that has been detrimentally affected by historical drainage.

4.2.4 The successful development of blanket bog is dependent on hydrological conditions in which the water table normally lies within 10-20 cm of the ground surface. Once those conditions are achieved on relatively flat ground, with nutrient-poor peat at depths usually greater than 0.5 m, an available source of colonising vegetation and, ideally, a viable seed bank, blanket bog will normally become the dominant habitat over a period of five to ten years, and species diversity can be expected to increase within and beyond that period.

4.2.5 A suitably experienced peatland ecologist will identify the number, location and spacing of peat dams required, which will take place in year 1 of the implementation of the final BREP following good practice guidelines detailed in Peatland Action Technical Compendium (NatureScot, 2023).

4.2.6 The following best practice measures² will be applied:

- *Where possible peat dams should be created in conjunction with drain reprofiling. An alternative type of damming with reprofiling could be installation of wave dams and zipping, however these two methods have not yet been in use for long enough to assess whether they produce effective measures in the long term. Standard peat dams, with reprofiling, have been shown to work across the suite of Peatland ACTION projects over the last decade.*
- *Install peat dams where drains are at their narrowest. A general rule is that dams need to be spaced so that the water always reaches the toe of the previous dam. Drains on*

² <https://www.nature.scot/doc/peatland-action-technical-compendium-restoration-7-stabilisation-and-revegetation>

steeper slopes need dams at short intervals. On sites with very shallow gradients (<1 degree), dams can be spaced more widely with a maximum spacing of 15 m. Spacing may also depend on drain size and whether drain reprofiling is also being undertaken.

- *Dams must be a sufficient width to ensure water cannot flow around the dam edge and re-join the same drain line. If the drain is aligned to the slope this is a significant risk. Where possible, construct dams with a bit of a longer spur on the downhill side to encourage spreading out flow laterally. Behind the dam, water needs to be encouraged to seep across the peatland, rather than creating large pools of water behind the dam. The use of swales can achieve this in most circumstances.*
- *The height of the dam should be slightly higher than the fall line of the drain so that water cannot flow or seep across the top of the dam.*
- *The dams must be formed so they span the full width of the oxidised cross section of the drain i.e., the zone that has sunken due to the drain on each side. On some sites this can be very pronounced and extend up to 2 m either side of the drain. If this is not blocked then water will still be trapped in this swale and will simply flow round each dam shoulder and continue down the drain route.*
- *If there is a spoil line adjacent to the drain (typically on the downslope side) this must be broken through or squashed adjacent and immediately upstream of the dam to ensure water can disperse laterally. Spoil heaps are usually highly oxidised (becoming crumbly) so should not be used for creating dams or infilling when reprofiling.*
- *Donor material of turf required for the top of the dam should be gathered from a donor site that should be upstream and upslope of the dam. Turves should be taken from shallow borrow pits adjacent to (but not too close to) drains. Do not use vegetation from the drains themselves - leave this intact.*
- *Where flow rates are high and/or drains are greater than 1 m wide and/or deep, it may be worth considering more substantial "composite" dams (peat used with wood or plastic piling), or plastic piling dams.*
- *Ditch blocking work will occur between September and March to avoid disturbing breeding birds.*



Plate 2: Drained, modified bog with rank heather and extensive purple moor-grass coverage



Plate 3: Drain within bog with rank heather



Plate 4: Drain within bog with purple moor-grass and bog myrtle

INSTALLING SURFACE PEAT BUNDS AND SPHAGNUM PLUG PLANTING

- 4.2.7 In addition to restore the hydrological processes of modified and drained bog across the Site by slowing or interrupting surface water flow through the blocking of channels (grips or drains), a number of candidate areas (examples of typical habitat conditions are presented in **Plates 5 and 6**) identified as purple moor-grass and heather dominated blanket bog, will be restored through a combination of surface bunding and Sphagnum planting.
- 4.2.8 Peat bunds would comprise an impermeable dam (See **Plate 7**) feature constructed on the bog surface, rather than within drains or grips (as above). They are intended to slow the flow of water over and through the modified bog, holding the water for longer and, in doing so, rewetting the peat and creating the conditions that support active blanket bog species assemblages, including Sphagnum, which form in a low disturbance, low nutrient, low pH and low-flow (waterlogged) environment. It is anticipated that by rewetting these modified bog habitats dominated by purple moor-grass and in some places heather, will reduce suitability for these species, which have a preference for drier conditions and increase the ability of sphagnum mosses to survive and compete.
- 4.2.9 Trials conducted by Moors for Future as part of the Partnership MoorLIFE 2020 project investigated whether bunding is an effective restoration technique. These showed that the construction of different bund-types has had little to no negative or harmful impact upon the blanket bog ecosystem or its designated features. They also found that scallop and fish-scale bund-types (See **Plate 8**) showed the largest amount of surface water pooling.



Plate 5 and Plate 6: Modified blanket bog dominated by purple-moor grass (dried thatch and green leaves) and bog myrtle (woody stemmed shrub)

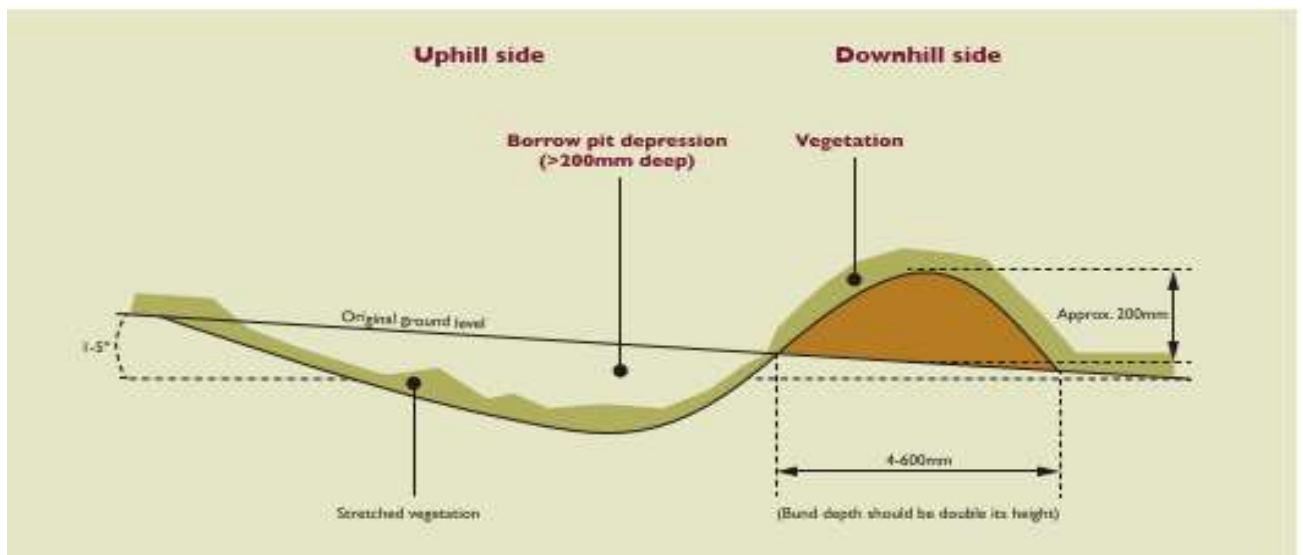


Plate 7 – Cross section of a peat bund (Moors for the Future Partnership, Sphagnum Practitioners Guide 2022)

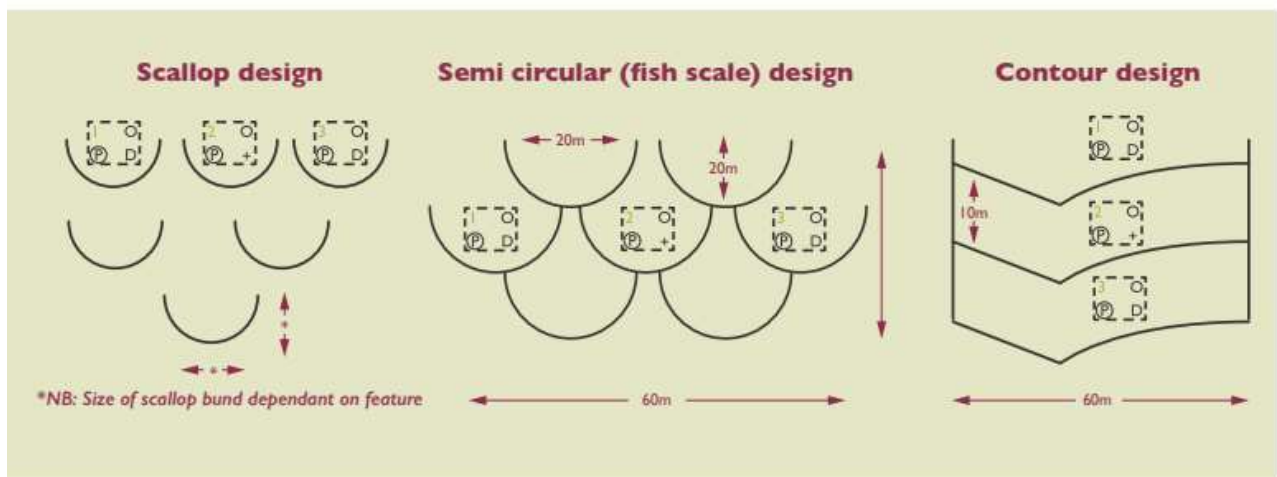


Plate 8 – Different bund types trialled by Moors for the Future Partnership (Sphagnum Practitioners Guide 2022)

- 4.2.10 Bunds would best be constructed on the flatter areas within the Site, where slope angles are 5 degrees or less and where the deepest peat is found. Where slopes are shallower, water backing up behind the bund will cover a greater area, resulting in more area of peat being kept wetter for longer.
- 4.2.11 As water is held back behind the bunds, during a high rainfall event, water is being held on the Site, slowing the flow of water from the Site into the wider catchment and ultimately into the River Cree, slowing and preventing that water from arriving at the Cree catchment below all at once. Across the Site, this may help reduce flood risk and lower flood waters.
- 4.2.12 It is recommended that liaison with the local Peatland Action officer is undertaken in order to confirm that the technique of creating bunds is judged to be appropriate, safe and practical, as well as agreeing best practice measures³, which would include the following:
- *In high surface water flow situations, it is better to use surface bunds with gaps, i.e., fish-scale or scallop bunds, so that water can pass through. Such bunds can be used on edges of raised bogs to stop surface water accumulating in areas where this isn't desired.*
 - *Ensure areas of surface water are not too large; wave action over larger pools can cause erosion of the bunds. Rule of thumb is not to have cellular bundled cells too large (10 x 10 m). Ensure the design of pools through cell bunding avoids channelling water into the edges of e.g., raised bogs, consider the overall shape of the site in the design.*
 - *Surface bunds should be well-capped with vegetation, which would then help to colonise the pools. Linear bunds should have "tie-backs" or finger bunds every 20-25 m minimum, these can be 5 m long.*
 - *The final height of the surface peat bund is usually around 250-300 mm above the peat surface. Bear in mind that peat features will settle.*

³ <https://www.nature.scot/doc/peatland-action-technical-compendium-restoration-5-bunding-intervention>

- 4.2.13 Once small shallow pools have been created following bund installation, where Sphagnum mosses can more readily colonise, some Sphagnum planting is proposed in order to encourage growth. This would involve harvesting Sphagnum from donor sites (within the Site itself, or close to the Site), or potentially use cultivated Sphagnum moss in the form of plug plants and spreading these in pools behind peat bunds or pushing small plugs of Sphagnum into the wetter areas of bare peat.

SELF-SEEDED CONIFER REMOVAL

- 4.2.14 There is a high density of non-native conifers (chiefly Sitka spruce) in the vicinity of the existing forestry within the Site (See **Plate 9**), which will be having a negative impact on the bog, contributing to the drying out of bog communities. Regenerating conifers will therefore be removed from a combined area of 27 ha by hand clearance using chain saws. Trees will be cut below the lowest whorl in order to prevent any future growth and will be left on site but may require additional treatment dependent on size and density.



Plate 9: Self-seeded conifer regeneration on modified bog

4.3 FENCING, PLANTING AND NATURAL REGENERATION

- 4.3.1 Habitat enhancement will also include the establishment of riparian and non-riparian scrub/woodland corridors aligning with the aims and priority actions within the Dumfries & Galloway Local Biodiversity Action Plan⁴ - Priority Action (LRB1) - Lowland Rivers & Backwaters; Priority Action (LBD1) Lowland Burns & Ditches; and Priority Action NWW1 and NWW2 - Native Wet Woods.
- 4.3.2 Establishment of scrub/woodland corridors (See **Plate 10** as a suitable location within the Site) will improve habitats for songbirds, as well as aquatic mammals/ invertebrates and fish. Watercourses

⁴ https://www.dumgal.gov.uk/media/19945/Local-Biodiversity-Action-Plan/pdf/Local_Biodiversity_Action_Plan.pdf?m=636561914667330000

where there is existing scrub and trees have been prioritised for additional targeted planting and fencing (as requested by the landowner) to ensure cattle are excluded from these areas, to promote connectivity and allow for linkage through natural regeneration.

- 4.3.3 Upland woodland planting will include downy birch, silver birch, rowan, aspen, hawthorn, blackthorn and downy willow, including some native broad-leaved planting of climax species such as sessile oak, ash and wych elm. The full extent of planting (both mix, coverage and balance of natural regeneration) will be agreed with DGC but will cover approximately 7.55 ha within eight management units (i - viii). Woodland and scrub fencing and planting locations are illustrated in **Figure 4.1**, along the following locations/watercourses detailed in **Table 4.2**.

Table 4.2 Broadleaf planting locations

Unit	Watercourse	Grid reference	Description	Extent of planting
Ci	Castle Stewart Burn (Lower)	NX 36070 71344	Fencing, low density riparian broadleaf planting and natural regeneration	A minimum 2 ha will be planted along a 500 m stretch.
Cii	Castle Stewart Burn (Upper)	NX 35327 72191		A minimum 0.7 ha will be planted along a 425 m stretch.
Ciii	Unnamed Burn Knockville North	NX 35869 72947		A minimum 0.8 ha will be planted along a 900 m stretch.
Civ	Craigie Burn (Upper)	NX 34380 73933		A minimum 0.7 ha will be planted along a 280 m stretch.
Cv	Craigie Burn (Lower)	NX 34701 74110		A minimum 0.65 ha will be planted along a 220 m stretch.
Cvi	Boughty Burn (Upper)	NX 34406 74598		A minimum 0.5 ha will be planted along a 270 m stretch.
Cvii	Boughty Burn (Lower)	NX 35000 75309		A minimum 1 ha will be planted along a 370 m stretch.
Cviii	Loch Swad plantation east	NX 34437 72114	Low density broadleaf planting	A minimum 1.2 ha will be planted along the eastern edge of the clearfell forestry.



Plate 10: Castle Stewart Burn (Lower), bracken/marshy grassland offers good riparian planting areas.

- 4.3.4 Examples of existing fenced habitat that has led to the successful establishment of natural regeneration of native tree and scrub species on open ground and alongside small watercourses are illustrated in **Plate 11**, **Plate 12** and **Plate 13**.



Plate 11: Example of fenced unnamed watercourse illustrating broadleaf tree and scrub natural regeneration (bog myrtle, rowan and goat willow).



Plate 12: Example of fenced unnamed watercourse illustrating natural regeneration of willow scrub along Castle Stewart Burn (Upper)



Plate 13: Willow scrub natural regeneration along Castle Stewart Burn (Upper) – white line illustrates opportunities for expansion of scrub corridor with planting and natural regeneration.

- 4.3.5 Low density planting along forestry edge (along the southern clear fell area south of Loch Quie) will provide additional food sources for black grouse in the spring and winter, together with suitable cover from predation for both adults and broods, and will provide connectivity for the species between foraging, lekking and breeding habitats. Discontinuous areas of planting will ensure that extensive shading of existing food plants (e.g. grasses and blaeberry, where present) for black grouse does not occur, with planted tree and shrub species being selected for their preference by black grouse.
- 4.3.6 During the establishment phase, trees will be protected in accordance with best practice guidance available at the time of planting, with the requirement for fencing being avoided at this location, where cattle grazing is considered less likely.

PLANTING METHODOLOGY AND MAINTENANCE

- 4.3.7 A local contractor (overseen by a suitably experienced ecologist) will be appointed to carry out the tree/scrub planting based on the following planting methodology:
- Prior to planting, a soil survey will be carried out to determine appropriate locations for tree planting along the cleughs; and the suitability of native broadleaf species in these locations will be determined based on the presence of existing trees and scrub;
 - Plants will be of local provenance and of varying ages, and densities would be around 500 trees per hectare, planting at between 3.0 m and 1.8 m centres;
 - Hand preparation will be used for all planting areas due to the proximity of watercourses;
 - Planting will take place on either side of the watercourse and will be planted in varying strips of 10-20 m wide;
 - Trees will be staked and tubed to protect against deer and vole damage. Five years after planting approximately, all tubes will be removed or when they reach a three-inch basal diameter;
 - Planting areas will be fenced where the landowner identifies sheep/cattle are likely to be present.
 - Planting will aim to create a mosaic of native species in a random pattern of distribution;
 - Weed killing will be undertaken annually by hand weeding (must be suitable for use within close proximity to watercourses); and
 - Beating up will be undertaken the year after planting and in year five (although there may be a requirement in other years) to replace dead trees. Lost or broken stakes or tubes will be replaced.

4.4 LEAKY DAMS

- 4.4.1 Installation of in-stream barriers within the Craigie Burn will help to slow the flow of water in flood conditions, temporarily hold large volumes, releasing it at a steadier rate over a longer period of time and allow for natural pooling (See **Plate 14**) and creation of localised wetland habitats. These proposals are considered a positive incorporation of natural flood management within the Site.



Plate 14 – Example of natural pooling along Craigie Burn watercourse, spilling over into inundated marshy grassland (good quality habitat for snipe)

- 4.4.2 Structures will be designed and installed so as to not affect normal flow conditions and therefore allow fish and sediment/gravel to move along the stream. In flood conditions however, they can cause the stream to over top and spread flood water across safe areas of the floodplain.
- 4.4.3 Different methods may be appropriate in different locations, including installation of leaky dams and/or the use of large woody debris ⁵ (using locally sourced materials) (See **Plate 15**) to help slow the flow, provide habitat niches and create pools; as well as timber barrier placements with branches removed (See **Plate 16**), which would be placed to virtually block the channel during periods of flood and slow the flow of water.
- 4.4.4 It is important to note that each leaky dam, the channel morphology, and the flood event will all differ. Therefore, a suitable structure must be designed and built to the specific site conditions and securely anchored in the channel - incorrectly constructed leaky barriers could cause significant negative impacts on flooding, fish movements and gravel transport; and poorly secured barriers will be ineffective.

⁵ The landowner has identified dead ash trees (due to ash dieback) within the Site that could be utilised for this purpose.

- 4.4.5 Each of the locations identified will be ground-truthed and appropriate measures and approaches confirmed and agreed between the tenant, landowner and suitably qualified ecologist and hydrologist. Proposals will also need to comply with the principles outlined in SEPA's Regulatory Guidance⁶ on the Placement of Large Wood in the Water Environment and consultation with SEPA should be undertaken at the detailed design stage.



Plate 15 - Leaky dams/ large woody debris in the Eddleston catchment, Scottish Borders. Credit: Tweed Forum

⁶ <https://www.sepa.org.uk/media/519183/regulation-of-lwd.pdf>



Plate 16 - Examples of different types of in stream placements with low and high vertical height and schematic inset. © Nisbett et al. 2015 [within Dodd et al. 2016]

4.5 MANAGEMENT FOR BREEDING WADERS

- 4.5.1 The aim of these management prescriptions is to benefit breeding ground nesting birds in Spring and Summer, particularly waders such as lapwing, redshank, snipe and curlew. Damp grassland/rush pasture with a diversity of sward structure provides an abundance of invertebrates for the birds to eat and feed their chicks and is favoured by many wader species.

RUSH CUTTING

- 4.5.2 Open rush pasture is suitable for waders, but birds will tend to avoid denser stands of rush. Any extensive areas of rush cover should therefore be reduced within Management Unit E by targeted annual mowing in Autumn (outside the breeding season) to benefit both wading birds and grazing.
- Aim for 30% rush cover scattered across the whole field, and overall grassland/rush mosaic with a mix of vegetation heights.
 - Aim to create large open patches with irregular edges rather than straight edged rectangular blocks.
 - Aim to leave bays and coves on the edge to provide shelter from the wind for wader chicks and lambs.

WADER SCRAPES

- 4.5.3 Wader scrapes are small (often no larger than 20m²) shallow scrapes in the ground which are intended to hold water long into the summer months. They are created using a digger to scrape off the surface layer of grass to expose the mud underneath, creating a shallow basin. This fills with water over winter and gradually recedes as the year progresses leaving wet muddy margins, which can be very

important feeding sites for the chicks and adults of farmland waders such as lapwing and redshank as their gently sloping edges support large numbers of invertebrates. Wader scrapes will be installed across Management Units E (i-iv) and in the field parcel along the River Cree.

- Aim for areas of existing dampness/wetland/localised pooling
- Where present, target already available field drains.
- Impermeable soils, such as clays and silt are best for wader scrape as they keep the water on the surface.
- Scrapes should be created >100m from field boundaries and away from overhead lines to encourage use by waders.
- Linear or irregular shapes are best as these provide more edge compared with a round feature of the same area.

PREDATOR CONTROL

- 4.5.4 To support ground-nesting waders within the Site, a programme of predator control would be undertaken within the Site boundary during the lifetime of the Proposed Development, which would seek to reduce the predation on breeding waders and other significant species which are vulnerable to predation.
- 4.5.5 Species targeted would be particularly species such as foxes and avian predators such as carrion crows, which can be controlled using methods which are specific and have little potential for impacts on other species (e.g. lamping for foxes). Control methods and approach would be discussed with the tenant farmer at the detailed design stage.

5 IMPLEMENTATION

5.1 MANAGEMENT

- 5.1.1 It is envisaged that the BREP will be an evolving document, and all alterations will be agreed with the Steering Group.
- 5.1.2 This oBREP outlines the necessary steps to be taken and that further developing of the management prescriptions above will be progressed following consultation with DGC and NatureScot. The terms of reference need to be agreed, but the applicant is expected to co-ordinate, deliver and drive the implementation of the finalised BREP.
- 5.1.3 Each of the management proposals detailed at this outline stage will be further developed and defined in consultation with the landowner and tenant in order to ensure compatibility between the management objectives and the objectives of the working farm.

5.2 PARTNERSHIP WORKING

- 5.2.1 The applicant will implement the BREP with the help of a number of potential partners which are expected to include (but not be limited to) those listed in **Table 5.1**. It is envisaged that these partners will be involved from the earliest stages in order to ensure the effective delivery of the plan.

Table 5.1 Potential BREP Delivery Partners

Partner	Roles
Landowner and tenant farmer	Implementation of breeding wader management prescriptions – rush-cutting and predator control
DGC	- Advice, information & technical input - Integration of management plan outputs with Local Biodiversity Action Plan (LBAP)
NatureScot/ Peatland Action	- Advice, information, monitoring & technical input. - Licensing
SEPA	- Advice, information, monitoring & technical input. - Licensing
RSPB	- Advice, information & technical input on habitat restoration & species requirements - Strategic linkage with other Wind Farm BREP objectives
Local contractors	- Peatland restoration implementation and wader scrapes - Implementation of tree planting and stock fencing - Installation of leaky dams
Ecologist	Oversee BREP implementation, liaison with landowners, contractors and delivery partners, monitoring.

- 5.2.2 Core delivery partners to whom agreements regarding the scope and responsibilities of the BREP will need to be confirmed. Funding will be directed in order to implement the BREP objectives. This may include local peatland restoration and forestry planting and fencing contractors, who may be well placed to deliver some of the identified actions.

5.3 FUNDING

- 5.3.1 The implementation of the management plan will be funded by the applicant. The funding commitment by the applicant will span the life of the project; a period of at least 35 years.

5.4 MONITORING AND REVIEW

- 5.4.1 BREP prescriptions will be subject to monitoring to assess their effectiveness at achieving the overarching aims and objectives. The outcomes of the monitoring prescriptions will be used by a Steering Group (or identified key stakeholders) to adjust current objectives and their prescriptions, or to devise new aims and objectives.
- 5.4.2 It is critical the habitat management process remains flexible, allowing alterations to prescriptions in response to the monitoring programme. The monitoring results for each year will therefore be analysed and presented in an annual report to be prepared by an appropriately qualified ecologist (or ecologists). This report will include recommendations regarding any changes to management practices and/or monitoring requirements that may be considered necessary.
- 5.4.3 An indicative outline of monitoring prescriptions associated with the activities described in **Sections 4.2 - 4.5** are summarised in **Table 5.2**.

POST-CONSTRUCTION BIRD MONITORING

- 5.4.4 Breeding wader surveys will be undertaken in years 1-5, 10, 15, 20, 25 and 30 during the operational life of the wind farm following standard survey guidance (NatureScot, 2017). The main objective being to assess the status of curlew population on the Site and to establish the success of habitat management measures.
- 5.4.5 Surveys will follow a moorland bird survey based on an adapted Brown & Shepherd (1993) method with four survey visits at least seven days apart. These should cover the whole breeding season between mid-April and early July and be undertaken between 8:30 hours and 18:00 hours. They should be carried out in a wind of Beaufort force 4 or less, and in dry weather. Study Area coverage would be to within a 500m buffer of the Site boundary.
- 5.4.6 Black grouse lek surveys will be undertaken to monitor the effect of management prescriptions on local black grouse populations. Monitoring will be undertaken in Years 1-5 following wind farm operation, then subsequently every five years subject to review. Monitoring in each year will comprise black grouse lek site surveys.
- 5.4.7 Survey scope and methods will be agreed with RSPB and DGC prior to commencement.

Table 5.2 Indicative Scope of Monitoring and Target Outcomes

	Objective	Scope of monitoring prescriptions	Target outcome
1.1	To halt progressive peat drying and erosion through a programme of drain-blocking to raise the water table.	Following completion of ditch blocking works, monitoring will include key parameters as set out within Common Standards Monitoring Guidance for Upland Habitats (JNCC, 2009) and Peatland Action Monitoring Strategy 2023-2030 ⁷ . Monitoring will be carried out in the year following drain blocking works and will take place annually for the first five years of operation of the Proposed Development. Thereafter in years 10, 15, 20,25, 30 and 35.	Core monitoring objective to establish whether restoration works are resulting in conditions favourable to the recovery of a functioning peatland habitat.
1.2	To install peat bunds to further raise the water table, reduce vigour of purple moor-grass and reintroduce Sphagnum		Likely targets will relate initially to stability and revegetation of the target areas, followed by potentially longer-term change in peatland state that will encourage the re-establishment of some ecosystem functions.
1.3	To remove self-seeded Sitka spruce, which contributes to drying out of peatland habitats.	Dipwells will be installed at a range of monitoring points where gulley blocking is proposed. The number and location of such monitoring points will be determined at detailed design stage. Monitoring will be carried out for at least one year prior to drain-blocking works and will continue for at least five years henceforth. Monitoring of vegetation establishment will be undertaken at all identified locations for drain-blocking, bunding and Sphagnum planting and self-seeded conifer regeneration.	Several parameters could be measured that would be expected to be altered through restoration including: • fluctuation of annual water table level, • percentage Sphagnum cover, • presence of positive and negative indicator species, and • change in the extent of bare peat. Annual progress reports will be produced documenting the findings of all monitoring and survey work, comparison with previous findings,

⁷ <https://www.nature.scot/doc/peatland-action-monitoring-strategy>

	Objective	Scope of monitoring prescriptions	Target outcome
			identifying key trends and issues and providing a basis upon which to formulate further actions through the Steering Group or identified stakeholders, including Peatland Action.
2.1	To fence riparian habitat along watercourses and existing woody vegetation to encourage mosaic of naturally regenerating broadleaf woodland, alongside supplementary planting.	Monitoring of natural regeneration will be undertaken by a suitably qualified ecologist every 5 years, measuring progress in vegetation establishment (woody and non-woody vegetation).	Broadleaf and scrub regeneration will aim to create a mosaic of native species along riparian corridors, providing improved cover and connectivity.
2.2	To plant low density native broadleaf trees to provide improved scattered scrub/woodland mosaic habitat for a variety of species including black grouse.	Hand-weeding will be undertaken annually at all planting locations and beating up will be undertaken the year after planting and in year 5 (although there may be a requirement in other years) to replace dead trees.	Low density broadleaf planting along forestry edges and peatland restoration will aim to improve the network of suitable habitat across the Site, improving year-round foraging and nesting resource for black grouse and helping to support the local population.
		Black grouse lek surveys will be undertaken to monitor the effect of management prescriptions on local black grouse populations. Monitoring will be undertaken in Years 1-5 following wind farm operation, then subsequently every five years subject to review. Monitoring in each year will comprise black grouse lek site surveys.	Black grouse lek totals will be reviewed annually (through liaison with SUP or RSPB) to determine status of these known leks and establish trends. A summary report will be prepared at the end of each survey season.
3.1	To install leaky dams/ large woody debris along the Craigie Burn. contributing to natural flood management and providing localised wetland habitats.	Leaky dams would be monitored annually in years 1 - 5 following installation to identify success of management actions and any repairs or replacement works required. Thereafter, monitoring would be undertaken on a five yearly basis subject to review, with recommendations for replacement dams to be installed as required.	Leaky dam installation will aim to slow the flow of the Craigie Burn during flood conditions and contribute to localised wetland creation benefiting the breeding wader population.
4.1	To undertake targeted rush-cutting in identified management parcels to		

	Objective	Scope of monitoring prescriptions	Target outcome
	create varied patches and grassland/ rush mosaic to improve nesting habitat for breeding waders.	Post-construction breeding wader monitoring surveys will be undertaken during the operational life of the wind farm to establish the progress of management actions.	Management prescriptions aim to provide more beneficial habitat conditions for breeding wader populations to flourish.
4.2	To create wader scrapes to provide feeding sites for the chicks and adults of farmland waders.	Surveys will follow an adapted Brown & Shepherd method, comprising four survey visits between the last week in March and mid-May. They will be undertaken on an annual basis for the first five years following the start of wind farm operation and thereafter in Years 10, 15, 20, 25 and 30.	Following annual surveys, a summary report will be prepared at the end of each survey season.
4.3	To undertake predator control of foxes and carrion crows in order to improve egg and chick survival for on-site breeding waders.		

6 REFERENCES

- Dodd, J.A., Newton, M & Adams, C.E. (2016). *The effect of natural flood management in-stream wood placements on fish movement in Scotland*, CD2015_02.
- Joint Nature Conservation Committee (2009) Common Standards Monitoring Guidance for Upland Habitats. Version July 2009. <https://hub.jncc.gov.uk/assets/78aaef0b-00ef-461d-ba71-cf81a8c28fe3>
- MacDonald, A., Stevens, P., Armstrong, H., Immirizi, P. and Reynolds, P. (1998) *A Guide to Upland Habitats. Surveying Land Management Impacts*. Field Guide 1, Scottish Natural Heritage, Edinburgh.
- Moors for the Future Partnership (2022). *Sphagnum Practitioners' Guide. A Toolkit for Sphagnum Reintroduction into Blanket Bog*.
- NatureScot (2022). Peatland ACTION - Technical Compendium. <https://www.nature.scot/doc/peatland-action-technical-compendium>
- NatureScot (2023). *Advising on peatland, carbon-rich soils and priority peatland habitats in development management*. Guidance note. Revised November 2023. <https://www.nature.scot/doc/advising-peatland-carbon-rich-soils-and-priority-peatland-habitats-development-anagement#:~:text=Priority%20peatland%20is%20a%20sensitive,to%20result%20in%20significant%20effects>
- SEPA (2015). *Natural Flood Management Handbook*. December, 2015.
- SEPA (2020). *SEPA's Regulatory Guidance on the Placement of Large Wood in the Water Environment*, June 2020.
- SNH (1998). *A Guide to Upland Habitats - Surveying Land Management Impacts - The Field Guide*. Volume 2.
- SNH (2016a). *Planning for development: What to consider and include in Habitat Management Plans*. Version 2.

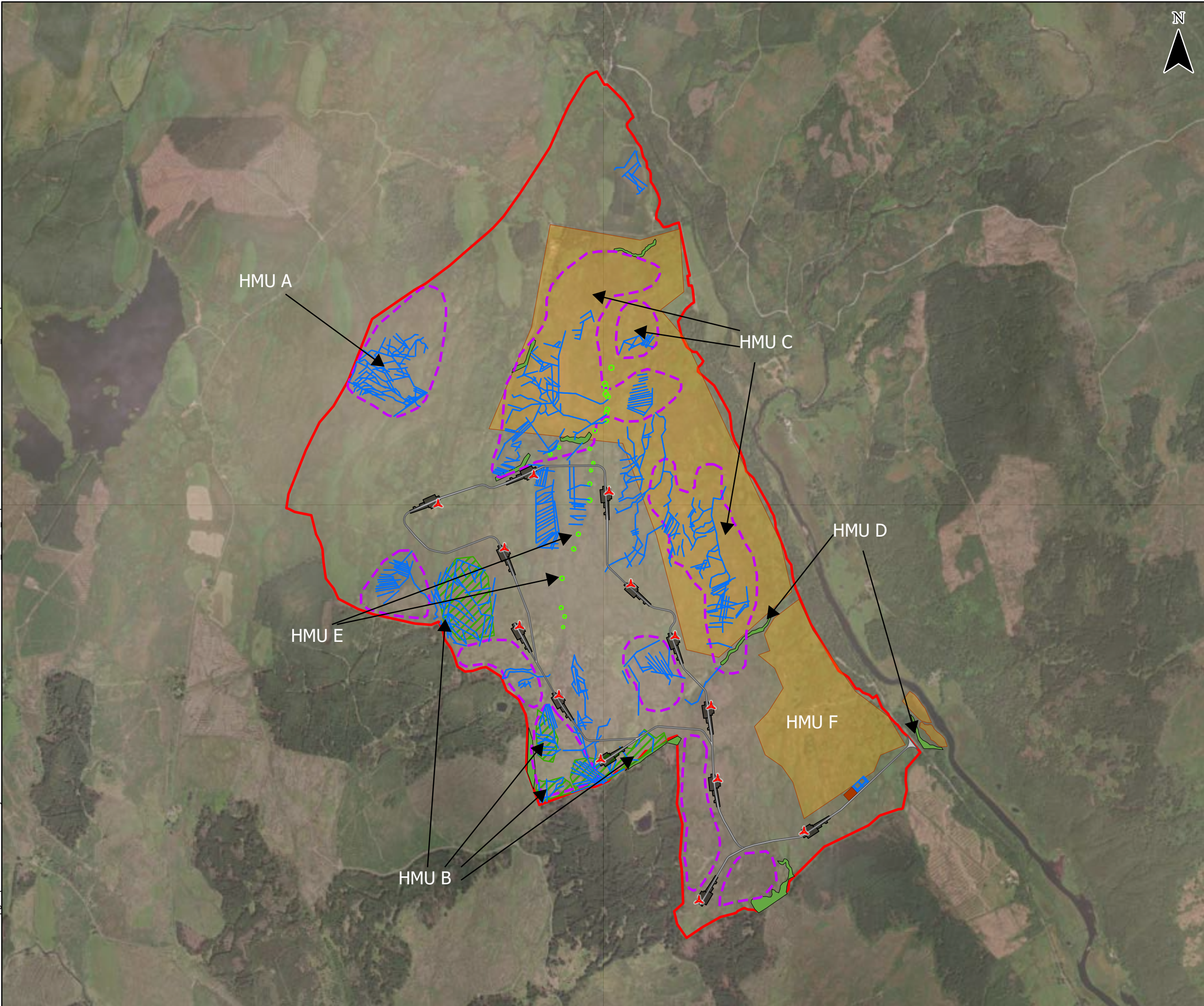
FIGURES



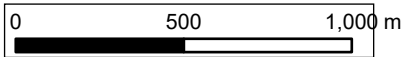
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- Key**
- Site boundary
 - Turbine location
 - Substation
 - Access track
 - Hardstanding and laydown areas
 - Construction compound
 - Drainage ditch (HMU A)
 - Removal of conifer regeneration (HMU B)
 - Candidate areas for peat bunds and sphagnum plug planting (HMU C)
 - Broadleaf planting/regeneration (HMU D)
 - Leaky dam (HMU E)
 - Breeding wader management area (HMU F)



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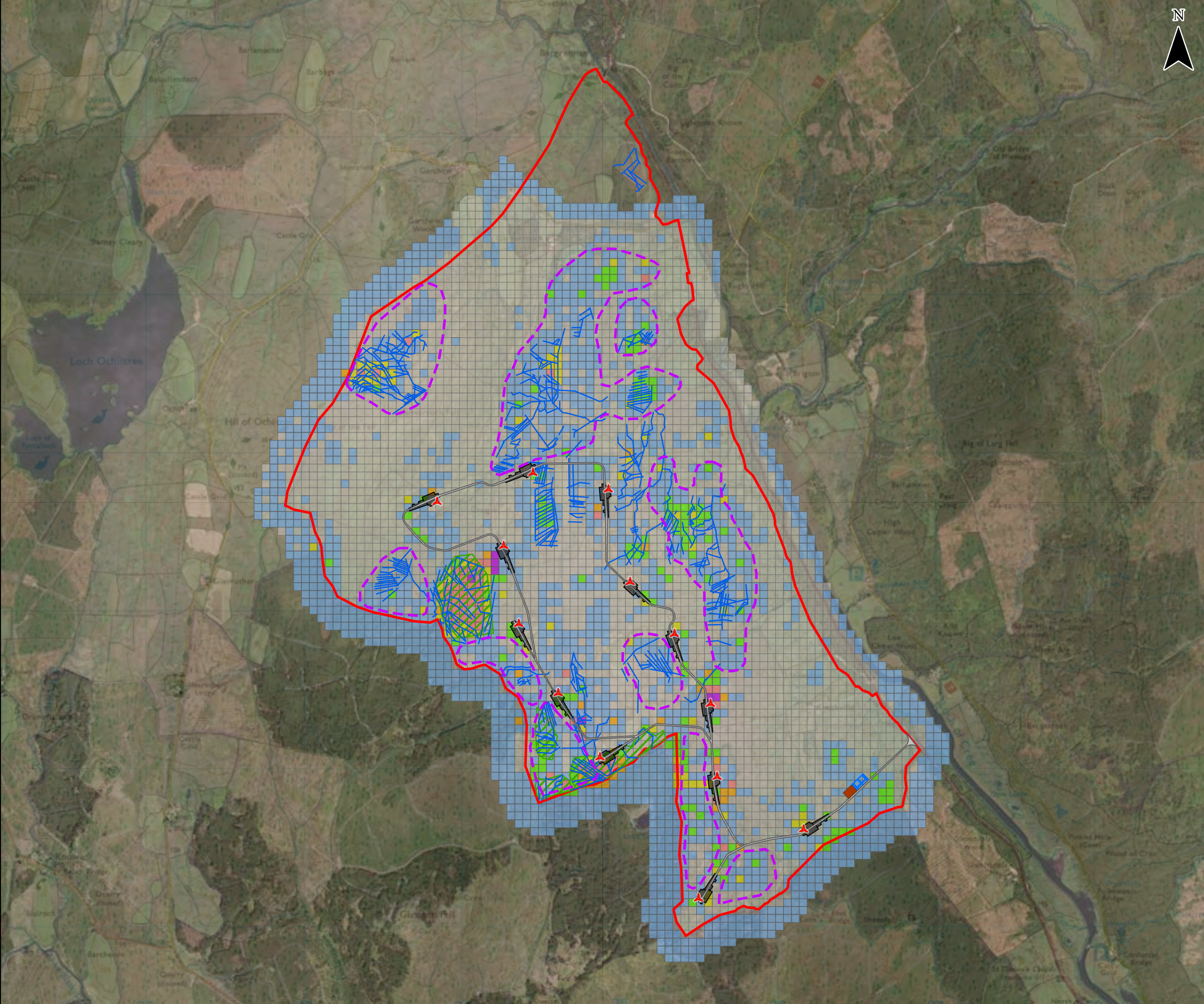


Project: Glenvernoch Wind Farm
Environmental Impact Assessment Report
Technical Appendix 9.4:
Outline Biodiversity Restoration Enhancement Plan

Title:
Figure 9.4.1
Habitat management proposals

DATE: 9/24/2024 SCALE @ A3 SIZE: 1:22,500
DRAWN: UKGFP776 CHECKED: AM APPROVED:

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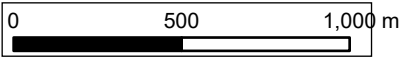
Key

- Site boundary
- turbine location
- Substation
- Access track
- Harstanding and laydown areas
- Construction compound
- Removal of conifer regeneration
- Candidate areas for peat bunds and sphagnum plug planting

Peat Depth (m)

- <0.5 m
- 0.5 - 1.0 m
- 1.0 - 1.5 m
- 1.5 - 2.0 m
- 2.0 - 2.5 m
- 2.5 - 4.0 m
- >4.0 m

Drainage ditch



World Imagery: Maxar, Microsoft



Client:



Project: Glenvernoch Wind Farm
Environmental Impact Assessment Report
Technical Appendix 9.4:
Outline Biodiversity Restoration Enhancement Plan

Title:

Figure 9.4.2
Peatland restoration

DATE: 9/24/2024 SCALE @ A3 SIZE: 1:22,500
DRAWN: UKGFP776 CHECKED: AM APPROVED:

DRAWING NUMBER:

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