

Appendix 9.6:

Protected Species

Survey Report

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Shepherds' Rig Wind Farm

Protected Species Survey Report
2026

Appendix 9.6

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1 Introduction

Proposed Varied Development Background

- 1.1 SETT Wind Development Limited ('the Applicant') gained Section 36 consent and deemed planning permission from Scottish Ministers in August 2023 to construct and operate Shepherds' Rig Wind Farm ('the Consented Development'). The Consented Development comprised 17 turbines (15 turbines with a maximum blade tip height of 149.9 metres (m) and two turbines with a maximum blade tip height of 125 m) and associated infrastructure.
- 1.2 The Applicant is now applying to Scottish Ministers for consent under Section 36C of the *Electricity Act 1989 (as amended)* and the *Town and Country Planning (Scotland) Act 1997* to vary the Consented Development. The proposed variations include:
 - Removal of six turbines and associated crane hard standings;
 - Increase in the maximum blade tip height of the remaining 11 turbines to 220 m;
 - Increase in size of associated crane hardstandings to accommodate the larger turbines;
 - Relocation of eight turbines beyond the micro-siting allowance of the Consented Development, but within the same pattern of development;
 - Amendments to part of the track layout to reflect turbine removal and relocation (as outlined above);
 - Change to the number and location of required watercourse crossings to accommodate the amended track layout;
 - Increase in size and capacity of the associated Battery Energy Storage System (BESS);
 - Relocation of the temporary construction compound slightly beyond micro-siting allowance;
 - Removal of the previously proposed anemometer mast; and
 - Increase to the period of consent from 30 to 40 years.
- 1.3 Collectively, the proposed variations listed above are referred to as the 'Proposed Varied Development'.
- 1.4 The key element of the Proposed Varied Development is the variation to the number and locations of the turbines. Turbines 5, 6 and 7 are unchanged (within micro-siting allowance) from the Consented Development. Locations of most of the remaining turbines are only slightly adjusted (within 200 m of a consented turbine position) to incorporate the constraints associated with larger turbines. Four turbines (1, 2, 4 and 11) are over 200 m from a consented turbine location; however, no turbine is over 500 m from a consented location, and all turbines are within the same habitat types as the original consented scheme.
- 1.5 A suite of ecological survey data was gathered by Bear Environmental Limited and Arcus Consultancy Services Limited in 2018 to support the Consented Development's Section 36 application, submitted in 2018. The application was successful based on the ecological baseline gathered in 2018, the ecology chapter of the Environmental Impact Assessment (EIA) having determined that no significant impacts would occur due to the Consented Development. Due to the age of the data collected in 2018, updated ecological surveys have been undertaken to support the Proposed Varied Development, to determine if the conditions on-site have remained unchanged.
- 1.6 BSG Ecology have been commissioned by the Applicant to provide the terrestrial ecology chapter of the EIA Report, as well as updated baseline habitat and protected species survey data for the site, to support the Section 36C application.

Review of previous ecological baseline assessments

- 1.7 To support the original application for the Consented Development, a number of previous ecological baseline assessments were undertaken as part of the EIA. These included:
- Shepherds Rig Wind Farm EIA Report – Chapter 9: Ecology;
 - Shepherds' Rig Wind Farm Additional Environmental Information Report – Chapter 9 Ecology;
 - Shepherds Rig Wind Farm EIA Report – Appendix 9.2: Protected Species; and
 - Shepherds Rig Wind Farm EIA Report – Appendix 9.4: Fisheries.
- 1.8 A review of the above sources was undertaken to inform the approach of the updated surveys in 2024.

Site description

- 1.9 The site remains the same as the Consented Development as is centred on British National Grid (BNG) 262319 593591, approximately 5 km east of the village of Carsphairn, Dumfries and Galloway. The site totals approximately 752 hectares (ha) and is dominated by commercial coniferous plantation in various stages of maturity interspersed with poor condition marshy grassland rides. The site is displayed in **Figure 1**.
- 1.10 The site is surrounded by wet grassland habitats (likely managed as upland pasture), heathland, and other commercial coniferous plantations. Several burns flow through the site. These are tributaries of the Water of Ken, located approximately 0.3 km east of site. These are displayed in **Figure 1** and summarised in **Table 2, Section 4**.

Purpose of report

- 1.11 Updated surveys were required to determine if the site character had changed since 2018 and if the original baseline data was still fit for purpose. This report details the methodology, potential limitations, and results of the updated protected species surveys (including otter *Lutra lutra*, water vole *Arviculus amphibius*, red squirrel *Sciurus vulgaris* and pine marten *Martes martes*) undertaken on-site in 2024 and 2026.
- 1.12 A summary review of the Consented Development's 2018 data for comparison to results collected in 2024 and 2026 for the Proposed Varied Development is considered in more detail along with the 2024 to 2026 data in the Ecology Chapter of the EIA Report (**Chapter 9**).
- 1.13 Updated bat survey data (BSG Ecology, 2025a) and baseline habitat data (BSG Ecology, 2025b) are presented in separate reports as **Appendix 9.7** and **Appendix 9.5**, respectively.

Personnel

- 1.14 This report was written by Harry Glass, Ecologist at BSG Ecology. Harry has been working in ecological consultancy since 2022 and has experience drafting protected species reports for a variety of renewables projects across the UK. The 2026 amendments to the report were undertaken by Jennifer Peacock, Ecologist at BSG Ecology. Jennifer has over 2 years' experience in Ecological Consultancy, including drafting a number of protected species reports.
- 1.15 The report was technically reviewed by Ian Heard ACIEEM and Principal Ecologist at BSG Ecology. Ian has worked in the ecological sector for more than 14 years and has been particularly involved in wind farm developments in the uplands of southern Scotland and northern England. He has contributed to a wide range of survey reports as author and/or reviewer on a variety of projects including wind farms.
- 1.16 A further review was undertaken by Associate Director Claire Dewson at BSG Ecology. Claire has worked in nature conservation for over twenty years and is experienced in writing and reviewing protected species reports.

- 1.17 Protected species surveys were undertaken by Rozanna Shah ACIEEM, Robert Mansbridge ACIEEM and Sarah Parkin ACIEEM, Associate Ecologists at Solway Ecology. The surveyor team have a wide range of protected species survey experience, including all target species, on a variety of renewables projects in England and Scotland. The 2026 surveys were undertaken by Jennifer Peacock, Ecologist and Hannah Breadin ACIEEM, Principal Ecologist.

2 Methods

Desk study

- 2.1 A desk study¹ was undertaken to identify sites designated for nature conservation, protected and notable habitats and species, and invasive non-native species relevant to the site. A stratified approach was taken when defining the desk study area based on the likely zone of influence of the scheme on different ecological receptors and an understanding of the maximum distances typically considered by statutory consultees.
- 2.2 A 5 km study area (increased to 20 km for bat records) was considered to be proportionate, taking into account the size of the proposal and the habitats surrounding. Records from 2014 onward were utilised to inform this report, in some cases if records prior to 2014 were considered notable they were also reviewed.
- 2.3 The South West Scotland Environmental Information Centre (SWSEIC) was contacted in December 2024 to obtain records of protected species and habitats, as well as non-statutory designated sites, within the desk study area.
- 2.4 Records were reviewed critically alongside field survey results to assist with the evaluation as opposed to relying on them as the sole basis for the evaluation. A summary of key records provided by the desk study (those that are potentially relevant to the development) is presented in Section 4 of this report.
- 2.5 Ordnance Survey mapping and publicly available aerial photography (accessed on 16 December 2024 <https://www.bing.com/maps>) were also used to assess habitats and check for any features of potential interest.
- 2.6 Information publicly available on MAGIC Mapping was also consulted (accessed on 16 December 2024 <https://magic.defra.gov.uk/MagicMap.aspx>) to search for statutory designated sites within 5 km.
- 2.7 Resources used to complete the desk study are summarised below in **Table 1**.

Table 1: Data sources referenced in the assessment

Data Source	Date Accessed / Received	Notes
MAGIC ² (https://magic.defra.gov.uk/)	Most recently accessed 16 December 2024	A 5 km desk study area was adopted for Statutory-designated sites. Scottish European protected species licence data is not available on MAGIC.
SWSEIC	Records received 09 December 2024	A 5 km desk study area was adopted as proportionate, and data was requested on protected species and designated non-statutory wildlife sites. A 20 km buffer was requested for bat species data.
Bing maps (https://www.bing.com/maps)	Most recently accessed 16 December 2024	A search was made for ponds and watercourses within 500 m of the site. Habitats were assessed using aerial imagery.

¹ The data from the desk study is from December 2024 and therefore less than 2 years old. Given that the site has not changed significantly in character since then (and since 2018) this is considered appropriate for the assessment.

² Multi Agency Geographic Information for the Countryside (MAGIC).

Field survey

- 2.8 Protected species surveys were undertaken to determine if the data used to support the Consented Development was still valid. All surveys extended at least 300 m from turbine locations and 100 m from tracks and other infrastructure. This reflects Scottish Environmental Protection Agency (SEPA) (2017) guidance, which recommends a minimum 250 m perimeter survey area around all excavations of 1 m or more depth.

Otter and water vole surveys

- 2.9 Otter and water vole surveys targeted habitats on-site with potential to support the species, namely the watercourses on-site. Surveys were undertaken on 20 June, 21 June, 23 July, 24 July and 06 August 2024 in suitable weather conditions. Additional survey work was undertaken at the Water of Ken from 27- 30 April 2026, also in suitable weather conditions with no rain preceding the surveys (this was deemed necessary due design iteration for the Proposed Varied Development which included turbine re-location in early 2026).
- 2.10 Otter surveys were undertaken following guidance from Natural England and Defra (2014) and NatureScot (2024). The surveys comprised a walked transect of the watercourses on-site and looked for signs of the species including spraints, anal jelly, feeding remains (such as discarded fish bones or crustacean and mollusc shells), slides, haul-outs, footprints, and potential resting sites.
- 2.11 Water vole surveys were undertaken following guidance from Dean *et al* (2016). The surveys were undertaken alongside the otter surveys and comprised a walked transect of the watercourses on-site to search for signs of the species including droppings, latrines, feeding remains (such as vegetation chewed at a 45° angle), footprints and burrows.
- 2.12 The Water of Ken was not included within the 2024 survey effort as it was located approximately 600 m east of the proposed infrastructure on-site and considered sufficiently distant that indirect impacts were considered likely to be negligible. However, turbine locations were amended in March 2026, closer to the Water of Ken (which is within 200 m of the site boundary), therefore survey of the watercourse was considered necessary.

Pine marten and red squirrel surveys

- 2.13 Habitat assessment surveys for red squirrel and pine marten were undertaken to determine if the existing baseline was still valid. Habitat characterisation using methods outlined by Cresswell *et al*, 2012 were used to assess the habitats on-site for their suitability to support red squirrel and pine marten.
- 2.14 Targeted pine marten and red squirrel walkover surveys were completed on 20 June, 21 June, 23 July, 24 July and 06 August 2024 in suitable weather conditions. Targeted walkovers were initially based on habitat suitability assessments made during the 2018 assessment by Arcus and refined following the first visit.
- 2.15 Red squirrel surveys comprised a walked transect of suitable habitats (primarily mature conifer plantation) following survey guidance set out in Cresswell *et al* (2012) and Gurnell, Lurz and Pepper (2009). Surveyors searched for field signs of the species including sightings of both red and grey squirrels, stripped pinecones and piled scales (feeding remains), footprints, and squirrel dreys in trees (potential breeding and resting sites). Pine marten surveys comprised a walked transect of suitable habitats (primarily mature conifer plantation and grassland rides) following survey guidance set out in Cresswell *et al* (2012). Surveyors searched for field signs of the species including sightings, scats, footprints, and features suitable for den creation (potential breeding and resting sites). Evidence was target noted (Appendix 2) using a five-figure grid reference.

Fisheries

- 2.16 Formal electrofishing surveys were undertaken by the Galloway Fisheries Trust in September 2018 as part of the 2018 baseline surveys. This data was reviewed to inform the Proposed Varied Development.

- 2.17 The Galloway Fisheries Trust was contacted in January 2025 to request information regarding any further electrofishing surveys in the catchment since September 2018. The trust provided guidance (Scottish Government 2021) which indicated that further survey was not required.

Other species

- 2.18 Evidence of or habitat suitability for badger and common reptiles was target noted where observed, but targeted surveys for these species were not undertaken. This was considered proportionate based on the results of the 2018 baseline surveys and outcomes of the Ecology Chapter of the EIA for the Consented Development.

Limitations to methods

- 2.19 All watercourses within 200 m of proposed works locations were subject to survey in relation to otter. However, due to land access restrictions, a 250 m buffer of works areas for pine marten was not followed for the turbines in the west of the site (Turbines 1, 3, 6, 8 and 10, **Appendix 1**), where only onsite habitat within this buffer was surveyed. The off-site habitat that was not surveyed consists almost entirely of grassland habitat unsuitable for pine marten den creation, with the exception of approximately 0.27 ha of mature conifer plantation west of Turbine 10. This area was continuous with on-site mature coniferous plantation, which displayed limited potential for pine marten den creation. The limitation is therefore not considered to significantly affect the assessment.

3 Results

3.1 Target notes are presented in **Figure 2** and summarised in **Table A1** of **Appendix 2**.

Otter

Desk study

3.2 SWSEIC returned a single record of otter within 5 km of the site since 2014. The record was of otter prints observed within the site itself near Watercourse 3 (see **Table 2** below and **Figure 1**) at OSNGR: NX 62850 93510.

2018 baseline surveys

3.3 A summary of the results of the 2018 otter surveys are presented below in **Table 2** and mapped in **Appendix 3**. The 2018 surveys targeted the watercourses on-site and within 200 m.

Table 2: Summary of 2018 otter survey results

Watercourse	Description at time of survey	Suitable habitat	Species evidence
1	Slow flowing, shallow burn passing through mature plantation woodland. Partially dry. Bankside vegetation was sparse.	Yes	None
2 (Dry Burn)	Shallow burn with a slow to moderate flow rate, passing through mature plantation and felled woodland. Bankside vegetation was sparse.	Yes	Otter spraint; NX 62569 91732 (on-site)
3 (Black Burn)	Slow flowing, shallow burn with some deeper pools passing through grassland, mature and felled woodland. Bankside vegetation present in grassland areas.	Yes	Otter spraint (on-site); NX 63179 93730 NX 61987 93077 NX 61987 93077
4 (Craigengillan Burn)	Moderate to fast flowing burn passing through grassland with vegetated banks along the majority of the watercourse. Bankside vegetation is absent where the burn passes through felled and mature plantation woodland.	Yes	Otter spraint (on-site); NX 63335 93821 NX 62921 94011 NX 62841 94053 Otter feeding remains (on-site); NX 63318 93842 NX 63166 93920
5	Very shallow slow-flowing burn with high steep bank sides. Mosses dominate the bankside vegetation.	Yes	None
6	Very shallow slow-flowing burn flowing through open areas as well as felled and mature plantation woodland. High density of vegetation in open sections.	Yes	None

Watercourse	Description at time of survey	Suitable habitat	Species evidence
	Signal crayfish <i>Pacifastacus leniusculus</i> (an otter food resource) are present.		
7 (Water of Ken and tributaries)	Slow to moderate flowing river with variable channel depth. Grassland and rocks present along bankside. Signal crayfish and brown trout <i>Salmo trutta</i> observed.	Yes	Otter spraint (off-site); NX 63265 96219 NX 63460 95733 Otter feeding remains (off-site); NX 63265 96219 (Poldores Burn) NX 63460 95733 (Polifferie Burn) NX 63484 93852 NX 63509 93816 NX 63502 93515 NX 63491 93006 NX 63519 92952 NX 63502 95504 Otter couches (off-site); NX 63502 95504 (Polifferie Burn) Otter holt (off-site); NX 63500 92882

3.4 The 2018 otter surveys found signs of otter presence on watercourses 2, 3, 4 and 7. All watercourses on-Site (1 – 6) have potential to support commuting otter. Watercourses on-site were considered unlikely to support sufficient fish populations to provide a suitable resource for foraging otter, however signal crayfish (a viable otter food resource) were present within watercourses 6 and 7 in 2018. Due to the invasive nature of signal crayfish, it is considered likely that their range on-site has increased since 2018 and they are also now present in other connected watercourses on-site.

3.5 Watercourse 7, located off-site within 200 m (and 600 m from the closest proposed works area), was deemed to be particularly suitable for otter foraging and commuting due to the river's shape, flow width, bank structure and the confirmed presence of prey items such as brown trout and signal crayfish. One otter couch and an otter holt were also found on the banks of Polifferie Burn and The Water of Ken respectively in 2018. The couch is located over 1 km north-east, and the holt is approximately 800 m east of any proposed works. Consequently, neither structure will be impacted directly by the Proposed Varied Development, and a survey update was not considered proportionate.

2024 update surveys

3.6 The 2024 update surveys found no evidence of otter on the watercourses on-site (1 to 6). Watercourse characteristics were observed to be as recorded in the 2018 baseline surveys with no significant deviation in flow rate, depth or bank side vegetation. Habitat suitability for the species was therefore concluded to be as recorded in the 2018 surveys.

2026 update surveys

3.7 The 2026 survey of the Water of Ken and tributaries (Polifferie Burn and Poldores Burn) found evidence of otter throughout the course of the river. The river measured approximately 12 m wide with an average depth of 30 cm. Deeper pools and shallow riffles were present. The substrate was dominated by cobbles and boulders (**Photograph 1, Appendix 4**). The bank sides measured an average of 1 m in height and formed cliffs with overhanging grassy vegetation in places. Adjacent habitat was grazed and dominated by soft rush *Juncus effusus* (**Photograph 2, Appendix 4**).

- 3.8 No otter holts were located during the survey. The previous holt identified in 2018 was no longer present due to the bank subsiding (**Photograph 3, Appendix 4**). Forestry woodland located to the west of the Water of Ken (**Photograph 4, Appendix 4**) is suitable for otter holt creation with a number of fallen trees present, however no holt was recorded at the time of survey in 2026. The survey results from 2026 are mapped in **Figures 3 a-c**.

Table 3: Summary of 2026 otter survey results

Watercourse	Description at time of survey	Suitable habitat	Species evidence
7 (Water of Ken and tributaries: Polifferie Burn and Poldores Burn)	Slow to moderate flowing river with variable channel depth. Grassland and rocks present along bankside which varies in gradient from shallow to near vertical. Signal crayfish <i>Pacifastacus leniusculus</i> and brown trout <i>Salmo trutta</i> observed.	Yes	Otter spraint (off-site); NX 63409 95977 (Polifferie Burn) NX 63412 95996 (Polifferie Burn) NX 63261 96209 (Polifferie Burn) NX 63486 93535 NX 63496 93524 NX 63516 93499 NX 63469 93369 NX 63468 93357 NX 63442 93227 NX 63448 93168 NX 63472 93044 NX 63507 92886 NX 63504 92744 NX 63434 92283 NX 63435 92277 NX 63297 91884 NX 63254 91839 Otter feeding remains (off-site); NX 63503 92892 NX 63506 92698 NX 63435 92286 NX 63294 91888 Potential otter couch (off-site): NX 63487 93695 NX 63489 93413 NX 63461 93360

Water vole

Desk study

- 3.9 SWSEIC returned no records of water vole within 5 km of the site.

2018 baseline surveys

- 3.10 A summary of the results of the 2018 water vole surveys are presented below in **Table 4** and mapped in **Appendix 3**. The 2018 surveys targeted the watercourses on-site and within 200 m.

Table 4: Summary of 2018 water vole survey results

Watercourse	Description at time of survey	Suitable habitat	Species evidence
3 (Black Burn)	Slow flowing, shallow burn with some deeper pools passing through grassland, mature and felled woodland. Bankside vegetation present in grassland areas.	Yes	Potential water vole feeding remains (onsite); NX 62025 93081
5	Very shallow slow-flowing burn with high steep bank sides. Mosses dominate the bankside vegetation.	Yes	None
6	Very shallow slow-flowing burn flowing through open areas as well as felled and mature plantation woodland. High density of vegetation in open sections. Signal crayfish present.	Yes	None
7 (Water of Ken and tributaries)	Slow to moderate flowing river with variable channel depth. Marshy and rocks present along bankside. Signal crayfish and brown trout <i>Salmo trutta</i> observed.	Yes	None

- 3.11 Watercourses 1, 2 and 4 did not present suitable habitat for the species.
- 3.12 Watercourses 3, 5, 6 and 7 displayed suitability for water vole foraging and burrow creation due to their favourable bank profiles, bank side vegetation, and slow flow rates. The 2018 surveys also found potential water vole feeding remains at Watercourse 3 in the form of vegetation chewed at a 45° angle. No other evidence of the species was recorded; presence of the species was therefore not confirmed in 2018.

2024 update surveys

- 3.13 The 2024 update surveys found no evidence of water vole on the watercourses on-site (1 to 6). Watercourse characteristics were observed to be as recorded in the 2018 baseline surveys with no significant deviation in flow rate, depth or bank side vegetation. Habitat suitability for the species was therefore concluded to be as recorded in the 2018 surveys.

2026 update surveys

- 3.14 The 2026 survey of the Water of Ken and its tributaries (Polifferie Burn and Poldores Burn) found no evidence of water vole. The Water of Ken is approximately 4 – 6 m wide and flows over bedrock boulders and gravel substrate (**Photograph 5, Appendix 4**). The banks were approximately 2 m high and consisted of a mix of steep and gentle slopes vegetated with rush, heath and grassland habitats. Scattered hazel and alder scrub was also present. The flow of the river was slow to moderate, with a mix of broken waves and ripples in areas of faster flow.

Pine marten**Desk study**

- 3.15 SWSEIC returned no records of pine marten *Martes martes* within the 5 km of the site.

2018 baseline surveys

- 3.16 The 2018 baseline surveys recorded no evidence of pine marten on-site.
- 3.17 The felled woodland, mature coniferous, mixed plantation woodland and marshy grassland habitats on-site were deemed to provide suitable foraging habitat for pine marten. The plantation and mixed woodland were also deemed to provide suitable den creation habitat, particularly where wind-blown trees with exposed root plates were present.

2024 update surveys

- 3.18 Several potential pine marten scats were recorded on-site during the 2024 update surveys (TN06 – 10, 12 and 13, Figure 2, Appendix 2). The scats were deemed to be potential pine marten evidence due to their location, prominence, composition and musk. However, due to their age and apparent exposure, samples taken were unsuitable for eDNA testing (Swift Ecology, 2022). Their origin was therefore not confirmed.
- 3.19 The felled woodland, mature coniferous and mixed plantation woodland, and grassland habitats on-site were deemed to be suitable for foraging pine marten due to the diversity of food resource for the species. The mature coniferous and mixed plantation woodland on-site was deemed suitable for pine marten den creation in the form of exposed root plates of wind-blown trees, though no suitable features on the trees themselves were recorded. This assessment is consistent with the 2018 baseline surveys. Several areas of mature coniferous plantation on-site have been felled since the baseline surveys, which represents a reduction in potential den creation habitat.

Red squirrel**Desk study**

- 3.20 SWSEIC returned 102 records of red squirrel *Sciurus vulgaris* within 5 km of the site within the last decade. None of the records were from within the site itself. The closest record to site was located approximately 1 km south of site at Carsphairn Community Woodland, dated September 2024. The record has direct terrestrial connectivity to the site via mature coniferous woodland.

2018 baseline surveys

- 3.21 The 2018 baseline surveys recorded evidence of potential red squirrel feeding remains throughout the mature coniferous plantation woodland. However, no red squirrels or squirrel dreys were observed on-site.
- 3.22 The mature coniferous woodland on-site was deemed to be optimal for foraging and breeding red squirrel. The other habitats on-site were deemed unsuitable due to the lack of foraging resource.
- 3.23 It was concluded that red squirrel were likely present on-site based on the evidence found, extent and suitability of habitats on-site and records of the species in the area found during the 2018 desk study.

2024 update surveys

- 3.24 No evidence of red squirrels was recorded during the 2024 update surveys.
- 3.25 The mature coniferous woodland on-site was deemed optimal for red squirrel foraging and breeding, however recent routine felling operations in 2024 have reduced the availability and continuity of this

habitat resource across the site. The marshy grassland present along plantation rides and tracks is suitable for red squirrel commuting and dispersal, only where these are surrounded by non-felled woodland habitats.

- 3.26 Due to the suitability of onsite habitats and potential field signs in 2018, the presence of red squirrel onsite cannot be ruled out.

Fisheries

Desk study

- 3.27 SWSEIC returned no records of brown trout or Atlantic salmon *Salmo salar* within 5 km of the site.

2018 baseline surveys

- 3.28 Nine distinct points of the watercourses on and near site (Figure 1) were sampled. Juvenile brown trout in varying densities and age classes in Watercourses 1 - 7. No Atlantic salmon were recorded.
- 3.29 Signal crayfish were recorded at Watercourses 6 and 7.
- 3.30 Competition from signal crayfish and the presence of the impassable Kendoon Dam downstream of the site (rendering the entire catchment inaccessible to migratory salmonids) renders the watercourses on-Site unsuitable for salmonids despite in-stream habitat quality.

2024 update

- 3.31 A survey update was not considered proportionate to the infrastructure amendments proposed for the Proposed Varied Development for the following reasons:
- The findings of the 2018 survey data indicated that the watercourses are not accessible to migratory salmonids due to the presence of a dam downstream at Kendoon Loch. The dam remains present and no other route allows salmonids access to site.
 - The population of invasive signal crayfish onsite in 2018 is likely to have spread, increasing competition and further reducing the onsite suitability of watercourses for salmonids.
- 3.32 The Galloway Fisheries Trust confirmed that they are not aware of any additional electrofishing surveys undertaken in the catchment since 2018.
- 3.33 Given that the site is cut off from migratory salmonids and the population of North American signal crayfish is likely to have grown, the suitability of the habitat on-site is considered likely to have declined since the 2018 surveys.

Badger

Desk study

- 3.34 SWSEIC returned three records of badger within 5 km of the site within the last decade. Of the records, two related to badger setts: a record located approximately 2.5 km south of the site, dated February 2017, and a record approximately 4.5 km south of site dated April 2024. The third record pertained to a male badger observed on the B729 road 4 km west of site.

2018 baseline surveys

- 3.35 No evidence of badgers was recorded during the 2018 baseline surveys, though their presence was not ruled out due to the presence of suitable habitats and the difficulty associated with thoroughly accessing the mature coniferous plantation woodland to check for setts.

- 3.36 The site was deemed to be of low suitability for badgers. Although the mature coniferous plantation woodland on-site presents opportunities for badger sett creation, the surrounding felled woodland and bog habitats (both on-site and in the wider area) was deemed to limit the Site's overall suitability.

2024 update surveys

- 3.37 All locations within 30 m of proposed turbines and infrastructure were subject to survey in 2024. Limited evidence of badger was recorded during the 2024 surveys, comprising badger foraging signs (TN01, Figure 2, Appendix 2) approximately 206 m from turbine 3; a badger latrine (TN11) approximately 65 m from turbine 8, and badger prints (TN15) approximately 300 m from turbine 5. The evidence was found in the western areas of site between stands of mature coniferous plantation woodland.
- 3.38 The woodland rides displayed a good variety of invertebrate foraging resource for badger and were deemed suitable for the species' foraging and commuting. The mature coniferous plantation woodland on-Site presents suitable sett creation habitat for the species, though none were found.

Reptiles

Desk study

- 3.39 SWSEIC returned ten records of reptile within 5 km of the site within the last decade, comprising six records of common lizard *Zootoca vivipara* and four records of adder *Vipera berus*.
- 3.40 The closest record to the site is located approximately 1 km south-west of Site, comprising a record of common lizard dated August 2022.

2018 baseline surveys

- 3.41 Formal reptile survey of the site was not undertaken. A single common lizard *Zootoca vivipara* was recorded during the 2018 baseline surveys near watercourse 2 (Dry Burn) (NX 62708 91952).
- 3.42 The felled woodland, woodland rides and marshy grassland habitats along the tracks were deemed suitable for common lizard and adder *Vipera berus*, presenting suitable foraging, refuge and hibernation resource.

2024 update surveys

- 3.43 Formal reptile survey of the site was not undertaken in line with NatureScot guidance for windfarms (NatureScot 2020). No evidence of reptiles was recorded during the walkover surveys (although as surveys were undertaken in the height of summer this is not unexpected).
- 3.44 The grassland, felled woodland and woodland rides were deemed suitable for reptile foraging, refuge and hibernation. This is consistent with the 2018 surveys. Additionally, three sections of dry-stone wall found on-site (TN03-05, Figure 2, Appendix 2) were assessed to provide a suitable reptile basking and hibernation resource.

Amphibians

Desk study

- 3.45 SWSEIC returned sixteen records of amphibians within 5 km of the site in the last decade; four common toad *Bufo bufo*, eleven common frog *Rana temporaria* and one palmate newt *Lissotriton helveticus*. SWSEIC holds no great crested newt *Triturus cristatus* (GCCN) records for locations within 5 km of the site.
- 3.46 The closest record to the site is located approximately 1.3 km south of site, comprising a record of common toad dated August 2022.

2018 baseline surveys

- 3.47 Throughout the 2018 baseline surveys several observations of both common frog and common toad were made onsite. During the Phase 1 habitat survey conducted by Bear Environmental in April 2018, a small pond was discovered in the northern area of site within the mature coniferous plantation woodland on the south face of Craigengillan Hill (approx. NX 62735 94723). Five unidentified newts were recorded in the pond. The pond was not present during the protected species surveys undertaken by Arcus in June 2018 and is therefore likely to be ephemeral in nature and suboptimal as a breeding site for amphibians.

2024 update surveys

- 3.48 No ponds were recorded within 500 m of infrastructure during the 2024 surveys, and therefore GCN survey was not required. Whilst wet habitats on site, including grassland, remain suitable for amphibians, none were recorded on site.

4 Summary

- 4.1 **Table 5** below summarises the change in protected species evidence recorded between the 2018 baseline and 2024-2026 update surveys.

Table 5: Summary of 2018 and 2024-2026 protected species surveys

Species	2018 surveys		2024-2026 surveys	
	Evidence recorded	Species presence	Evidence recorded	Species presence
Otter	Confirmed	Confirmed	None	Not ruled out
Water vole	Potential feeding remains	Not ruled out	None	Not ruled out
Pine marten	None	Not ruled out	Potential scats	Likely present
Red squirrel	Potential feeding remains	Likely present	None	Not ruled out
Salmonids	Confirmed	Confirmed	Not surveyed	Not surveyed. Signal crayfish assumed present.
Badger	None	Not ruled out	Feeding signs, prints, latrine	Confirmed
Reptiles (incidental)	Common lizard individual	Confirmed (common lizard)	None	Not ruled out
Common amphibians	Common frog and toad	Confirmed (common frog and toad)	None	Likely present

- 4.7 No evidence of otter, water vole, red squirrel or reptiles was recorded in the 2024 update surveys. Otter presence was recorded in 2026.
- 4.8 Evidence of otter use was recorded on Watercourses 2, 3, 4 and 7 in 2018; all Watercourses displayed habitat suitability for the species. No otter evidence was recorded during the 2024 surveys. Significant otter activity along the Water of Ken and tributaries was recorded in 2026. Habitat suitability on-site for otter has not changed since 2018.
- 4.9 Potential water vole evidence was recorded on Watercourse 3 in 2018 only, but presence was not concluded. Only watercourses 3, 5, 6 and 7 displayed habitat suitability for the species. No water vole evidence was recorded during the 2024 or 2026 surveys. Habitat suitability for water vole has not changed since 2018.
- 4.10 The 2018 baseline recorded no pine marten evidence. A large amount of potential pine marten evidence was recorded throughout the 2024 update surveys, though this evidence could not be confirmed through DNA analysis. The site continues to offer extensive foraging habitat, but routine felling has reduced the cover of mature conifer plantation on-site and consequently reduced the availability of suitable den creation habitat on-site.
- 4.11 The 2018 baseline recorded limited evidence of potential red squirrel feeding remains and concluded they were likely present on-site. No red squirrel evidence was recorded during the 2024 surveys. Routine felling has reduced the cover of mature conifer plantation on-site and consequently reduced the availability of suitable foraging and breeding habitat.

- 4.12 The 2018 baseline confirmed presence of brown trout in the watercourses on-site. The suitability of the watercourses on-site for salmonids is considered likely to have declined since the 2018 baseline surveys given the presence of the dam downstream and the presence of signal crayfish.
- 4.13 The 2018 baseline recorded no badger evidence. Badger is the only species whose presence on-site has been confirmed in the 2024 update surveys, although no setts were recorded on-site. Routine felling has reduced the cover of mature conifer plantation on-site and consequently reduced the availability of suitable breeding habitat.
- 4.14 The 2018 baseline confirmed presence of common lizard on-site in mosaic habitat near Watercourse 2. No reptile evidence was recorded during the 2024 surveys. Habitat suitability for reptiles has not significantly changed since 2018.
- 4.15 The 2018 baseline confirmed presence of common frog and common toad throughout the site. No amphibians were recorded during the 2024 surveys. Habitat suitability for amphibians has not significantly changed since 2018.

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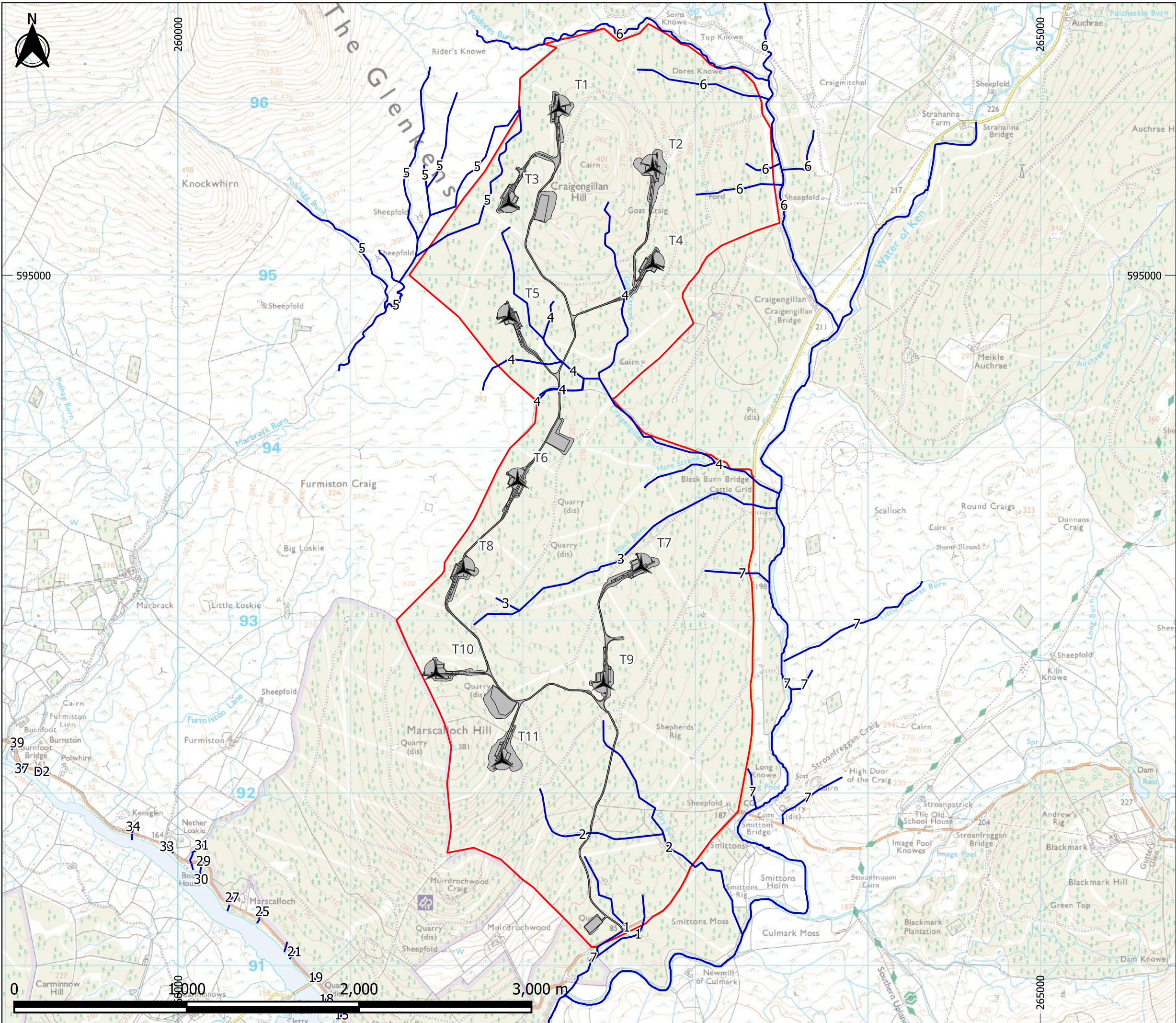
6 Figures

Figure 1: Watercourses

Figure 2: 2024 Target notes

Figure 3a-c: 2026 Survey Results

(overleaf)



- Legend
- Running water
 - Turbine
 - Infrastructure
 - Site boundary

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PROJECT TITLE
SHEPHERDS RIG WIND FARM

DRAWING TITLE
Figure 1: Watercourses

DATE: 15/06/2026 CHECKED: HS SCALE: 1:21,000
DRAWN: CS APPROVED: HS VERSION:1.0

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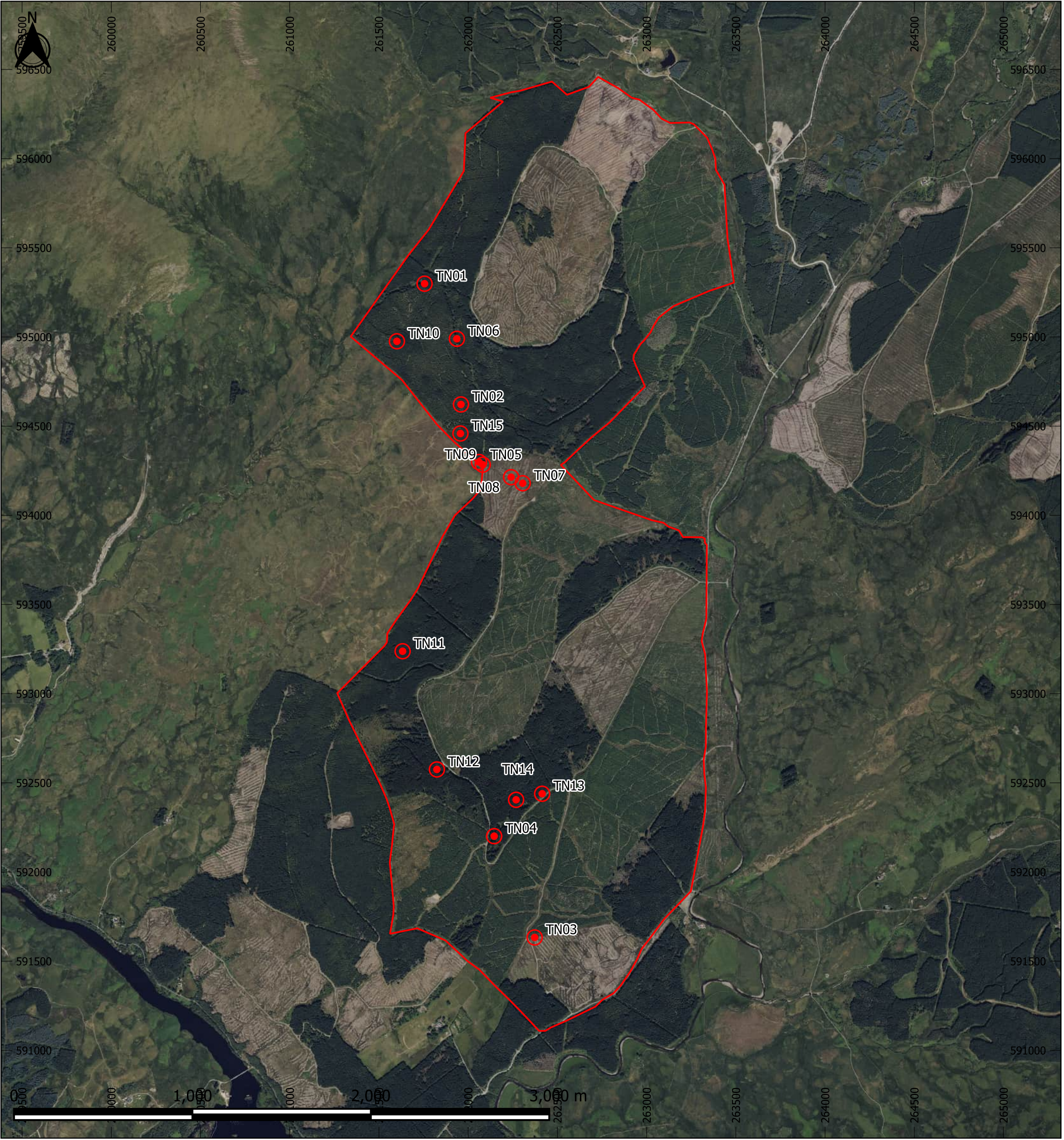
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Projection: OSGB 1936/British National Grid - EPSG 27700

Sources: BSG Ecology survey data



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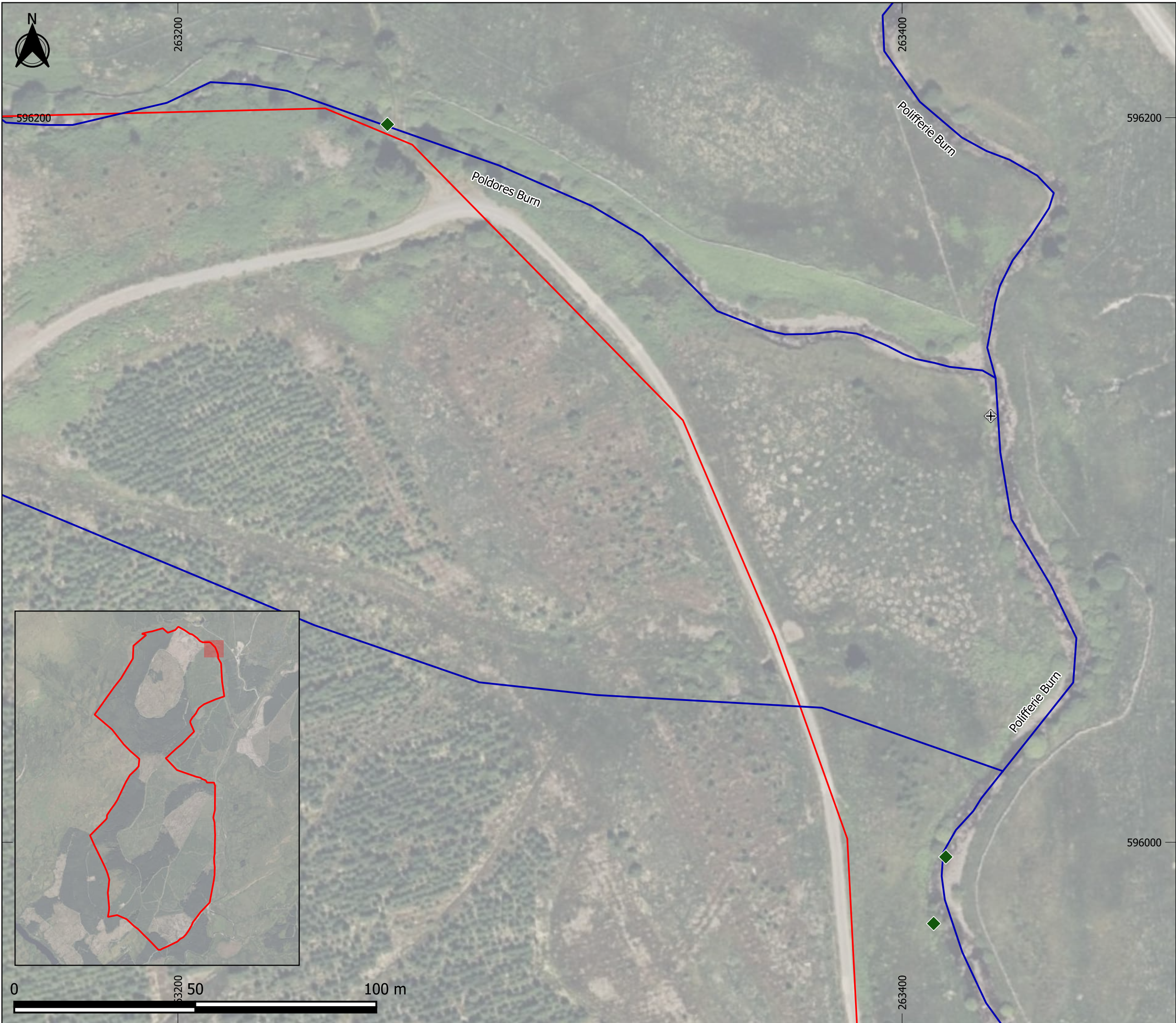
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SHEPHERDS RIG WIND FARM

DRAWING TITLE
Figure 2: Target Notes

DATE: 12/12/2024
DRAWN: MZ
CHECKED: HG
APPROVED: IH
SCALE: 1:21,000
VERSION:1.0

Legend

-  Target note
-  Site boundary



Legend

- ⊕ Otter - Run/pathway
- ◆ Otter - Spraint
- Watercourse
- Site boundary

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PROJECT TITLE
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DRAWING TITLE
Figure 3a: Otter survey results (map 1 of 3)

DATE: 05/05/2026 CHECKED: JP SCALE: 1:1,000
DRAWN: SL APPROVED: IH VERSION:1.0

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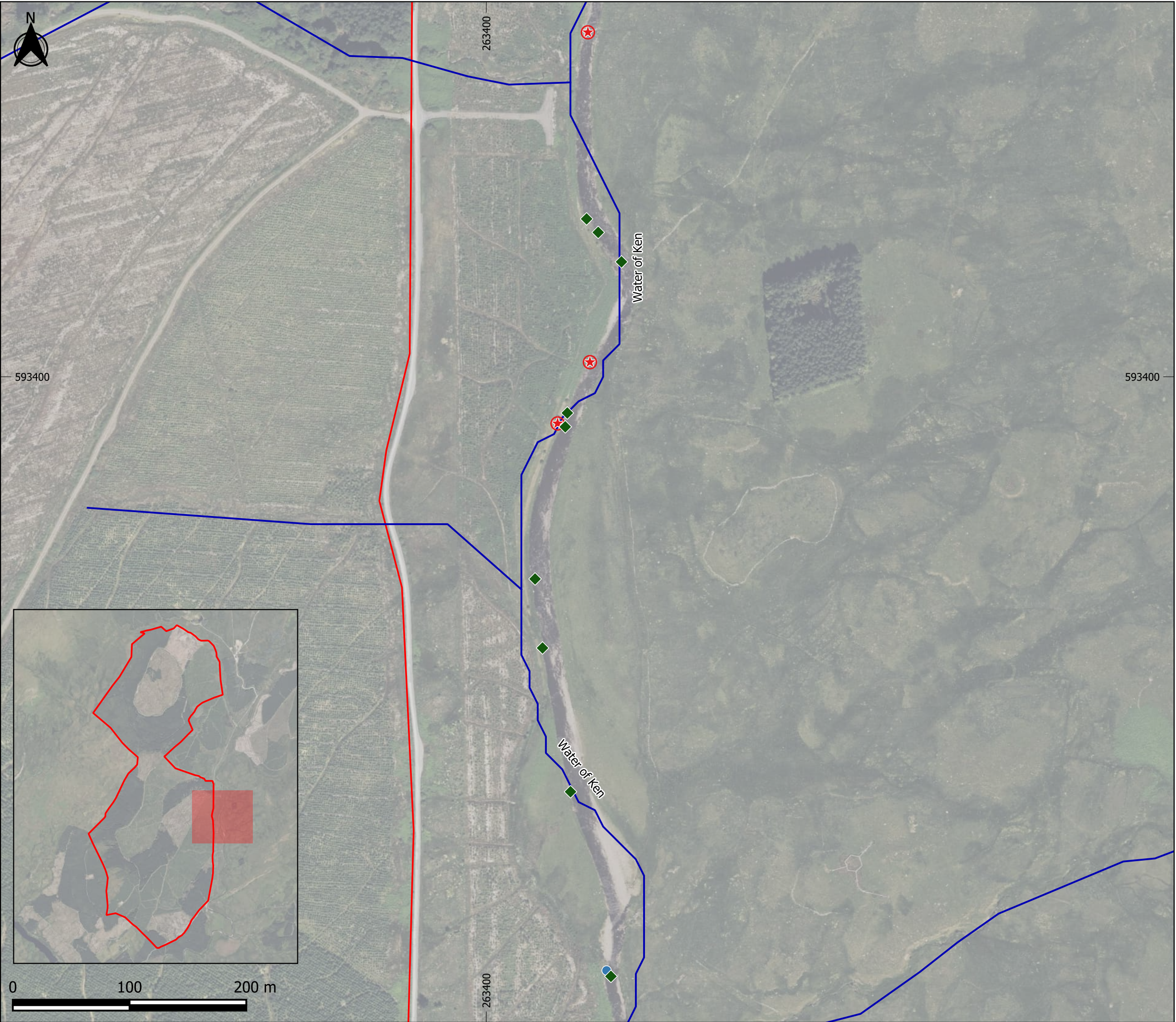
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Sources: BSG Ecology survey data



- Legend
- Otter - Feeding remains
 - ◆ Otter - Spraint
 - ★ Otter - Couch
 - Watercourse
 - Site boundary

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PROJECT TITLE
SHEPHERDS RIG WIND FARM

DRAWING TITLE
Figure 3b: Otter survey results (map 2 of 3)

DATE: 05/05/2026
DRAWN: SL

CHECKED: JP
APPROVED: IH

SCALE: 1:3,100
VERSION:1.0

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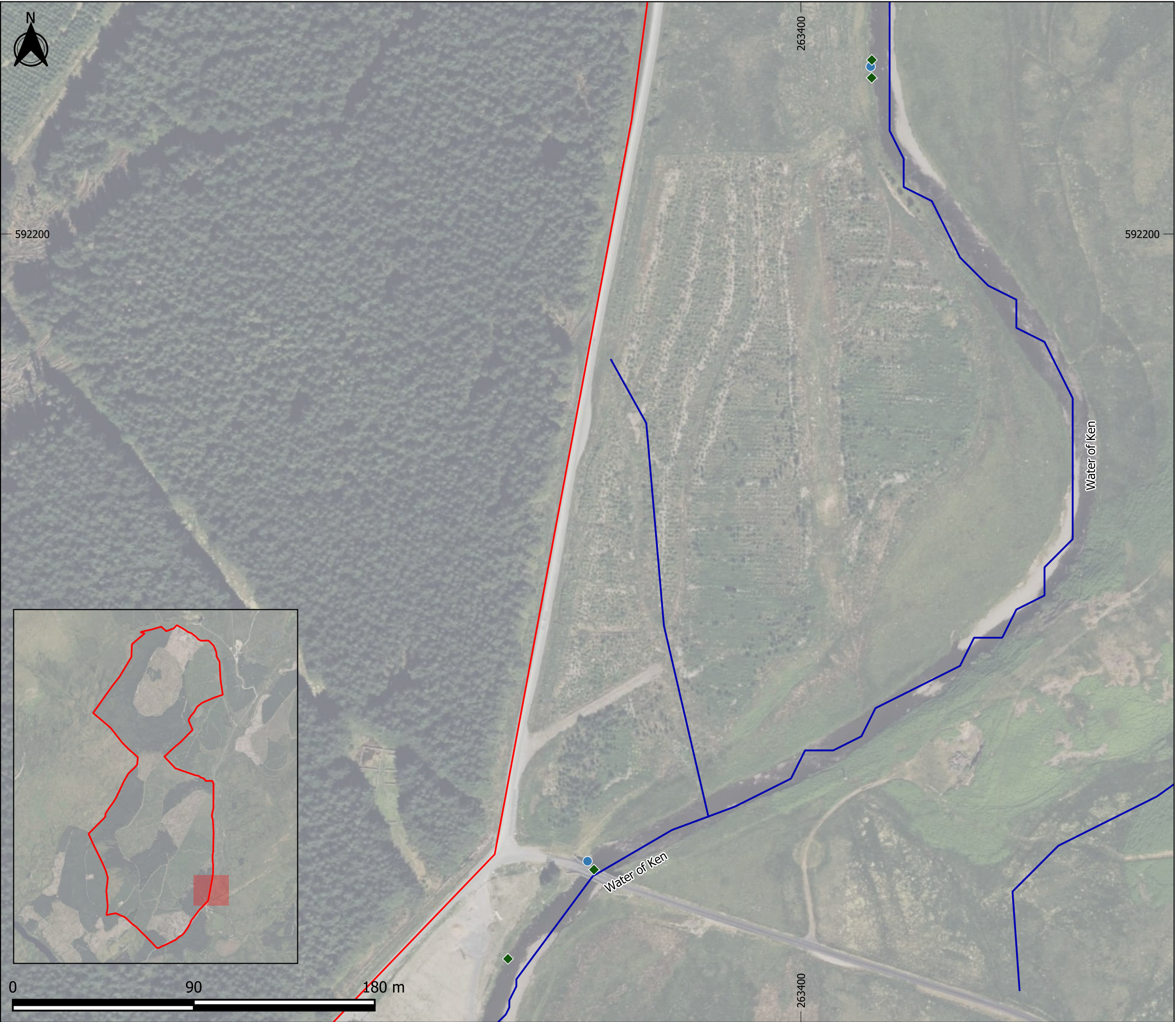
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Sources: BSG Ecology survey data



- Legend
- Otter - Feeding remains
 - ◆ Otter - Spraint
 - Watercourse
 - Site boundary

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PROJECT TITLE
SHEPHERDS RIG WIND FARM

DRAWING TITLE
Figure 3c: Otter survey results (map 3 of 3)

DATE: 05/05/2026 CHECKED: JP SCALE: 1:1,800
DRAWN: SL APPROVED: IH VERSION:1.0

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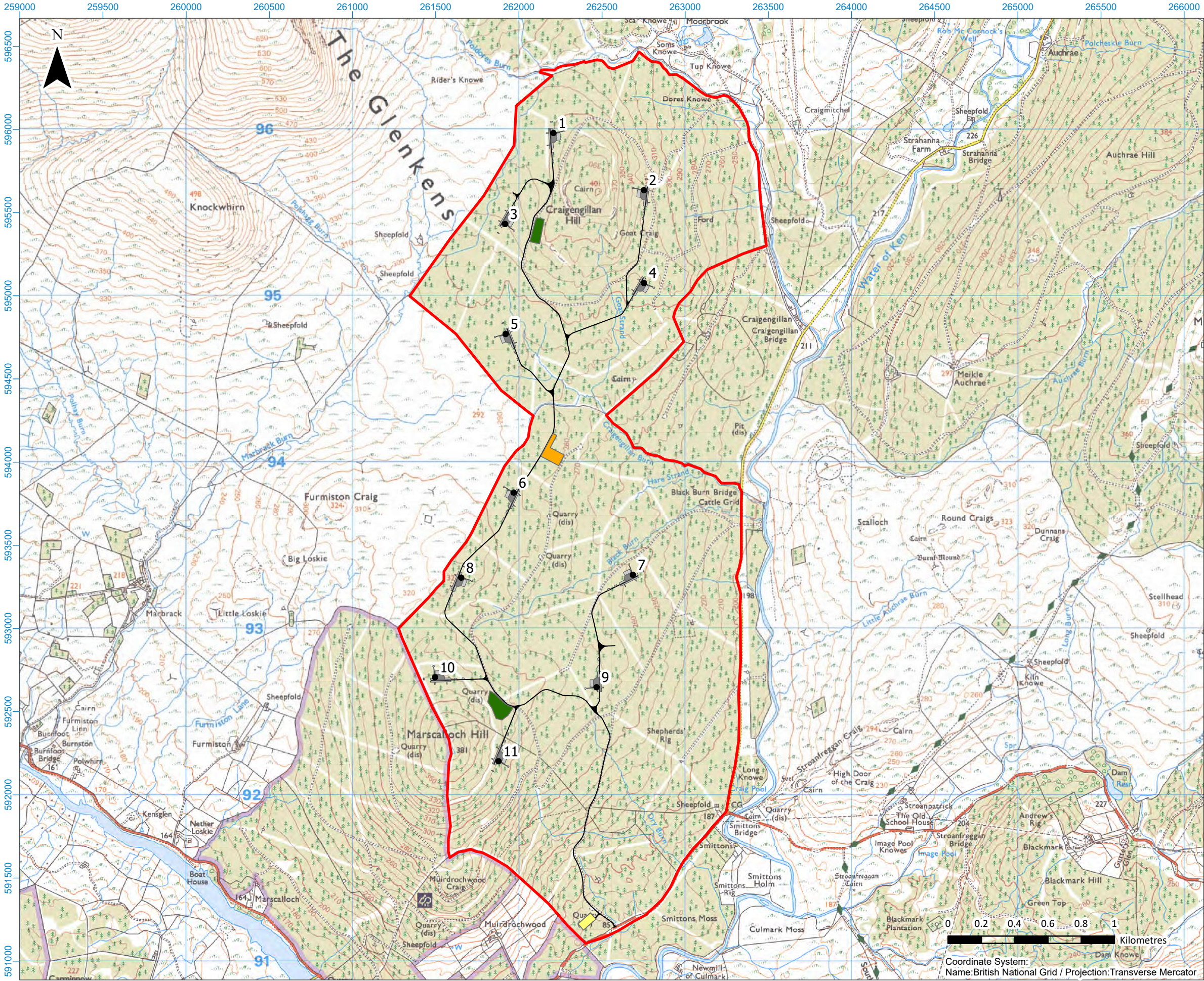
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Projection: OSGB 1936/British National Grid - EPSG 27700

Sources: BSG Ecology survey data

Appendix 1: Revised turbine layout

Figure 4.1: Proposed Varied Development Layout



- Legend:
- Site Boundary
 - Turbine Location
 - Access Track
 - Hardstanding (Permanent)
 - Hardstanding (Temporary)
 - Substation and BESS Compound
 - Construction Compound
 - Borrow Pit



Title
Proposed Varied Development Layout

Project:
Shepherds' Rig Wind Farm Section 36C

Source:
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Client:
Boralex

Drawn by:	Checked:
AR	CK
Date:	Figure:
14/04/2026	4.1
Scale:	Revision No.
1:23,000	1



Appendix 2: Target Notes (2024 surveys)

Table A1: Summary of Target Notes (TN) (see also Figure 2)

Label	Species	Description
TN01	Badger	Badger snuffle holes found in mature coniferous woodland ride.
TN02	Sparrowhawk <i>Accipiter nisus</i>	Two individuals observed.
TN03	Reptile	Three drystone walls between 15 – 30 m in length, suitable as reptile hibernation and basking resource.
TN04		
TN05		
TN06	Pine marten	Potential pine marten scat found in prominent location in woodland ride. Lacked a scent. Fruit seeds found inside. 9 cm x 9 cm.
TN07		Potential pine marten scat found in prominent location in woodland ride. Sweet musky scent. Beetle remains and fruit seeds found inside. 9 cm x 9 cm.
TN08		Potential pine marten scat found in prominent location in woodland ride. Beetle remains and fruit seeds found inside. 9 cm x 2 cm.
TN09		Potential pine marten scat found on edge of mature woodland. Beetle remains and fruit seeds found inside. 6 cm x 3 cm.
TN10		Potential pine marten scat found within stand of woodland. Beetle remains found inside. 8 cm x 8 cm.
TN11	Badger	Latrine found within woodland stand near grassland ride. Beetle remains found inside. 8 cm x 8 cm.
TN12	Pine marten	Two potential pine marten scats, light brown in colour, found in woodland clearing. 2.5 cm x 2.5 cm.
TN13		Single potential pine marten scats, recorded near woodland stand edge. 2.5 cm x 2.5 cm.
TN14		Single potential pine marten scat recorded in southern woodland parcel.
TN15	Badger	Badger footprints recorded in mature woodland along mammal trail.

Appendix 3: 2018 Protected Species Survey Results



SHEPHERDS' RIG WIND FARM

APPENDIX 9.2: PROTECTED SPECIES

SEPTEMBER 2018



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APPENDIX A: FIGURES

APPENDIX B: PHOTOGRAPHS

1 INTRODUCTION

This Technical Appendix (TA) describes the methods and results of the Protected (Mammal) Species Surveys undertaken to obtain baseline ecological information, to inform the Environmental/Ecological Impact Assessment (EIA/EcIA) of the proposed Shepherd's Rig Wind Farm. This TA will present the methods and results of Protected Species Surveys undertaken in 2018, and supports the EIA Report - Chapter 9: Ecology in addition to:

- TA 9.1: Habitats & Botany 1
- TA 9.3: Bats²;
- TA 9.4: Fisheries³.

The aim of the Protected Species Surveys was to obtain detailed information regarding the occurrence and distribution of Protected Species within the Protected Species Survey Area (Figure 1, Appendix A), to provide an accurate and robust baseline on which to base an EcIA.

The following terminology is used throughout this TA:

- **The Development:** the whole physical process involved in the development of the land at Shepherd's Rig Wind Farm, including the wind farm construction and operation (not a piece of land);
- **The Site:** the area of land with the potential to support the Development (shown as red line boundary in Figure 1, Appendix A);
- **Protected Species Survey Area:** the land within which the Protected Species surveys were undertaken (shown as blue line boundary in Figure 1, Appendix A)

1.1 Site Background

The Site, centred on national grid reference NX 62306 94337, lies approximately 5 kilometres (km) east of the village of Carsphairn, Dumfries and Galloway. The Site is accessed through forestry gates in the south and east via the B729 between Carsphairn in the west and Moniave in the east.

Marscalloch Hill is located within the southern section of the Site and Craigengillan Hill in the northern section. Black Burn and Craigengillan Burn are situated within the northern section of the Site and Dry Burn is located in the south of the Site. Notable watercourses outwith the Site include; the Water of Deugh (situated approximately 1 km to the south-west), the Water of Ken (parallel to the eastern boundary of the Site) and Polifferie Burn (parallel to the north-eastern boundary of the Site). The Water of Deugh and the Water of Ken converge, forming Kendoon Loch, approximately 1.4 km south-west of the Site. Habitats within the Site are dominated by coniferous plantation woodland of various ages (included recently felled woodland), and the landscape surrounding the Site is comprised of primarily coniferous plantation and grassland habitats (including livestock pasture).

2 METHODS

2.1 Protected Species Survey Area

All Protected Species Surveys were undertaken within the Protected Species Survey Area as presented in Figure 1 (Appendix A). The Protected Species Survey Area encompassed all land within the Site, plus an additional buffer of up to 250 metres (m) informed by a review

¹ Bear Environmental (2018) REPORT No. 1001-117: Shepherd's Rig Ecological Appraisal: Extended Phase 1 Habitat Report.

² Arcus (2018) Shepherd's Rig Technical Appendix 9.3: Bats

³ Galloway Fisheries Trust (2018) Commissioned Report No. RMAD26: Electrofishing and habitat survey to cover the proposed Shepherd's Rig Wind Farm

of Scottish Natural Heritage (SNH) guidance⁴. Although the Protected Species Survey Area includes survey areas for all species assessed likely to be present, the area surveyed for each species varied depending on species specific survey guidelines⁴, as outlined below:

- Otter: Suitable riparian habitats within the Site and up to 200 m up and downstream of watercourses potentially impacted by the Development;
- Water vole: Suitable riparian habitats within the Site and up to 50 m up and downstream of watercourses potentially impacted by the Development;
- Badger: Suitable habitats within the Site and up to 100 m buffer outwith;
- Pine marten: Suitable habitats within the Site and up to 250 m buffer outwith; and,
- Red squirrel: Suitable habitats within the Site and up to 50 m buffer outwith.

2.2 Desk Study

To provide local context for the results of the Protected Species Surveys, existing biological records of protected and notable species were sought within and up to a 2 km radius of the Protected Species Survey Area. The desk study requested records from the following organisations:

- South West Scotland Environmental Information Centre (SWSEIC);
- Dumfries and Galloway Bat Group (DGBG);
- Scottish Wildlife Trust (SWT);
- Galloway Fisheries Trust; and,
- Nith District Salmon Fisheries Board.

A data search was undertaken for statutory and non-statutory designated sites of nature conservation interest for European Protected Species (EPS) was undertaken. The search criteria applied is provided in Table 1, and was sought through data requests as well as from publically available data sources such as the Scottish Natural Heritage (SNHi Information Service) SiteLink website⁵ and the National Biodiversity Network⁶ (NBN) database.

Table 1: Search Criteria for Designated Sites

Protection	Designation	Search radius
Non-statutory	Ancient Woodland Inventory (AWI) Site of Interest for Nature Conservation (SINC) Local Nature Reserves (LNR)	2 km
Statutory	Sites of Special Scientific Interest (SSSI) National Nature Reserves (NNR)	5 km
	Ramsar Sites Special Area of Conservation (SAC)	10 km

2.3 Field Surveys

Protected Species Surveys were carried out by Laura Spence BSc (Hons) Grad CIEEM and Katie Allan BSc (Hons) of Arcus Consultancy Services Limited (Arcus) within June 2018. All surveys were undertaken within the Protected Species Survey Area and included surveys for the following protected species;

- Badger (*Meles meles*);

⁴ Scottish Natural Heritage: Planning and development: protected animals. Available online at: <https://www.nature.scot/professional-advice/planning-and-development/natural-heritage-advice-planners-and-developers/planning-and-development-protected-animals/> [Accessed August 2018]

⁵ Scottish Natural Heritage. SiteLink [Accessed August 2018]

⁶ National Biodiversity Network (2016). Available at: <https://data.nbn.org.uk/> [Accessed August 2018]

- Otter (*Lutra lutra*);
- Pine marten (*Martes martes*);
- Red squirrel (*Sciurus vulgaris*); and,
- Water vole (*Arvicola amphibious*).

In addition to the targeted Protected Species Surveys, a watching brief for other notable species such as reptiles, amphibians and non-native invasive species was maintained by Arcus personnel whilst undertaking work within the Protected Species Survey Area and incidental records of protected species were maintained

Various guidance texts were consulted to ensure accuracy of the identification of field signs and appropriate application of guidance. The key utilised texts, and indicators of presence are summarised in Table 2..

Table 2: Summary of Protected Species Indicators and Key Guidance Utilised.

Species	Indicators of presence	Key guidance documents utilised
Amphibians	Sightings, suitable habitats, spawn	Common Standards Monitoring Guidance for Reptiles and Amphibians ⁷ Evaluating the suitability of habitat for the Great Crested Newt ⁸
Badger	Setts (groups of burrows), paths, snuffle holes, feeding remains, scratching posts, latrines (dung pits used as territorial markers), prints, hairs and suitable habitats	Surveying Badgers ⁹
Otter	Sprainting sites, prints, resting sites, paths, slides, feeding remains and suitable habitat	Animal Tracks and Signs ¹⁰ How to find and Identify Mammals ¹¹
Pine marten	Dens, scats, prints and suitable habitats	UK BAP Mammals Interim Guidance for Survey Methodologies, Impact Assessment and Mitigations ¹²
Red squirrel	Watching brief maintained for sightings, feeding remains and dreys	Practical Techniques for Surveying and Monitoring Squirrels ¹³
Reptiles	Sightings, suitable hibernacula.	National Amphibian and Reptile Recording Scheme Reptile Habitat Guide ¹⁴
Water vole	Droppings, prints, burrows, feeding stations, runs, 'nests', lawns of short vegetation around burrow entrances and suitable habitat.	The Water Vole Mitigation Handbook ¹⁵

⁷ Joint Nature Conservation Committee (2004) *Common Standards Monitoring Guidance for Reptiles and Amphibians*, Version February 2004. JNCC, Peterborough.

⁸ Oldham R.S., Keeble J., Swan M.J.S. & Jeffcote M. (2000). Evaluating the suitability of habitat for the Great Crested Newt (*Triturus cristatus*). *Herpetological Journal* 10 (4), 143-155.

⁹ Harris, S., Cresswell, P. and Jefferies, D. (1991) *Surveying Badgers* The Mammal Society, London

¹⁰ Bang, P. and Dahlstrøm, P. (2001). *Animal Tracks and Signs*. Oxford University Press, Oxford.

¹¹ Sargent, G. and Morris, P. (2003). *How to find and Identify Mammals*. The Mammal Society, London.

¹² Cresswell, W.J., Birks, J.D.S., Dean, M., Pacheco, M., Trehwella, W.J., Wells, D. and Wray, S. (2012). UK BAP Mammals Interim Guidance for Survey Methodologies, Impact Assessment and Mitigations. The Mammal Society, Southampton

¹³ Gurnell, J. Lurz, P. and Pepper, H. (2009). *Practical Techniques for Surveying and Monitoring Squirrels*. Forestry Commission, Surrey.

¹⁴ The Herpetological Conservation Trust (2007). National Amphibian and Reptile Recording Scheme, Habitat Recording Guide

¹⁵ Dean, M., Strachan, R., Gow, D., and Andrew, R. (2016) *The Water Vole Mitigation Handbook* (The Mammal Society Mitigation Guidance Series). The Mammal Society, London.

The location of field signs, habitats and notable features identified during the Protected Species Surveys were recorded with a handheld Global Positioning System (GPS) or using the Esri Collector App for ArcGIS mobile application. Where appropriate, photographs were taken to visually document evidence and habitat features to assist interpretation of results, and inform reporting and assessment (see Appendix B: Photographs).

2.4 Survey Constraints and Limitations

2.4.1 Otter and Water Vole Survey Limitations

Due to the nature of the terrain and the watercourses present, it was not possible to survey the full extent of all watercourses and wetland areas within the Protected Species Survey Area in detail, for health and safety reasons. It is not considered however that this limitation affected the accuracy of the survey, or the robustness of the data recorded.

2.4.2 Other Limitations

The dense nature of much of the plantation forestry significantly limited access to some areas of woodland, reducing the ability to survey in detail. Access to some areas, including areas of wind-blown trees and areas inundated with water, was not possible for health and safety reasons. This was a survey limitation for those protected species more likely to be associated with woodland habitat such as badger, red squirrel and pine marten. However it is also worth noting that dense and waterlogged stands of coniferous woodland generally provide less favourable resources to these species.

3 RESULTS

3.1 Desk Study Results

Table 3 below summarises the protected species data obtained from SWSEIC and the National Biodiversity Network⁶ within approximately 2 km of the Protected Species Survey Area. Data was not received from any other requested sources, this was partly as data collected by these organisation is either submitted to SWEIC or to NBN.

Table 3: Summary of Records of Protected & Notable Species

Species	Latin name	Date of Record	No of Record	Conservation Status	Closest Proximity to Site
Badger	<i>Meles meles</i>	2006	1	UK ¹⁶ , SBL ¹⁷	5 km
Red squirrel	<i>Sciurus vulgaris</i>	2001-2017	17	UK, LBAP ¹⁸ , SBL	2.0 km
Adder	<i>Vipera berus</i>	2003-2016	6	SBL, LBAP	3.0 km
Common frog	<i>Rana temporaria</i>	1998-2008	2	SBL	3.4 km
Common Toad	<i>Bufo bufo</i>	1999-2008	2	SBL	3.4 km

¹⁶ Wildlife and Country Side Act (as amended in Scotland). Available online at <https://www.legislation.gov.uk/ukpga/1981/69> Accessed September 2018

¹⁷ Scottish Biodiversity List Available online: <https://www.gov.scot/Topics/Environment/Wildlife-Habitats/16118/Biodiversitylist/SBL> Accessed September 2018

¹⁸ Dumfries and Galloway Local Biodiversity Action Plan: Available at: https://www.dumgal.gov.uk/media/19945/Local-Biodiversity-Action-Plan/pdf/Local_Biodiversity_Action_Plan.pdf Accessed September 2018

Only one statutory designated site was located within 5 km of the Protected Species Survey Area; Cleugh Site of Special Scientific Interest (SSSI), which is designated for its assemblage of lowland neutral grassland species.

No non-statutory designated sites were found within the Protected Species Survey Area or surrounding 2 km.

3.2 Protected Species Survey Results

3.2.1 Otter

The Water of Ken, which flows adjacent to the eastern boundary of the Site (Table 4: Watercourse 7) has particular suitability for otter foraging and commuting due to the size and flow rate of this watercourse, coupled with the suitability of this watercourse to support fish species the main source of prey upon which otter would feed¹⁹. Fish species recorded within this watercourse during protected species surveys included

All other watercourses within the Protected Species Survey Area have potential to support commuting otter, however many were considered to be lesser value resource for foraging otter. It is unlikely that many of the watercourses within the Site sustain notable fish populations, however some of the larger watercourses within the Site, such as Craigengillan Burn, Black Burn and Dry Burn have the potential to support small population of fish, including juvenile salmonids. As the survey visit coincided with the peak period for amphibian spawning (primarily common frog), it is feasible that the Site was temporally being utilised by foraging otter to feed on amphibian prey species²⁰.

The watercourses are identified on Figure 1, Appendix A, and the physical attributes for each of the watercourses are presented in Table 4 below.

Presence of otter was established in four of the seven watercourses surveyed (see Table 4, below). Within the site, the Dry Burn, Black Burn and Craigengillan Burn all displayed evidence of otter usage in the form of spraints and feeding remains. Outwith the Site boundary, as well as spraints and feeding remains two otter couches were confirmed within the Water of Ken. Additionally, an otter holt was identified within the bank of the Water of Ken. The holt, a tunnel within the bank, extended more than 0.5 m backwards into the bank. The tunnel entrance was approximately 0.3 m wide, narrowing to 0.25 m within.

¹⁹ Harris, S. & Yalden, D. W. eds. (2008). Mammals of the British Isles: Handbook, 4th Edition.

²⁰ Weber, J.M. (1990) Seasonal exploitation of amphibians by otters (*Lutra lutra*) in north-east Scotland. Journal of Zoology. Volume 220. Issue 4. April 1990. Pages 641-651

Table 4: Otter and Water Vole (Watercourse reference numbers refer to locations shown in Figure 1, Appendix A)

Watercourse Ref./Name	Av. Width (m)	Av. Depth (m)	Flow Rate	Substrate Type	Bankside Vegetation	Habitat Suitability	Species Recorded	Evidence Record	Additional Notes
1	Varies 0.3 - 1	0.2	Slow	Bedrock, gravel	Watercourse passes through mature plantation – bankside vegetation sparse.	Otter	None	N/A	Southern fork of this watercourse was mostly dry at the time of survey. No evidence of protected species was recorded.
2 Dry Burn	1	0.2	Slow to moderate	Bedrock, gravel	Watercourse passes through mature plantation and felled woodland.	Otter	Otter	Spraint; NX 62569 91732	Channel depth and flow rate vary throughout the length of the watercourse.
3 Black Burn	0.5	0.3	Slow	Earth	Marshy grassland, also passes through areas of mature and felled plantation.	Otter Water vole	Otter	Spraints; NX 63179 93730 NX 61987 93077	Where the watercourse passes through open areas marshy grassland and rushes dominate. There are some deeper pools present in places.
4 Craigengillan Burn	3	0.3	Moderate to fast	Bedrock, gravel	Marshy grassland	Otter	Otter	Spraints; NX 61987 93077 NX 63335 93821 NX 62921 94011 NX 62841 94053 Feeding remains; NX 63318 93842 NX 63166 93920	Passes through some areas of felled woodland. Flow rate varies along the length of the watercourse but generally faster flow. Vegetated banks along majority of the watercourse.

Watercourse Ref./Name	Av. Width (m)	Av. Depth (m)	Flow Rate	Substrate Type	Bankside Vegetation	Habitat Suitability	Species Recorded	Evidence Record	Additional Notes
5	0.5	0.1	Slow	Compact earth banks	Watercourse passes through mature plantation, mosses dominate the ground flora present	Otter Water vole	None	N/A	Water is very shallow, banksides 1m high in places with steep gradient. No evidence of protected species recorded.
6	0.2	0.1	Slow	Compact earth banks	Within open sections the channel is choked with vegetation, where the watercourse passes through planation there is little vegetation present.	Otter Water vole	None	N/A	

Watercourse Ref./Name	Av. Width (m)	Av. Depth (m)	Flow Rate	Substrate Type	Bankside Vegetation	Habitat Suitability	Species Recorded	Evidence Record	Additional Notes
7 Water of Ken	12	0.5	Slow to moderate	Bedrock , gravel, limited sections of earth banks	Marshy grassland, rocks	Otter Water vole	Otter	Spraints; NX 63265 96219 NX 63460 95733 Feeding signs; NX 63265 96219 NX 63460 95733 NX 63484 93852 NX 63509 93816 NX 63502 93515 NX 63491 93006 NX 63519 92952 NX 63502 95504 Otter couch: NX 63502 95504 Otter holt: NX 63500 92882	Some areas of the channel too deep to walk through. Brown trout (<i>Salmo trutta</i>) and signal crayfish (<i>Pacifastacus leniusculus</i>) recorded.

3.2.2 Water Vole

Watercourses within the Protected Species Survey Area varied in their ability to support water vole due to variation in bankside vegetation and substrate (Table 4, cross-referenced with Figure 1, Appendix A). Four watercourses within the Protected Species Survey Area were generally considered to be sub-optimal for water vole, having stony or rocky substrate and banksides with limited opportunity for water vole burrow construction.

Watercourses 3, 5, 6 and 7 (see Table 4) displayed better suitability for water vole, due to the suitability of the bankside gradient and composition for burrow construction, well-vegetated banks (providing both food (rushes) and shelter), slowly flowing water, and lack of shade from nearby trees²¹.

No water vole burrows or latrines were found within the Protected Species Survey Area and therefore the presence of the species cannot be confirmed. However, potential water vole foraging signs (characteristically chewed vegetation at an angle of 45 degrees) were identified along the western section of the Black Burn.

3.2.3 Badger

Coniferous plantation forestry can provide suitable habitat in which badgers can excavate setts; however, if present, these were difficult to detect due to the restricted access this habitat presented surveyors. Whilst areas of mature plantation forestry provide possible habitat for badgers; the majority of these areas were surrounded by bog/marshy grassland areas and felled planation, which limits accessibility for badgers to these habitats. Badgers are most commonly associated with deciduous woodland, arable farmland and intensive grassland²²; therefore, it is considered that the habitats within the Protected Species Survey Area offer low potential to support badgers.

No evidence or sightings of badger were recorded during the protected species surveys, however as some habitats of limited suitability to the species exist within the Protected Species Survey Area and the surrounding environment, their presence in low densities cannot be ruled out.

3.2.4 Pine Marten

The large areas of coniferous plantation forestry within the Protected Species Survey Area provide potential denning habitat for pine marten. Wind-blown trees, particularly their root plates can provide features (for example cavities), which pine martens could use for dens or refuge²³. Non-forest habitats (such as felled areas and forest rides) within the Protected Species Survey Area offer suitable foraging habitat for pine marten.

No evidence or sightings of pine marten were recorded during the Protected Species Surveys, however as suitable habitat for the species exists within the Protected Species Survey Area and the surrounding environment, their presence in low densities cannot be ruled out.

3.2.5 Red Squirrel

Large sections of forestry within the Protected Species Survey Area were considered to be sub-optimal for red squirrel, as extensive areas of coniferous plantation have been felled or are juvenile (lacking pine cones). However, areas of more mature plantation do exist:

²¹ Dean, M., Strachan, R., Gow, D., and Andrew, R. (2016) The Water Vole Mitigation Handbook, 3rd Edition (The Mammal Society Mitigation Guidance Series). The Mammal Society, London.

²² Rainey, E., Butler, A., Bierman, S., and Roberts, A.M.I. (2009) Scottish Badger Distribution Survey 2006 – 2009: estimating the distribution and density of badger main setts in Scotland. Scottish Badgers and Biomathematics and Statistics Scotland

²³ Hanniffy, R. (2016). A native enigma: the pine marten. Vincent Wildlife Trust

these are considered to be of optimal suitability to red squirrel, providing an abundant food source, with many cones evident.

The Protected Species Survey Area was considered to have moderate potential to support red squirrel. The Site is within the known range of the species (see Desk Study) and coniferous plantation provides suitable drey habitat and a seed food supply, however red squirrel favour habitat with mixture of tree species which provides a more reliable food resource. Additionally the coniferous plantation is dominated by Sitka spruce which is less favourable to this species compared to woodland dominated by pine species¹⁹.

Observations of pine cones which showed characteristics of being eaten by squirrel were found throughout areas of mature conifer forestry within the Site. However, no sightings of red squirrel were made, nor were any squirrel dreys identified.

3.2.6 Other Species

3.2.6.1 Amphibians

Prevailing wet underfoot conditions throughout the Protected Species Survey Area provides ample aquatic habitat for breeding amphibians including both common frog and common toad. No ponds were present within the Protected Species Survey Area and therefore the potential for breeding great crested newt (*Triturus cristatus*) did not exist.

A number of observations of common frog and common toad were made during the protected species surveys.

3.2.6.2 Reptiles

Marshy grassland, felled plantation and forest rides are present throughout the Protected Species Survey Area, all of which offer foraging, refuge and hibernation resources for reptiles¹⁴ including adder and common lizard (*Zootoca vivipara*). One common lizard was sighted within the Protected Species Survey Area (at NX 62708 91952).

4 DISCUSSION

Watercourses within the Protected Species Survey Area provide suitable commuting and foraging opportunities for otter: the Water of Ken, located approximately 0.2 km east of the Site, was assessed to offer the greatest potential for otter due to the size of this watercourse and availability of foraging opportunities. As well as numerous spraints and feeding remains, two confirmed and a potential third otter resting place were recorded along the Water of Ken. Evidence, in the form of spraints, was also found within the Site. Numerous spraints were recorded along Craigengillan Burn and Black Burn and a single spraint was noted on Dry Burn. All three burns within the Site where otter field signs were found connect to the Water of Ken. Due to the greater suitability offered by the Water of Ken, as well as the lack of resting places found within the Site, it is likely that otters are primarily utilising the Water of Ken and merely using burns within the Site for commuting purposes.

Some of the watercourses within the Protected Species Survey Area also provided suitable water vole habitat: potential foraging signs were recorded within the Site in one location at the southern end of Black Burn. As no water vole burrows or latrines were found the presence of the species within the Site cannot be confirmed. However, as suitable habitat exists both within the Site and the wider landscape the presence of water vole within the Site cannot be ruled out.

Pine cones showing markings indicative of squirrel foraging were identified inside conifer plantation forestry within the Site. As the Site is located within the geographical range of red squirrel and records of the species within 2 km of the Site were found during the desk study, it is likely that this species is present.

No evidence of badger or pine marten was discovered during the Protected Species Surveys and the Desk Study returned no records of either within 2 km of the Site. However, areas of mature coniferous plantation across the Protected Species Survey Area provide suitable habitat for these species. Connectivity exists with other plantations in the wider landscape, thus providing a large connected area in which these species could roam.

Numerous sightings of amphibians (common frog and common toad) were made within the Protected Species Survey Area. A single observation of a common lizard was also made. Suitable habitat for amphibians and reptiles is widespread throughout the Site and the wider area; it is therefore concluded that both are present throughout these habitats.

5 CONCLUSION

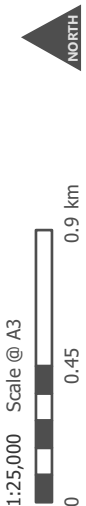
Habitats within the Protected Species Survey Area offered moderate to low levels of suitability to support protected species, however it is considered that otter, amphibians and reptiles are all present, and that water vole and red squirrel are likely present. No evidence of badger or pine marten could be established, although suitable habitat for both species exists within the Site. Due to the inaccessibility of areas of coniferous plantation and the availability of suitable habitats in the wider landscape, the presence of these species within the Protected Species Survey Area cannot be discounted.

Protected species confirmed to be present within the Site was limited to otter.

APPENDIX A: FIGURES

- Figure 1 - Protected Species Survey Results

- Developable Area
- Protected Species Survey Area
- Watercourses
- Red Squirrel
- Water Vole
- Otter
- Amphibian
- Reptile
- Fish



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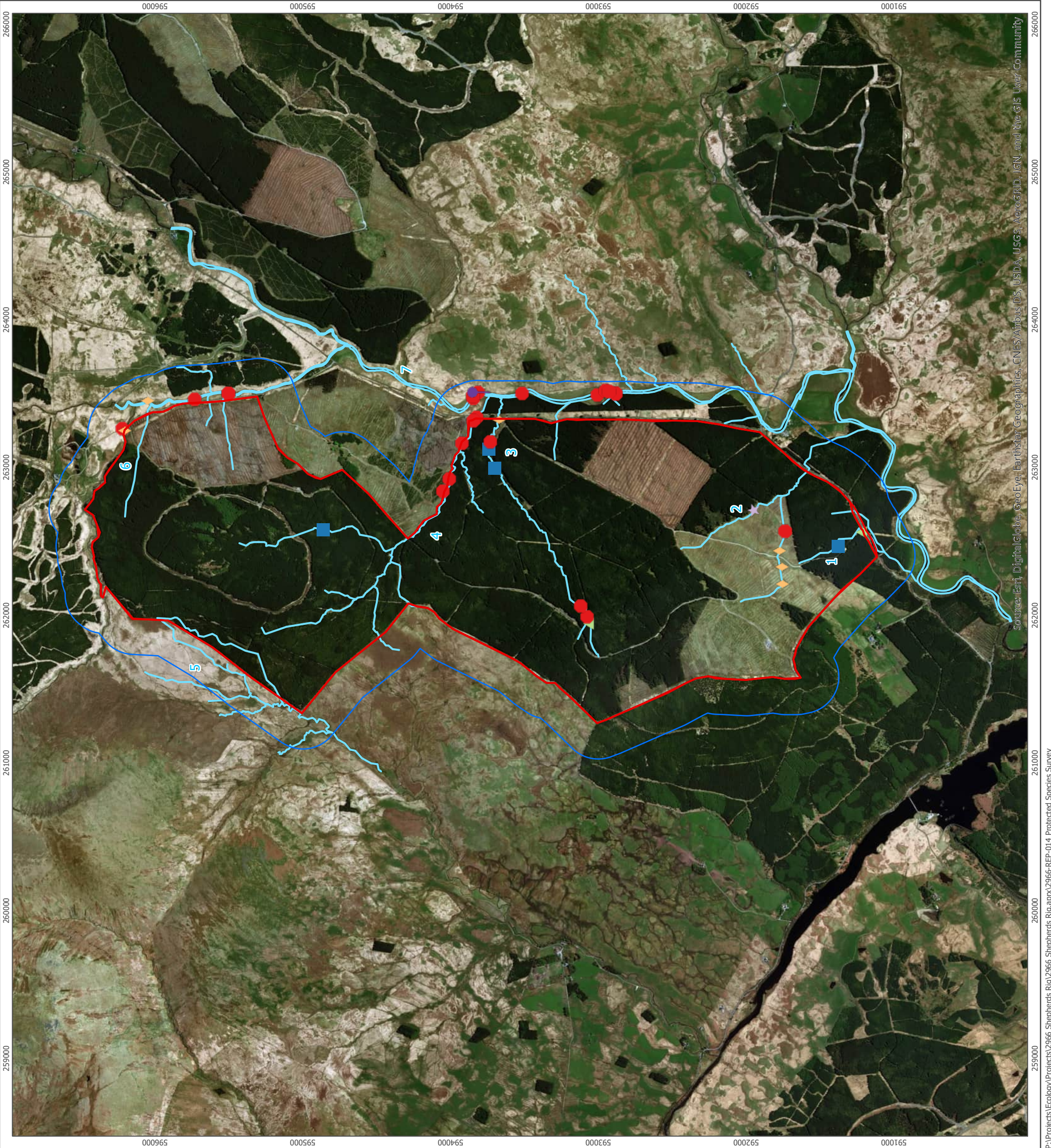
Protected Species Survey Results

Figure 1

Shepherd's Rig Wind Farm

Protected Species Technical

Appendix



APPENDIX B: PHOTOGRAPHS

Appendix Table 1: FIELD SURVEY PHOTOGRAPHS

	
Photograph 1: Conifer plantation woodland habitat	Photograph 2: Marshy grassland habitat
	
Photograph 3: Potential water vole feeding remains showing characteristic 45° chew pattern	Photograph 4: Common lizard found within a forestry ride
	
Photograph 5: Otter couch with spraints present	Photograph 6: Otter spraint close up

Appendix 4: Photographs

	
Photograph 1: banks of Polifferie Burn	Photograph 2: Polifferie Burn and adjacent habitat
	
Photograph 3: Location of holt identified in 2018.	Photograph 4: River of Ken with area of woodland to the west.



Photograph 5: River of Ken.