

**CRAIGINMODDIE WIND FARM TECHNICAL APPENDIX 9.1:  
PHASE 1, NVC & GWDTE  
GEL19117**

**ENERGIE KONTOR**

**07/12/2020**



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## Executive Summary

Gavia Environmental was commissioned by Energie Kontor in 2019 to undertake a baseline habitat assessment at the proposed Craiginmoddie wind farm site, north east of Barr in south Ayrshire, for the following; Phase 1 habitat survey, national vegetation classification (NVC) assessment and potential groundwater dependent terrestrial ecosystems (GWDTEs). Additional NVC survey work was carried out in 2020 on an extension of the proposed Craiginmoddie wind farm site as well as additional new access track to the west and north west of the main windfarm site.

Habitat extents were identified from aerial imagery and overlain onto field maps. These were systematically surveyed in the field and mapped using appropriate NVC coding. Any potential GWDTE habitats identified were sampled and water chemistry was assessed to determine the habitats dependence on ground water.

Initial NVC survey work in 2019 was impacted by the Doughty Hill plantation scheme resulting in previously collected NVC quadrat data and water chemistry sampling points becoming invalid as the new plantation overwrites any previous habitat recorded.

A total of 14 Phase 1 Habitats (including mosaics and non-vegetated habitats such as hardstand), encompassing 26 NVC habitats were recorded across the Survey Area. Coniferous plantation was the dominant habitat across the entire survey area, covering 63.21%. Wet modified bog (M15 & M25, 10.72%) and marshy grassland (M23 & M25, 7%) were the next most frequently recorded.

Three habitats, M15 *Scirpus cespitosus*<sup>1</sup>–*Erica tetralix* wet heath (Sample point 13); M17/M25 *Scirpus cespitosus*–*Eriophorum vaginatum* blanket mire/ *Molinia caerulea*–*Potentilla erecta* mire mosaic (Sample point 17) and M25/M17 *Molinia caerulea*–*Potentilla erecta* mire/ *Scirpus cespitosus*–*Eriophorum vaginatum* blanket mire mosaic (Sample point 18) were identified as having 'moderate; potential to be GWDTE's. One high potential habitat, M23 *Juncus effusus/acutiflorus*–*Galium palustre* rush-pasture was identified along the edges of the coniferous plantation. Following water chemistry analysis, it is not considered that these habitats are ground water dependent.

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<sup>1</sup> It should be noted that *Scirpus cespitosus* is now more commonly referred to as *Trichophorum germanicum*, however the NVC nomenclature has not yet been updated to account for this change.

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# 1 Introduction

## 1.1 Aims and Objectives

Gavia Environmental Ltd. ('GEL') was commissioned Energie Kontor ('the Client') to undertake a baseline habitats assessment, including Phase 1 Habitats, National Vegetation Classification (NVC) and Groundwater Dependent Terrestrial Ecosystems (GWDTE) habitats at the proposed Craiginmoddie Wind Farm Site, ('the Site') which is located at Grid Reference NX 31200 98500 approximately 5.5 km north east of Barr in South Ayrshire (Figure 1.1). Following the original visit to the Site in September 2019, further additional areas were also evaluated after being commissioned by the Client. These consisted of:

- An extension to include the open ground over Doughty Hill, east of the original Site redline boundary. This area was recently planted between 2019-2020 as part of Doughty Hill plantation scheme, surveyed in July 2020 (Figure 1.2, Plate 1);
- An extension to the south west to account for the proposed access track route. This area was surveyed in October 2020 (Figure 1.3); and
- Additional isolated section of access track to the north west of the Site surveyed in October 2020 (Figure 1.4).

All survey areas are presented in Figure 1.1-1.4 corresponding to the relevant boundary area at the time of survey. The 'survey area' encompasses all areas of redline boundary and additional 150m buffer where land access was agreed. The buffer was extended out to 250m to the north west of the access track below Delamford hill (Figure 1.3); at the time of survey the access track layout was not fixed as such, the 250m buffer accounted for potential disturbance from deep excavations (>1m) on potential GWDTEs (See section 1.2.1).

This report details the ecological baseline conditions on habitats and potential ground water dependant terrestrial ecosystems (GWDTE) which may be impacted by the Proposed Development.

## 1.2 Legislation

GWDTE's are fully protected under the Water Framework Directive (WFD) 2000/60/EC (SNIFFER, 2009). The WFD is transposed into Scottish legislation in the Water Environment and Water Services (Scotland) Act (2003) (known as WEWS), which introduces regulatory controls to the Scottish Ministers and the Scottish Environment Protection Agency (SEPA) to protect and improve the Scottish water environment. As part of its duties to regulate various activities relating to the WEWS Act (2003), SEPA has introduced a series of regulatory regimes relating to abstraction, impoundment, and engineering activities, as well as replacing the Control of Pollution Action (CoPA) Act (1974). These regulatory regimes are enforced through the Water Environment (Controlled Activities) Regulations 2011 (as amended) (SEPA 2019), hereafter referred to as the CAR Regulations.

To fulfil the objectives of the WFD, any development must not cause a decline in the quality or quantity of groundwater supplied to a GWDTE. SEPA require any GWDTE located within 250m from excavations >1m deep to be avoided, or for any impacts to be mitigated against. SEPA consider any decline in groundwater status to be a contravention of the EU WFD.

The Forestry Commission Scotland 'Briefing Note 18' guidance (2018) states that there are two types of activities that can disrupt groundwater flow and impact on sensitive receptors:

- Deep excavation (>50cm) associated with the creation, or significant modification, of forest roads, tracks and borrow pits – these could disrupt groundwater flow to or from a GWDTE; and
- Excavations due to construction projects are associated with drainage ditches and run-off which have a potential 'drying out' effect on groundwater dependent features.

## 2 Methodology

### 2.1 Desk Study

Prior the field survey, a desk study was undertaken to provide up to date ecological information on statutory designated sites within 10km of the Site (from the last 10 years), habitats, geological information on bedrock formation, superficial deposits and peat deposits.. Information was sought from the following sources:

- South Ayrshire Local Biodiversity Action Plan (LBAP) (2010);
- Multi-Agency Geographical Information for the Countryside (MAGIC);
- Sitelink ;
- BSBI Database (2020);
- Scotland's Soils: Carbon and Peatland Map (NatureScot, 2016); and
- British Geological Survey Digital Maps (BGS, 2020).

### 2.2 Field Survey

#### 2.2.1 Phase 1 Survey

The habitats on Site were initially mapped to a broad scale using JNCC (2010) methodology. This level of survey allows for the broad habitat types to be mapped in order to identify potentially sensitive wetland areas which may have GWDTE potential or areas of habitat which may qualify as EC Annex 1 habitats. The Phase 1 Survey documents habitats to a recognised standard and also records any stands of invasive non-native plants.

It should be noted that the extended Phase 1 methodology does not constitute a full botanical or protected species survey but allows a professional judgement to be made as to whether or not further specialist surveys would be advisable – either in relation to the planning application/design stage or subsequently.

#### 2.2.2 National Vegetation Classification Field Survey

To inform the field study, aerial photography was overlain on the Site boundary and existing Phase 1 habitat polygons to map habitat extents. The habitats identified were marked onto maps using Graphical Information Systems (GIS) software and assessed in closer detail in the field. Transects were walked on slopes at various heights to intersect the differing habitats, with particular focus on wet flush points identified during the desk study. The Survey Area included the Site development area and a buffer of 150 m, where land access was agreed, and extending out to 250m along the area to the south west to account for the access track (Figure 1.3).

National Vegetation Classification (NVC) codes were assigned to the habitats identified on Site using the standard methodology published by the Joint Nature Conservation Committee; National Vegetation Classification Users Handbook (JNCC, 2006). Reference was also made to British Plant Communities' Volumes 1-3, (Rodwell, 1991a, 1991b & 1997,) and an Illustrated Guide to British Upland Vegetation (Averis, 2004). Higher plant nomenclature follows that of Stace (2010), and bryophyte nomenclature follows that of the British Bryological Society (2010).

#### 2.2.3 Ground Water Dependant Terrestrial Ecosystem Survey

##### 2.2.3.1 Initial mapping

Aerial photography was again overlain across the Site boundary to map habitat extents and identify any likely groundwater dependant terrestrial ecosystem (GWDTE) features. Typically, GWDTE habitats are linear in shape with widening of the habitat common on flatter areas at the bottom of hill slopes, where 'flushing out' of water occurs.

A full list of NVC communities which have a dependency on groundwater has been produced for a UK Technical Advisory Group (UK TAG, 2004) and can be seen in Appendix III of SNIFFER (2009) WFD66. This list has been revised by the SEPA document 'Land Use Planning System SEPA Guidance Note 31 - Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems' (SEPA, 2017). Each of the groundwater dependant NVC communities identified in the SNIFFER report has been assigned a dependency rating as detailed in Table 1.

| GDWTE Rating | Description                                                                                                                                                                                                                                                                         |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| High         | Strong dependency upon groundwater discharge from bedrock or superficial aquifers at majority of sites.                                                                                                                                                                             |
| Moderate     | Likely to be some dependency on groundwater discharge at most sites – either direct from likely recognised aquifers or indirectly as recharge from minor aquifers in superficial deposits. Water from other sources (surface runoff, overbank flooding etc.) may also be important. |
| Low          | Groundwater discharge usually irrelevant. Site fed by other water sources. This may also include components of ombrogenous systems with intrinsic groundwater system fed by rain.                                                                                                   |

*Table 1: GWDTE Dependency Ratings*

### 2.2.3.2 Assessment Method

All potential GWDTE areas were systematically sampled to enable characterisation of the water supply mechanisms. Using the sample points previously identified in the desk study, each indicative location was walked to identify any obvious flush points, spring heads or wet areas of ground indicating the water supply mechanism of each habitat.

In order to characterise water chemistry, portable measuring devices (Hannah HI-98129 EC/TDS & pH probe and Hannah HI-98121 pH and ORP probe) were used to record electrical conductivity (EC), oxygen reduction potential (ORP), total dissolved solids (TDS) temperature and pH. These probes were calibrated prior to use. The use of these probes was to aid the screening assessment of the potential GWDTE. Conductivity, temperature, ORP, and pH values were compared against literature published by Sanders (1998) for groundwater, and surface water control samples, enabling the identification of likely water sources. Table 2 illustrates average field values of water from rain, surface and groundwater sources.

A total of 31 sample points were sampled to provide to provide an indication of the water supply mechanisms across the Survey Area.

| Water Origin  | Electrical Conductivity ( $\mu$ S) | Oxygen Reduction Potential (mv) | TDS (ppm)    | pH        |
|---------------|------------------------------------|---------------------------------|--------------|-----------|
| Rainwater     | 2 – 100                            | +400 - +600                     | 10           | 4 -7      |
| Surface Water | 2 – 100                            | +300 - +500                     | 10 – 200     | 6.5 – 8.5 |
| Groundwater   | 50 – 50,000                        | -200 - +100                     | 100 – 50,000 | 6 – 8.5   |

*Table 2: Standard groundwater parameter ranges*

## 2.3 Limitations

Limitations to the survey include:

- The BSBI database returned limited results for species recorded within the grid squares within which the Survey Area is situated. As such no rare plant species were identified during the desk study and during the field survey s no specific survey for habitat condition or specific rare plant species was undertaken.

- It was noted that there had been rain showers in the days before the GWDTE survey. This limits the accuracy of water chemistry samples as water bodies may become diluted further by rainwaters making the characterisation of water origin less accurate. If conditions across Site had been dry in the previous days, visible flowing water would have provided a strong indication of a potential groundwater source.
- Characterisation of GWDTE by snapshot water quality testing cannot allow for seasonality of groundwater supply, dilution by surface water feeds, and hydrological conditions but rather provides an assessment at the time of survey to the likelihood of groundwater being present.
- Mapping of plantation and felled plantation is only recorded at time of survey. Due to the nature of commercial stands of plantation, it is likely additional felling may undertaken in future.
- Additional Phase 1 and NVC surveys were carried out along the isolated track section (Figure 1.4) in October 2020. Due to the timing of the survey, some flowering plants present on the Site during the growing season may have not been recorded. This is due to the fact some plants can be more difficult to identify, especially down to species level, without the flower. It should be noted some species might have even died off already and therefore not been recorded.
- The Doughty Hill plantation scheme has resulted previously collected NVC and water chemistry results becoming invalid as the new plantation overwrites the previous survey effort.

## 3 Results

### 3.1 Desk Study

No Statutory designated sites were identified within or immediately adjacent to the Survey Area.

The desk study highlighted 2 statutory designated sites, with habitat types as qualifying features, within 10 km of the Survey Area (Figure 2):

- Auchalton SSSI, designated for its orchid-rich lowland grassland, is located approximately 3.5 km north of the Survey Area. SNH code: 96; and
- Turnberry dunes SSSI, designated for its rich beetle diversity and dune habitat, located approximately 8.5km north west of the Survey Area. SNH Code 1571.

It is not considered there is any terrestrial or hydrological connectivity with the Survey Area and the Designated Sites identified.

The most recent South Ayrshire Local Biodiversity Action Plan (LBAP) (2010) lists 32 Local Priority Habitat types. The habitat types most relevant to the Survey Area are detailed in Table 3 along with their status within the county:

| Habitat                             | Ayrshire has a significant proportion of the UK resource | Ayrshire has a significant proportion of the Scottish resource | High rate of decline within Scotland | Locally under threat | Locally fragmented but capable of repair |
|-------------------------------------|----------------------------------------------------------|----------------------------------------------------------------|--------------------------------------|----------------------|------------------------------------------|
| Purple Moor grass and rush pastures | No                                                       | No                                                             | No                                   | No                   | No                                       |
| Planted conifers                    | Yes                                                      | Yes                                                            | No                                   | No                   | No                                       |
| Wet woodland                        | No                                                       | No                                                             | Data not provided within LBAP        | No                   | No                                       |
| Blanket bog                         | No                                                       | Yes                                                            | No                                   | Yes                  | No                                       |

*Table 3: Habitat information from LBAP (South Ayrshire, 2010)*

No potential GWDTE habitats were identified within the Survey Area from the data collected during the desk study.

### 3.2 Field Survey

#### 3.2.1 Phase 1 Habitats

The combined total area of the habitats within the Survey Area is approximately 1102.33 ha

Phase 1 habitats were undertaken initially in September 2019 and updated in June, July and October to account for changes in site area (see Section 1.1) All Phase 1 habitat types were mapped to their broad extent. It can be difficult to determine exact boundaries from one habitat to the next, especially where the transition can be over several meters and as such professional judgement has been used to demark the habitat extents.

Fourteen broad Phase 1 Habitats were identified from the survey results. Table 6 below details the Phase 1 habitat types and areas recorded. All Phase 1 habitats are presented in Figures 3.1.1-3.6.6.

| Phase 1 Code | Phase 1 Habitat                   | Area (ha)                 | Percentage (%) |
|--------------|-----------------------------------|---------------------------|----------------|
| A1.2.2       | Coniferous plantation             | 696.84                    | 63.21          |
| E1.7         | Wet modified bog                  | 105.48                    | 9.57           |
| B5           | Marshy grassland                  | 68.91                     | 6.25           |
| B1.2         | Semi-improved acid grassland      | 67.15                     | 6.09           |
| B4           | Improved grassland                | 47.48                     | 4.31           |
| A4.2         | Felled coniferous plantation      | 35.19 (at time of survey) | 3.19           |
| E1.6.1       | Blanket bog                       | 32.09                     | 2.91           |
| A1.1.1       | Semi-natural broadleaved woodland | 21.19                     | 1.92           |
| C1.1         | Continuous bracken                | 12.48                     | 1.13           |
| A1.1.2       | Plantation broadleaved woodland   | 6.42                      | 0.58           |
| D6           | Wet heath/acid grassland mosaic   | 6.13                      | 0.56           |
| C1.2         | Scattered bracken                 | 2.42                      | 0.22           |
| J3.6         | Hardstand (road)                  | 0.42                      | 0.04           |
| E2.1         | Acid/neutral flush                | 0.13                      | 0.01           |
| <b>Total</b> |                                   | <b>1102.33</b>            | <b>100</b>     |

*Table 4: Phase 1 Habitats and extent across the Survey Area*

### 3.2.2 NVC Habitats

Following from the Phase 1 Habitat survey, NVC surveys were undertaken. 26 habitat types (including mosaics) were identified.

The main development area is dominated by mature coniferous plantation woodland (PCW), the recent plantation from the Doughty Hill Forestry scheme is also included in the total plantation area (696.84ha, 63.21% of total Survey Area %) with a small felled area of plantation to the north (3.19%). Wet modified bog (M15 & M25) was the second most recorded habitat covering large areas of open ground along the edge of the plantation and within the larger areas of plantation rides (105.48ha, 9.75%) (Plate 2). Outside the plantation, across the open ground and buffer) areas of wet heath (M15) acid grassland (U4 & U5) and mosaics of both were recorded. Stands of bracken were present within the open ground as well as small areas of bog, heath and grassland. Smaller areas of broadleaved woodland (W7) and acidic/neutral flush (M23) was also recorded.

To the north of the main wind farm boundary, along the isolated access track section, improved grassland is dominant (47.48ha, 4.31% of total Survey Area), with several areas of semi natural broadleaved woodland (W7 & W8, 21.19ha, 1.92%).

The NVC habitats recorded are presented in Table 4 in order of area (hectares) and also presented in Figures 4.1-4.10.

| NVC Community                                                                                                                                                     | Area (ha)                 | Percentage (%) |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|----------------|
| PCW Plantation Coniferous woodland                                                                                                                                | 696.84                    | 63.21          |
| M25 <i>Molinia caerulea</i> – <i>Potentilla erecta</i> mire                                                                                                       | 76.37                     | 6.93           |
| M15 <i>Scirpus cespitosus</i> – <i>Erica tetralix</i> wet heath                                                                                                   | 58.46                     | 5.30           |
| U4 <i>Festuca ovina</i> – <i>Agrostis capillaris</i> – <i>Galium saxatile</i> grassland                                                                           | 52.78                     | 4.79           |
| MG6 <i>Lolium perenne</i> – <i>Cynosurus cristatus</i> grassland                                                                                                  | 47.48                     | 4.31           |
| FPCW Felled plantation Coniferous woodland                                                                                                                        | 35.19 (at time of survey) | 3.19           |
| M17 <i>Scirpus cespitosus</i> – <i>Eriophorum vaginatum</i> blanket mire                                                                                          | 27.40                     | 2.49           |
| M15/M17 <i>Scirpus cespitosus</i> – <i>Eriophorum vaginatum</i> blanket mire/ <i>Scirpus cespitosus</i> – <i>Erica tetralix</i> wet heath mosaic                  | 19.12                     | 1.73           |
| W7 <i>Alnus glutinosa</i> – <i>Fraxinus excelsior</i> – <i>Lysimachia nemorum</i> woodland                                                                        | 16.62                     | 1.51           |
| M23 <i>Juncus effusus</i> /acutiflorus– <i>Galium palustre</i> rush-pasture                                                                                       | 11.48                     | 1.04           |
| U20 <i>Pteridium aquilinum</i> – <i>Galium saxatile</i> community                                                                                                 | 10.09                     | 0.92           |
| M25/U5 <i>Molinia caerulea</i> – <i>Potentilla erecta</i> mire/ <i>Nardus stricta</i> – <i>Galium saxatile</i> grassland mosaic                                   | 7.19                      | 0.65           |
| U4/U20 <i>Festuca ovina</i> – <i>Agrostis capillaris</i> – <i>Galium saxatile</i> grassland/ <i>Pteridium aquilinum</i> – <i>Galium saxatile</i> community        | 6.99                      | 0.63           |
| W8 <i>Fraxinus excelsior</i> – <i>Acer campestre</i> – <i>Mercurialis perennis</i> woodland                                                                       | 6.20                      | 0.56           |
| M25/M17 <i>Molinia caerulea</i> – <i>Potentilla erecta</i> mire/ <i>Scirpus cespitosus</i> – <i>Eriophorum vaginatum</i> blanket mire mosaic                      | 5.87                      | 0.53           |
| M15/M25 <i>Scirpus cespitosus</i> – <i>Erica tetralix</i> wet heath/ <i>Molinia caerulea</i> – <i>Potentilla erecta</i> mire mosaic                               | 5.32                      | 0.48           |
| U20/U4 <i>Pteridium aquilinum</i> – <i>Galium saxatile</i> community/ <i>Festuca ovina</i> – <i>Agrostis capillaris</i> – <i>Galium saxatile</i> grassland mosaic | 4.82                      | 0.44           |
| W17 <i>Quercus petraea</i> – <i>Betula pubescens</i> – <i>Dicranum majus</i> woodland                                                                             | 4.79                      | 0.43           |
| U5 <i>Nardus stricta</i> – <i>Galium saxatile</i> grassland                                                                                                       | 2.84                      | 0.26           |
| M18 <i>Erica tetralix</i> – <i>Sphagnum papillosum</i> raised and blanket mire                                                                                    | 2.34                      | 0.21           |
| M17/M25 <i>Scirpus cespitosus</i> – <i>Eriophorum vaginatum</i> blanket mire/ <i>Molinia caerulea</i> – <i>Potentilla erecta</i> mire mosaic                      | 1.35                      | 0.12           |
| U4/M25 <i>Festuca ovina</i> – <i>Agrostis capillaris</i> – <i>Galium saxatile</i> grassland/ <i>Molinia caerulea</i> – <i>Potentilla erecta</i> mire              | 0.93                      | 0.08           |
| U4/U5 <i>Festuca ovina</i> – <i>Agrostis capillaris</i> – <i>Galium saxatile</i> grassland/ <i>Nardus stricta</i> – <i>Galium saxatile</i> grassland mosaic       | 0.89                      | 0.08           |
| M25/U20 <i>Molinia caerulea</i> – <i>Potentilla erecta</i> mire/ <i>Pteridium aquilinum</i> – <i>Galium saxatile</i> community mosaic                             | 0.43                      | 0.04           |

| NVC Community                                            | Area (ha)      | Percentage (%) |
|----------------------------------------------------------|----------------|----------------|
| Hardstand                                                | 0.41           | 0.04           |
| M4 <i>Carex rostrata</i> – <i>Sphagnum recurvum</i> mire | 0.13           | 0.01           |
| <b>Total</b>                                             | <b>1102.33</b> | <b>100</b>     |

*Table 5: NVC communities and site coverage.*

Of the habitats detailed above, comparison was undertaken with those NVC communities listed under SEPA's LUPS GU4 planning guidance documents (2017). Any habitats with NVC codes listed on the LUPS GU4 guidance are considered suitable to support potential GWDTEs and are discussed further in Section 4.2.2 below.

### 3.2.3 Potential GWDTE Survey

Of the habitats recorded during the NVC survey, the following were identified with a potential at 'high' level for dependency on a groundwater resource:

- W7 *Alnus glutinosa*–*Fraxinus excelsior*–*Lysimachia nemorum* woodland; and
- M23 *Juncus effusus*/acutiflorus – *Gallium palustre* rush-pasture

The following habitats were identified with a potential at 'moderate' level for dependency on a groundwater resource:

- M15 *Scirpus cespitosus* – *Erica tetralix* wet heath;
- M25 *Molinia caerulea* – *Potentilla erecta* mire; and
- Mosaics of habitats containing M15 or M25.

The percentage cover of potential GWDTE habitats is shown in Table 5. NVC Habitats with 'high' and 'moderate' dependency and water chemistry sample locations are presented in Figure 5.1-5.4.

| Potential GWDTE Dependency | Area (ha)      | Percentage of the Site (%) |
|----------------------------|----------------|----------------------------|
| High                       | 28.20          | 2.55                       |
| Moderate                   | 174.22         | 15.80                      |
| Low                        | 899.87         | 81.65                      |
| <b>Totals</b>              | <b>1102.33</b> | <b>100.00</b>              |

*Table 6: Potential GWDTE cover for the Site*

## 4 GWDTE Assessment

### 4.1 Definition of a GWDTE

The following is an excerpt from the EU GWDTE Technical Report (2011) which defines a GWDTE in the context of the Water Framework Directive:

*'In order for terrestrial ecosystems to be considered as part of the classification for groundwater bodies (GWBs), they need to be 'directly dependent' on the GWB (see also section 7.4). This means that the GWB should provide quantity (flow, level) or quality of water needed to sustain the ecosystems which are the reasons for the significance of the GWDTE. This critical dependence upon a GWB is most likely where groundwater supplies the GWDTE for a significant part or a significant time period of the year.'*

Therefore, for a habitat to be designated as a GWDTE, there must be significant hydrogeologic connectivity between the groundwater body (GWB) and the habitat.

#### 4.1.1 Hydrogeology and Hydrology

The Site is situated on the tops of Craiginmoddie, Daljeburgh Hill and the north west aspect of Doughty Hill (all approximately 380 m above sea level) with slopes of varying gradients.

The Site is subject to a Standard Average Annual Rainfall (SAAR) of 1305.18 mm (SEPA, 2019). This is below average for Scotland c.1450mm (average Met Office statistics for 1981-2010).

At the 1:625,00 scale, the solid geology of the Site is predominantly made up of the Lanark Group aquifer. Classed as a moderate productivity aquifer a regional aquifer of sandstones, siltstones, mudstones and conglomerate and interbedded lavas which can locally yield up to 12 litres per second. A small area of an unnamed igneous intrusion aquifer lies to the south of the Survey Area; this is classed as a low productivity aquifer with small amounts of groundwater likely to be present near the surface weathered zone. An inferred fault line runs through the north east corner of the Survey Area and two inferred fault lines run through the south buffer of the isolated track section.

Superficial deposits of Devensian till are present across the majority of the Survey Area with the Soils and Carbon 2016 (SNH, 2016) map detailing significant coverage of Class 5 peat (carbon-rich deep peat), with smaller deposits present on the upper slopes south of the isolated access track section.

#### 4.1.2 Water Chemistry

The presence of groundwater was assessed against published field guidance data (Sanders, 1998). Water chemistry results from the Site are presented in Table 7 and sample locations presented in Figures 5.1-5.4. Any results that are within typical groundwater chemistry ranges are presented in shaded cells.

| Sample Number | OS Grid | Easting | Northing | pH   | TDS (ppm) | EC (µs) | ORP (mV) | Water Temp (°C) | Air Temp (°C) |
|---------------|---------|---------|----------|------|-----------|---------|----------|-----------------|---------------|
| 1             | NX      | 32974   | 99401    | 6.51 | 55        | 106     | 291      | 5.1             | 7.6           |
| 2**           | NX      | 32782   | 99408    | *    | *         | *       | *        | *               | *             |
| 3**           | NX      | 32394   | 98902    | 5.4  | 16        | 37      | 258      | 5.2             | 4.3           |
| 4             | NX      | 32262   | 98973    | 7.1  | 52        | 110     | 204      | 5.5             | 4.4           |

| Sample Number | OS Grid | Easting | Northing | pH          | TDS (ppm) | EC (µs)    | ORP (mV)   | Water Temp (°C) | Air Temp (°C) |
|---------------|---------|---------|----------|-------------|-----------|------------|------------|-----------------|---------------|
| 5**           | NX      | 32794   | 99313    | *           | *         | *          | *          | *               | *             |
| 6**           | NX      | 31831   | 98548    | 5.44        | 17        | 38         | 379        | 6.1             | 5.3           |
| 7**           | NX      | 31785   | 98006    | 5.2         | 21        | 43         | <b>39</b>  | 6.1             | 6.8           |
| 8             | NX      | 32098   | 96955    | *           | *         | *          | *          | *               | *             |
| 9             | NX      | 30912   | 97583    | 4.59        | 37        | <b>82</b>  | 378        | 5.6             | 7.4           |
| 10            | NX      | 30355   | 97232    | 5.29        | 25        | 40         | 315        | 6.9             | 7.3           |
| 11            | NX      | 30123   | 97370    | 4.39        | 32        | <b>60</b>  | 417        | 6.8             | 7.3           |
| 12            | NX      | 29911   | 97349    | 4.62        | 26        | <b>65</b>  | 449        | 6.8             | 7.2           |
| 13            | NX      | 30187   | 98034    | <b>6.02</b> | 30        | <b>65</b>  | 214        | 6.9             | 7.4           |
| 14            | NX      | 30878   | 98311    | 4.2         | 28        | <b>55</b>  | 467        | 6.5             | 7.1           |
| 15            | NX      | 30114   | 98732    | 4.2         | 30        | <b>80</b>  | 456        | 6.9             | 7             |
| 16            | NX      | 30641   | 99275    | 5.45        | 26        | <b>69</b>  | 364        | 7.2             | 8.9           |
| 17            | NS      | 31358   | 00097    | <b>8.74</b> | 64        | <b>140</b> | <b>185</b> | 6.7             | 8.7           |
| 18            | NX      | 31098   | 99727    | <b>6.18</b> | 38        | <b>76</b>  | 210        | 6.6             | 6.4           |
| 19            | NS      | 31396   | 00638    | 5.82        | 28        | <b>57</b>  | 159        | 7.6             | 8.8           |
| 20            | NX      | 33196   | 99844    | <b>7.01</b> | 24        | 46         | 312        | 5.4             | 9             |
| 21            | NX      | 28102   | 99988    | 5.67        | 21        | 42         | 336        | 8               | 8.4           |
| 22 (Control)  | NX      | 28081   | 99982    | <b>6.6</b>  | 20        | 39         | 304        | 7.6             | 8.4           |
| 23            | NX      | 28211   | 99890    | <b>6.62</b> | 27        | <b>55</b>  | 243        | 7.8             | 8.3           |
| 24            | NX      | 28533   | 99932    | <b>6.38</b> | 31        | <b>54</b>  | 224        | 8.3             | 8.3           |
| 25            | NS      | 28640   | 00116    | 5.65        | 25        | 48         | 308        | 7.5             | 8.4           |
| 26            | NS      | 28785   | 00236    | <b>6.96</b> | 24        | 48         | 303        | 7.8             | 8.3           |
| 27            | NX      | 29438   | 97996    | 4.49        | 19        | 37         | 417        | 8.2             | 7.9           |
| 28            | NX      | 29590   | 98105    | <b>7.01</b> | 26        | 40         | 381        | 8               | 8.1           |
| 29            | NX      | 29858   | 98143    | 5.32        | 15        | 31         | 319        | 7.6             | 8.1           |
| 30            | NX      | 30314   | 98283    | 5.31        | 20        | 38         | 439        | 8.1             | 8.2           |
| 31            | NX      | 29871   | 97974    | <b>6.18</b> | 19        | 38         | 396        | 7.6             | 7.9           |

*Table 7: Potential GWDTE water chemistry sample results*

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Entries marked '\*' are absent of data due as no spring head, flush point or water source was present within the habitat and are therefore likely to be rainfall fed.

Entries marked '\*\*' which were surveyed in 2019, have since been planted over as a result of the Doughty Hill afforestation (Plate 3).

The Survey Area can be grouped into two main areas. The first being the main wind farm development area (Figure 1.3) which is situated across the upper slopes of Craiginmoddie, Green Larg and Doughty Hill, all approximated 360-380m Above Ordinance Datum (AOD). Coniferous plantation dominates most of this area, with open areas of moorland present on the lower slopes below the plantation. It is considered that the mounding/furrows used in coniferous plantation have already resulted in the destruction of potential GWDTE habitats and as such no GWDTE will be present within the plantation. Samples 2, 3, 5, 6 & 7 surveyed in 2019 have since been planted over during the Doughty Hill afforestation project from late 2019-2020.

**Sample 17** provides a strong indication of a groundwater source. The pH is alkaline, and the EC is the highest recorded across all Sample points and suggesting the waters sampled in this location have had contact with the mineral sandstone ground. No bedrock geology change was identified from BGS online maps, however Scarraig Well (spring) is present to the south west along the 250 m contour, similarly to Sample point 17 suggesting groundwater is present near the surface at this altitude.

**Sample 13** had a raised pH compared to previous Sample points; however, the other water chemistry values would indicate a rain/surface water source. At the Sample point there is a change in bedrock geology from the Lanark Group (a moderately productive aquifer) to the Leadhills Supergroup (Low productivity aquifer). There is therefore potential for groundwater to be present along the cracks in the bedrock and emerge at the surface in this area. As such, the **M15** habitat in this area is classified as being **moderately dependent** on a ground water source.

**Sample 18** exhibits similar water chemistry parameters to Sample 13 and therefore the **M27/M17** habitat in this area is similarly classed as being **moderately dependent** on a ground water source.

All 'actual' GWDTE identified are presented in Figure 6

The habitats identified at all other sample locations are not considered to be ground water dependent.

The M23 habitat recorded at Samples 1 & 4 was unaffected by the recent planting extent. The pH and EC for both Sample fall within the range of ground water, however the ORP and TDS match more closely with surface waters. The peat deposits across the Survey Area suggest an ombrogenous surface upslope from Sample point 1 and Sample point 4. Ombrogenous surfaces are fed exclusively by precipitation and flush out on the lower slopes. As such, it is considered that the M23 habitats recorded at Sample point 1 and 4 and fed by surface waters and are not considered to be GWDTE.

Samples 9-12, 14-16, 19 & 20 all present similar water chemistry values with acidic pH, and low TDS. All have EC values in the lower range of ground waters, however the raised ORP values place them closer to surface waters. The acidic pH is likely as a result of runoff draining from the coniferous plantation upslope. The water chemistry indicated the ombrogenous surface upslope within the plantation drains out on the lower slopes. As such the M15 and M25 in these locations is considered to be surface water fed and are not considered to be GWDTE.

Samples 27-31 were located away from the plantation edge, however all except Sample 31 were recorded on deep peat, suggesting an ombrotrophic surface fed by precipitation. Sample 31 was recorded above a stand of M15 but was recorded within a stand of U4 acid grassland. The water chemistry is indicative of surface waters and it is likely a perched water table is present in this location allowing waters to pool at the surface. As such it is considered the M15, M23 and M25 habitat recorded at these Sample locations are not dependant on a groundwater source and are not considered to be GWDTEs.

The second area for GWDTE potential is the isolated access track section (Figure 1.4) north west of the main wind farm site, situated on the lower slopes of Craig Hill approximately 110-140m AOD. Predominantly improved and semi-improved acid grassland, there are several stands of W7 broadleaved woodland along the water courses which flow into this area. The bedrock geology suggests several formations are present within this area as well as two inferred fault lines and upslope on Craig Hill Class 5 peat deposits are also present.

Sample 21-26 were recorded upslope from the W7 habitats. It was noted that there were several large man-made peat drains in this area, however the water chemistry is indicative of rain and surface waters with minimal contacts with the peat deposits upslope. It is likely that the extensive drainage diverts surface precipitation along the drainage percolation flow channels which would keep the pH more in line with rainwaters. As such it is considered that the W7 woodland downslope is fed by rain and surface waters which quickly drain off the hillside and into the small burns along which the W7 woodland is located down slope. The W7 habitat in this area is therefore not considered to be a GWDTE.

## 5 Summary and Valued Ecological Receptors (VER's)

A total of 14 Phase 1 Habitats (including mosaics and non-vegetated habitats such as hardstand), encompassing 26 NVC habitats were recorded across the Survey Area.

Coniferous plantation was the dominant habitat across the entire survey area, covering 63.21%. Wet modified bog (M15 & M25, 9.75%) and marshy grassland (M23 & M25) were the next most frequently recorded. Modified bog capable of regeneration (M15) is considered to be an EC Annex 1 Habitat and a UK Biodiversity Action Plan habitat however the extent and species diversity of this habitat is not sufficient to classify it as Annex 1. Purple moor grass pasture (M25) is listed as a UK BAP habitat but not on the local LBAP where it is listed as not locally under threat or important for key species.

Two small areas of blanket bog (M17 & M18) were recorded 2.91% of the Survey Area). Listed as an EC Annex 1 habitat, UK BAP habitat and LBAP habitat, blanket bog is usually considered internationally important. However, the blanket bog on Site is subject to modification from forestry drainage, manmade peat drainage and over grazing resulting in small areas of species poor bog and is unlikely to meet the criteria required to classify as an Annex 1 habitat.

Of the habitats identified within the Survey Area, following assessment of the hydrogeology and the water chemistry, the potential GWDTE habitats 'actual' dependence on ground water has been assessed. Ground water was identified at three Sample points 14, 17 & 18. The M15 and M25/M17 mosaics at points 17 & 18 (M25/M17) are classed as 'moderately' dependency on ground water. All other habitats Samples are classed as low or negligible dependency on ground water and no GWDTE were present within the development area as potential ground water tables will have been altered by tree planting.

| VERs                         | Protection                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Blanket bog (M17 & M18)      | Annex 1 habitats under the EC Directive 92/43/EEC on the Conservation of Natural Habitats and Wildlife Fauna (The Habitats Directive). UK BAP and LBAP priority Habitat. Small areas identified (32.09ha, 2.91%) centrally within the Survey Area and also to the south, along the plantation edge within the 150 m site buffer. Doesn't support a significant area of species rich vegetation and as such doesn't meet criteria for Annex 1.                                                                                               |
| Wet modified bog (M15 & M25) | Annex 1 habitats under the EC Directive 92/43/EEC on the Conservation of Natural Habitats and Wildlife Fauna (The Habitats Directive). UK BAP habitat. Degraded raised bogs only includes examples which are 'capable of natural regeneration', i.e. <i>"where the hydrology can be repaired and where, with appropriate rehabilitation management, there is a reasonable expectation of re-establishing vegetation with peat-forming capability within 30 years"</i> (JNCC, 2020a). Frequently recorded across the Survey Area and buffer. |
| Wet woodland (W7)            | Annex 1 habitats under the EC Directive 92/43/EEC on the Conservation of Natural Habitats and Wildlife Fauna (The Habitats Directive). UK BAP habitat. <i>"Riparian trees are excluded from the Annex I type except where these form part of a wider network of alluvial woodland and wetland communities"</i> (JNCC, 2020b). Recorded occasionally across the main wind farm development area and frequently across the isolated access track section.                                                                                     |
| Acid grassland (U4 & U5)     | UK BAP and LBAP habitat. Recorded frequently out with the plantation boundary of the main development area, however, Heavily grazed by sheep and deer. Not considered to meet UKBAP specification as <i>"swards in old and non-functional enclosures in the upland fringes, which are managed as free-range rough grazing in association with unenclosed tracts of upland, are excluded"</i> (JNCC, 2008)                                                                                                                                   |
| GWDTEs                       | GWDTE's are fully protected under the Water Framework Directive (WFD) 2000/60/EC (SNIFFER, 2009).<br><br>Two stands of M25 mosaics recorded with a moderate dependency on a groundwater source.                                                                                                                                                                                                                                                                                                                                             |

Table 8: Valued Ecological Receptors

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## Appendices

### Appendix A Figures

## Appendix B Target Notes

| TN  | OS Grid | Easting | Northing | Phase 1 | NVC    | Notes                                                                                                                              |
|-----|---------|---------|----------|---------|--------|------------------------------------------------------------------------------------------------------------------------------------|
| 1*  | NX      | 32748   | 99328    | B5      | M23    | <i>Juncus effusus/acutiflorus-Galium palustre</i> rush-pasture, <i>Juncus acutiflorus</i> sub-community                            |
| 2   | NX      | 32748   | 99328    | B5      | M23a   | <i>Juncus effusus/acutiflorus-Galium palustre</i> rush pasture, <i>Juncus acutiflorus</i> sub-community                            |
| 3   | NX      | 32258   | 98929    | B5      | M23a   | <i>Juncus effusus/acutiflorus-Galium palustre</i> rush pasture, <i>Juncus acutiflorus</i> sub-community                            |
| 4   | NX      | 29523   | 97951    | E1.7    | M15    | <i>Trichophorum germanicum-Erica tetralix</i> wet heath, <i>Vaccinium myrtillus</i> sub community                                  |
| 5   | NX      | 29744   | 97748    | E1.7    | M25    | <i>Molinia caerulea-Potentilla erecta</i> mire                                                                                     |
| 6   | NX      | 29598   | 97881    | B5      | M23a   | <i>Juncus effusus/acutiflorus-Galium palustre</i> rush pasture, <i>Juncus acutiflorus</i> sub-community                            |
| 7   | NX      | 29857   | 97783    | E1.6.1  | M17c   | <i>Trichophorum germanicum-Eriophorum vaginatum</i> blanket mire, <i>Juncus squarrosus-Rhytidiadelphus loreus</i> sub-community    |
| 8   | NX      | 30317   | 98131    | E1.7    | M25    | <i>Molinia caerulea-Potentilla erecta</i> mire                                                                                     |
| 9   | NX      | 30535   | 98361    | B1.2    | U4b    | <i>Festuca ovina-Agrostis capillaris-Galium saxatile</i> grassland, <i>Holcus lanatus-Trifolium repens</i> sub-community           |
| 10  | NX      | 30456   | 98504    | E1.6.1  | M17c   | <i>Trichophorum germanicum-Eriophorum vaginatum</i> blanket mire, <i>Juncus squarrosus-Rhytidiadelphus loreus</i> sub-community    |
| 11  | NX      | 32072   | 98643    | E1.7    | M15d   | <i>Trichophorum germanicum-Erica tetralix</i> wet heath, <i>Vaccinium myrtillus</i> sub-community                                  |
| 12* | NX      | 32792   | 99359    | E1.6.1  | M17c   | <i>Trichophorum germanicum-Eriophorum vaginatum</i> blanket mire, <i>Juncus squarrosus-Rhytidiadelphus loreus</i> sub-community    |
| 13* | NX      | 32602   | 99264    | E1.6.1  | M17c   | <i>Trichophorum germanicum-Eriophorum vaginatum</i> blanket mire, <i>Juncus squarrosus-Rhytidiadelphus loreus</i> sub-community    |
| 14  | NX      | 32523   | 99073    | E1.6.1  | M18    | <i>Erica tetralix-Sphagnum papillosum</i> raised and blanket mire, <i>Sphagnum magellanicum-Andromeda polifolia</i> sub-community  |
| 15  | NX      | 32414   | 99020    | E1.6.1  | M18a   | <i>Erica tetralix-Sphagnum papillosum</i> raised and blanket mire, <i>Sphagnum magellanicum-Andromeda polifolia</i> sub-community  |
| 16* | NX      | 31981   | 98691    | E1.7    | M25a   | <i>Molinia caerulea-Potentilla erecta</i> mire, <i>Erica tetralix</i> sub-community                                                |
| 17* | NX      | 33098   | 99354    | B1.2/B5 | M23/U4 | <i>Juncus effusus/acutiflorus-Galium palustre</i> rush pasture/ <i>Festuca ovina-Agrostis capillaris-Galium saxatile</i> grassland |
| 18* | NX      | 33065   | 99370    | B5      | M23a   | <i>Juncus effusus/acutiflorus-Galium palustre</i> rush pasture, <i>Juncus acutiflorus</i> sub-community                            |
| 19* | NX      | 32035   | 98817    | B5      | M23a   | <i>Juncus effusus/acutiflorus-Galium palustre</i> rush pasture, <i>Juncus acutiflorus</i> sub-community                            |
| 20  | NX      | 30828   | 97558    | B5      | M23a   | <i>Juncus effusus/acutiflorus-Galium palustre</i> rush pasture, <i>Juncus acutiflorus</i> sub-community                            |
| 21  | NX      | 30826   | 97554    | E1.7    | M15a   | <i>Trichophorum germanicum-Erica tetralix</i> wet heath, <i>Carex panicea</i> sub-community                                        |
| 22  | NX      | 30819   | 97546    | E1.7    | M15a   | <i>Trichophorum germanicum-Erica tetralix</i> wet heath, <i>Carex panicea</i> sub-community                                        |
| 23  | NX      | 30819   | 97546    | E1.6.1  | M17c   | <i>Trichophorum germanicum-Eriophorum vaginatum</i> blanket mire, <i>Juncus squarrosus-Rhytidiadelphus loreus</i> sub-community    |
| 24  | NX      | 30648   | 97508    | B1.2    | U5b    | <i>Nardus stricta-Galium saxatile</i> grassland, <i>Agrostis canina-Polytrichum commune</i> sub-community                          |
| 25  | NX      | 31458   | 97001    | E1.7    | M15d   | <i>Trichophorum cespitosum-Erica tetralix</i> wet heath, <i>Vaccinium myrtillus</i> sub-community                                  |
| 26  | NX      | 31222   | 97313    | E1.7    | M15d   | <i>Trichophorum cespitosum-Erica tetralix</i> wet heath, <i>Vaccinium myrtillus</i> sub-community                                  |
| 27  | NX      | 31037   | 97507    | E1.7    | M15d   | <i>Trichophorum cespitosum-Erica tetralix</i> wet heath, <i>Vaccinium myrtillus</i> sub-community                                  |
| 28  | NX      | 30873   | 97576    | E1.7    | M15d   | <i>Trichophorum cespitosum-Erica tetralix</i> wet heath, <i>Vaccinium myrtillus</i> sub-community                                  |

| TN  | OS Grid | Easting | Northing | Phase 1 | NVC    | Notes                                                                                                                                                                                                                                                                                                     |
|-----|---------|---------|----------|---------|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 29  | NX      | 31458   | 97040    | E1.6.1  | M17c   | <i>Trichophorum germanicum</i> - <i>Eriophorum vaginatum</i> blanket mire, <i>Juncus squarrosus</i> - <i>Rhytidiadelphus loreus</i> sub-community                                                                                                                                                         |
| 30  | NX      | 31318   | 97158    | E1.6.1  | M17c   | <i>Trichophorum germanicum</i> - <i>Eriophorum vaginatum</i> blanket mire, <i>Juncus squarrosus</i> - <i>Rhytidiadelphus loreus</i> sub-community                                                                                                                                                         |
| 31  | NX      | 29711   | 97590    | E1.6.1  | M17b   | <i>Trichophorum germanicum</i> - <i>Eriophorum vaginatum</i> blanket mire, <i>Cladonia species</i> sub-community                                                                                                                                                                                          |
| 32  | NX      | 29898   | 97433    | E1.6.1  | M17b   | <i>Trichophorum germanicum</i> - <i>Eriophorum vaginatum</i> blanket mire, <i>Cladonia species</i> sub-community                                                                                                                                                                                          |
| 33  | NX      | 29880   | 97274    | E1.6.1  | M17c   | <i>Trichophorum germanicum</i> - <i>Eriophorum vaginatum</i> blanket mire, <i>Juncus squarrosus</i> - <i>Rhytidiadelphus loreus</i> sub-community                                                                                                                                                         |
| 34  | NX      | 29740   | 97565    | B5      | M23a   | <i>Juncus effuses/acuteiflorus</i> - <i>Galium palustre</i> rush pasture, <i>Juncus acuteiflorus</i> sub-community                                                                                                                                                                                        |
| 35  | NX      | 29769   | 97544    | B5      | M23a   | <i>Juncus effuses/acuteiflorus</i> - <i>Galium palustre</i> rush pasture, <i>Juncus acuteiflorus</i> sub-community                                                                                                                                                                                        |
| 36  | NX      | 29887   | 97484    | B5      | M23a   | <i>Juncus effuses/acuteiflorus</i> - <i>Galium palustre</i> rush pasture, <i>Juncus acuteiflorus</i> sub-community                                                                                                                                                                                        |
| 37  | NX      | 29934   | 97273    | E1.7    | M25    | <i>Molinia caerulea</i> - <i>Potentilla erecta</i> mire                                                                                                                                                                                                                                                   |
| 38  | NX      | 30088   | 98796    | E1.7    | M15d   | <i>Trichophorum cespitosum</i> - <i>Erica tetralix</i> wet heath, <i>Vaccinium myrtillus</i> sub-community                                                                                                                                                                                                |
| 39  | NX      | 30050   | 98982    | C1      | U20    | <i>Pteridium aquilinum</i> - <i>Galium saxatile</i> community, <i>Anthoxanthum odortatum</i> sub-community                                                                                                                                                                                                |
| 40  | NX      | 30264   | 99033    | E1.7    | M25    | <i>Molinia caerulea</i> - <i>Potentilla erecta</i> mire                                                                                                                                                                                                                                                   |
| 41  | NX      | 30516   | 99164    | E1.6.1  | M17c   | <i>Trichophorum germanicum</i> - <i>Eriophorum vaginatum</i> blanket mire, <i>Juncus squarrosus</i> - <i>Rhytidiadelphus loreus</i> sub-community                                                                                                                                                         |
| 42  | NX      | 30944   | 99354    | E1.6.1  | M17c   | <i>Trichophorum germanicum</i> - <i>Eriophorum vaginatum</i> blanket mire, <i>Juncus squarrosus</i> - <i>Rhytidiadelphus loreus</i> sub-community                                                                                                                                                         |
| 43  | NX      | 31031   | 99485    | E1.7    | M6/M25 | <i>Carex echinata</i> - <i>Sphagnum fallax</i> mire, <i>Juncus acuteiflorus</i> sub-community  <i>Molinia caerulea</i> - <i>Potentilla erecta</i> mire                                                                                                                                                    |
| 44  | NX      | 31130   | 99611    | E1.7    | M25    | <i>Molinia caerulea</i> - <i>Potentilla erecta</i>                                                                                                                                                                                                                                                        |
| 45  | NX      | 33054   | 99315    | B5      | M23    | <i>Juncus effuses/acuteiflorus</i> - <i>Galium palustre</i> rush pasture, <i>Juncus acuteiflorus</i> sub-community<br>This community is found along the margins of a burn. Altitude: 324 m; Mean vegetation height: 50 cm.                                                                                |
| 46* | NX      | 33060   | 99165    | B5      | M23    | <i>Juncus effuses/acuteiflorus</i> - <i>Galium palustre</i> rush pasture, <i>Juncus acuteiflorus</i> sub-community<br>This community is found along the margins of a burn. Altitude: 322 m; Mean vegetation height: 50 cm.                                                                                |
| 47* | NX      | 33067   | 99080    | E1.7    | M15    | <i>Trichophorum germanicum</i> - <i>Erica tetralix</i> wet heath. An area of wet heath situated on steep sided slopes of Doughty Hill, the area has been planted with sitka spruce. Altitude: 319 m; Mean vegetation height: 20-30 cm.                                                                    |
| 48* | NX      | 32978   | 98970    | B5      | M23A   | <i>Juncus effuses/acuteiflorus</i> - <i>Galium palustre</i> rush pasture, <i>Juncus acuteiflorus</i> sub-community. An area of very wet ground present upon a gentle south-eastern facing slope, towards the burn. Altitude: 313 m; Mean vegetation height: 40 cm.                                        |
| 49* | NX      | 32709   | 98752    | E1.7    | M15    | <i>Trichophorum germanicum</i> - <i>Erica tetralix</i> wet heath. An area of wet heath situated on steep sided slopes of Doughty Hill, the area has been planted with sitka spruce. Altitude: 327 m; Mean vegetation height: 30-40 cm.                                                                    |
| 50* | NX      | 32662   | 98778    | B1.2    | U4b    | <i>Festuca ovina</i> - <i>Agrostis capillaris</i> - <i>Galium saxatile</i> grassland. Grassland occurring steep-sided bank of burn. Altitude: 332 m; Mean vegetation height: 5 -15 cm.                                                                                                                    |
| 51* | NX      | 32526   | 98951    | E1.6    | M18    | <i>Erica tetralix</i> – <i>Sphagnum papillosum</i> raised and blanket mire. Area of bog located in a flat hollow behind Doughty Hill. This area is very wet, with evidence of drainage channels and multiple hare bog pools and has not been planted. Altitude: 355 m; Mean vegetation height: 3 - 30 cm. |

| TN  | OS Grid | Easting | Northing | Phase 1   | NVC     | Notes                                                                                                                                                                                                                                                                |
|-----|---------|---------|----------|-----------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 52* | NX      | 32397   | 98915    | B5        | M4      | <i>Carex rostrata</i> – <i>Sphagnum fallax</i> mire. An area of mire located along the fringes of the above M18 mire and situated at the base of Doughty Hill, where there is a regular flow of water into the mire. Altitude: 359 m; Mean vegetation height: 50 cm. |
| 53* | NX      | 32255   | 98711    | E1.7      | M15     | <i>Trichophorum germanicum</i> - <i>Erica tetralix</i> wet heath. Very tussocky area of heath that has been planted. Altitude: 362 m; Mean vegetation height: 30 cm.                                                                                                 |
| 54* | NX      | 32086   | 98728    | B5        | M23A    | <i>Juncus effusus</i> / <i>acutiflorus</i> - <i>Galium palustre</i> rush pasture, <i>Juncus acutiflorus</i> sub-community. Understorey habitat from a planted area. Altitude: 334 m; Mean vegetation height: 60 cm                                                   |
| 55* | NX      | 31837   | 98401    | E1.6.1    | M17     | <i>Trichophorum germanicum</i> - <i>Eriophorum vaginatum</i> blanket mire. This marks a flat plateau between two hillocks of Doughty Hill. Altitude: 309 m; Mean vegetation height: 40 cm.                                                                           |
| 56* | NX      | 31773   | 98275    | E1.6.1    | M17     | <i>Trichophorum germanicum</i> - <i>Eriophorum vaginatum</i> blanket mire. This is a very small area of bog, located upon a shallow slope, surrounded by wet heath. The area is planted. Altitude: 313 m; Mean vegetation height: 20 cm.                             |
| 57* | NX      | 31790   | 98189    | E1.7      | M25     | <i>Molinia caerulea</i> - <i>Potentilla erecta</i> mire. This area is planted, located upon steep sided slopes, area too small to map. It is bordered by dense soft rush. Altitude: 308 m; Mean vegetation height: 30 cm.                                            |
| 58* | NX      | 31934   | 98247    | E1.6.1    | M17     | <i>Trichophorum germanicum</i> - <i>Eriophorum vaginatum</i> blanket mire. Area of bog that has been planted. Altitude: 304 m; Mean vegetation height: 30 cm.                                                                                                        |
| 59* | NX      | 32110   | 98440    | E1.6.1/B5 | M17/M23 | <i>Trichophorum germanicum</i> - <i>Eriophorum vaginatum</i> blanket mire. Small area of bog that has not been planted. This pocket is surrounded by M23 at the base of the hill. Altitude: 332 m; Mean vegetation height: 15 cm.                                    |
| 60* | NX      | 32449   | 98624    | E1.7      | M15A    | <i>Trichophorum germanicum</i> - <i>Erica tetralix</i> wet heath, <i>Carex panicea</i> sub-community. Wet heath covers a large area of the hillside; it has been planted. Altitude: 332 m; Mean vegetation height: 15 cm.                                            |
| 61* | NX      | 32843   | 98662    | E1.7      | M25     | <i>Molinia caerulea</i> - <i>Potentilla erecta</i> mire. This area of heath is planted upon a gentle slope. Altitude: 304 m; Mean vegetation height: 40 cm.                                                                                                          |
| 62  | NS      | 28802   | 00466    | -         | -       | Access track 1 Photo view (Plate 4)                                                                                                                                                                                                                                  |
| 63  | NX      | 29366   | 97842    | E1.7      | M15     | Access track 2 quadrat 1, bog habitat                                                                                                                                                                                                                                |
| 64  | NX      | 29459   | 97890    | B5        | M23     | Access track 2 quadrat 2, <i>Juncus acutiflorus</i> dominant                                                                                                                                                                                                         |
| 65  | NX      | 29517   | 97908    | E1.7      | M25     | Access track 2 quadrat 3, <i>Molinia caerulea</i> dominant                                                                                                                                                                                                           |
| 66  | NX      | 30068   | 97858    | E1.7      | H10     | Access track 2 quadrat 4, heather area near plantation                                                                                                                                                                                                               |
| 67  | NS      | 28844   | 00547    | B1.2      | U4      | General view of improved field on north-eastern section of route.                                                                                                                                                                                                    |
| 68  | NS      | 28858   | 00454    | -         | -       | Burn, grazed right up to banks.                                                                                                                                                                                                                                      |
| 69  | NS      | 28732   | 00434    | A1.1.1    | W7      | Holly, mature Ash and rowan in line of dyke. No BRP seen in Ash and grazed on east side TN68                                                                                                                                                                         |
| 70  | NS      | 28689   | 00489    | PCW       | PCW     | Just past TN 68. Young Sitka Spruce plantation - tallest c. 2m. Old tree stumps within, damp field layer with soft-rush, creeping buttercup,                                                                                                                         |
| 71  | NS      | 28725   | 00433    | A1.1.1    | W7      | From TN 68 heading west, there are more trees along the northern side of the dyke. Species include silver birch, alder, rowan, holly (c. 8m tall) with a bramble scrub layer.                                                                                        |
| 72  | NS      | 28756   | 00430    | -         | -       | Mature Alder along Burn                                                                                                                                                                                                                                              |
| 73  | NS      | 28619   | 00451    | FPCW      | FPCW    | Between TN68 and TN 72 here are some minor, soft-rush lined minor water courses.                                                                                                                                                                                     |
| 74  | NS      | 28580   | 00480    | B1.2      | U4      | Looking uphill - semi-improved grassland patches within U4                                                                                                                                                                                                           |
| 75  | NS      | 28519   | 00504    | A1.1.1    | W7      | Alder dominated woodland with occasional ash. Field layer of soft-rush, creeping buttercup and tufted hair-grass ( <i>Deschampsia cespitosa</i> )                                                                                                                    |

| TN | OS Grid | Easting | Northing | Phase 1 | NVC | Notes                                                                                   |
|----|---------|---------|----------|---------|-----|-----------------------------------------------------------------------------------------|
| 76 | NS      | 28382   | 00536    | -       | -   | Minor burn through plantation c.20cm wide x 5cm deep.                                   |
| 77 | NS      | 28325   | 00550    | -       | -   | Looking down burn through woodland, burn 50cm wide, 5cm deep.                           |
| 78 | NS      | 27974   | 00525    | -       | -   | Burn - grazed right to banks, below the fence line soft-rush lines burn.                |
| 79 | NX      | 29358   | 97756    | B5      | M23 | M23 Juncus effusus/acutiflorus-Galium palustre rush-pasture, Rhytidiadelphus squarrosus |
| 80 | NX      | 29459   | 97890    | B5      | M23 | Juncus acutiflorus flush                                                                |
| 81 | NX      | 29783   | 97887    | E1.7    | M25 | Looking uphill, Juncus effusus flush                                                    |
| 82 | NX      | 29942   | 97877    | C1      | U20 | Bracken dominated patch                                                                 |

TN's marked with a '\*' were originally recorded as these habitat types, but have since been mounded and planted as part of the Doughty Hill plantation scheme.

## Appendix C Quadrat Data

## Appendix D Species List

| Scientific Name                 | Common Name                | Scientific Name                   | Common Name              |
|---------------------------------|----------------------------|-----------------------------------|--------------------------|
| <i>Agrostis canina</i>          | Velvet bent grass          | <i>Linum catharticum</i>          | White flax               |
| <i>Agrostis capillaris</i>      | Common bent                | <i>Luzula multiflora</i>          | Common woodrush          |
| <i>Agrostis vinealis</i>        | Brown bent grass           | <i>Lychnis flos-cuculi</i>        | Ragged Robin             |
| <i>Alnus glutinosa</i>          | Alder                      | <i>Mentha aquatica</i>            | Water mint               |
| <i>Angelica archangelica</i>    | Wild celery                | <i>Molinia caerulea</i>           | Purple moor grass        |
| <i>Anthoxanthum odoratum</i>    | Sweet vernal grass         | <i>Myosotis scorpioides</i>       | Water forget-me-not      |
| <i>Aulacomnium palustre</i>     | Bog groove-moss            | <i>Nardus stricta</i>             | Matgrass                 |
| <i>Betula pendula</i>           | Silver birch               | <i>Narthecium ossifragum</i>      | Bog asphodel             |
| <i>Calliergonella cuspidata</i> | Pointed spear-moss         | <i>Palustriella falcata</i>       | Claw-leaved Hook-moss    |
| <i>Calluna vulgaris</i>         | Common heather             | <i>Pedicularis palustris</i>      | Marsh lousewort          |
| <i>Caltha palustris</i>         | Marsh marigold             | <i>Pedicularis sylvatica</i>      | Common lousewort         |
| <i>Camphylium stellatum</i>     | Yellow starry feather-moss | <i>Pellia sp.</i>                 | Liverwort sp.            |
| <i>Carex binervis</i>           | Green-ribbed sedge         | <i>Picea sitchensis</i>           | Sitka spruce             |
| <i>Carex echinata</i>           | Star sedge                 | <i>Pinguicula vulgaris</i>        | Common butterwort        |
| <i>Carex flacca</i>             | Blue-green sedge           | <i>Plagiothecium undulatum</i>    | Snake moss               |
| <i>Carex leporina</i>           | Eggbract sedge             | <i>Pleurozium schreberi</i>       | Red-stemmed feathermoss  |
| <i>Carex nigra</i>              | Smooth black sedge         | <i>Polygala serpyllifolia</i>     | Heath milkwort           |
| <i>Carex panicea</i>            | Carnation sedge            | <i>Polytrichum commune</i>        | Common haircap moss      |
| <i>Carex pulicaris</i>          | Flea Sedge                 | <i>Potamogeton polygonifolius</i> | Bog pondweed             |
| <i>Cerastium fontanum</i>       | Mouse-ear chickweed        | <i>Potentilla erecta</i>          | Tormentil                |
| <i>Cirsium palustre</i>         | Marsh thistle              | <i>Potentilla palustris</i>       | Marsh cinquefoil         |
| <i>Cladonia arbuscula</i>       | Flot                       | <i>Pseudoscleropodium purum</i>   | Neat feather-moss        |
| <i>Cladonia sp.</i>             | Lichen sp.                 | <i>Racomitrium lanuginosum</i>    | Wooly fringe-moss        |
| <i>Crepis paludosa</i>          | Marsh hawk's-beard         | <i>Ranunculus acris</i>           | Meadow buttercup         |
| <i>Cynosurus cristatus</i>      | Crested dog's-tail         | <i>Ranunculus repens</i>          | Creeping buttercup       |
| <i>Dactylorhiza maculata</i>    | Heath spotted-orchid       | <i>Rhynchospora alba</i>          | White beak-sedge         |
| <i>Dactylorhiza majalis</i>     | Broad-leaved marsh orchid  | <i>Rhytidiadelphus loreus</i>     | Lanky moss               |
| <i>Deschampsia cespitosa</i>    | Tufted hairgrass           | <i>Rhytidiadelphus squarossus</i> | Square goose-necked moss |
| <i>Deschampsia flexuosa</i>     | Wavy hair grass            | <i>Rhytidiadelphus triquetrus</i> | Rough goose neck moss    |
| <i>Drosera rotundifolia</i>     | Round-leaved sundew        | <i>Rubus fruticosus</i>           | Blackberry               |
| <i>Empetrum nigrum</i>          | Blackberry                 | <i>Rumex acetosa</i>              | Common sorrel            |
| <i>Epilobium palustre</i>       | Marsh willowherb           | <i>Rumex acetosella</i>           | Red sorrel               |
| <i>Equisetum palustre</i>       | Marsh horsetail            | <i>Sorbus sp.</i>                 | Rowan                    |
| <i>Erica tetralix</i>           | Cross-leaved heath         | <i>Sphagnum capillifolium</i>     | Red bogmoss              |
| <i>Eriophorum angustifolium</i> | Common cottongrass         | <i>Sphagnum denticulatum</i>      | Cow-horn bog-moss        |
| <i>Eriophorum vaginatum</i>     | Hare's-tail cottongrass    | <i>Sphagnum fallax</i>            | Flat-topped bogmoss      |
| <i>Euphrasia officinalis</i>    | Eye bright                 | <i>Sphagnum magellanicum</i>      | Magellanic bogmoss       |
| <i>Festuca ovina</i>            | Sheep's fescue             | <i>Sphagnum palustre</i>          | blunt-leaved bogmoss     |
| <i>Filipendula ulmaria</i>      | Meadowsweet                | <i>Sphagnum papillosum</i>        | Papillose peatmoss       |
| <i>Fraxinus excelsior</i>       | Ash                        | <i>Sphagnum quinquefarium</i>     | Five-ranked bogmoss      |
| <i>Galium palustre</i>          | Common marsh bedstraw      | <i>Stellaria alsine</i>           | Bog stitchwort           |
| <i>Galium saxatile</i>          | Heath bedstraw             | <i>Stellaria uliginosa</i>        | Bog chickweed            |

| Scientific Name             | Common Name         | Scientific Name                | Common Name          |
|-----------------------------|---------------------|--------------------------------|----------------------|
| <i>Holcus lanatus</i>       | Yorkshire fog       | <i>Succisa pratensis</i>       | Devil's-bit scabious |
| <i>Hydrocotyle vulgaris</i> | Marsh pennywort     | <i>Thuidium tamariscinum</i>   | Tamarisk-moss        |
| <i>Hylocomium splendens</i> | Glittering woodmoss | <i>Thymus polytrichus</i>      | Large thyme          |
| <i>Hypnum jutlandicum</i>   | Heath Plait-moss    | <i>Trichophorum germanicum</i> | Deer grass           |
| <i>Ilex sp.</i>             | Holly               | <i>Vaccinium myrtillus</i>     | Bilberry             |
| <i>Juncus acutiflorus</i>   | Sharp-flowered rush | <i>Vaccinium oxycoccos</i>     | Bog cranberry        |
| <i>Juncus articulatus</i>   | Jointleaf rush      | <i>Viola palustris</i>         | Marsh Violet         |
| <i>Juncus effusus</i>       | Soft rush           | <i>Viola riviniana</i>         | Common dog-violet    |
| <i>Juncus squarrosus</i>    | Heath rush          |                                |                      |

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## Appendix E Plates



Plate 1: View south west, towards Doughty Hill from north east corner of the Survey Area. New deer fence and mound/furrow visible across the majority of the hillside.



Plate 2: View north east from road, looking towards Craiginmoddie. White/light vegetation in background indicating M15 & M25 and green areas of U4 & U5 acid grassland.



Plate 3: *Eriophorum vaginatum* in flower along the plantation edge, looking south towards Doughty Hill. New mounding and planting resulting in new PCW habitat description.



Plate 4: View west across isolated access track area. W7 semi-natural broadleaved woodland visible with B5 marshy grassland in the foreground.

**CRAIGINMODDIE WIND FARM TECHNICAL APPENDIX 9.2:  
PROTECTED SPECIES  
GEL19117**

**ENERGIE KONTOR**

**07/12/2020**



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## Executive Summary

Gavia Environmental was commissioned by Energie Kontor to undertake a Protected Species Walkover Survey at the proposed Craiginmoddie wind farm site, north east of Barr in south Ayrshire.

Additional survey work was carried out on an original redline boundary in 2019, updated in 2020 to account for a site extension to include the open ground over Doughty Hill to the east of the plantation and access track south west of the plantation. .

An additional isolated section of access track, required to accommodate turbine blade delivery vehicles, c.2km to the north west of the main wind farm site was surveyed in October 2020. In this area a preliminary Ecological Appraisal (PEA) was undertaken which included identifying trees and features with bat roost potential.

All areas of the main site redline boundary were walked to identify field signs, habitats and features suitable to support protected species. A large pond was identified from aerial imagery and subject to a Habitat Suitability Assessment to assess potential to support great crested newt.

A desk study identified an active badger sett and latrine, approximately 500m outside of the main windfarm boundary and otter spraint along the Ferly Burn, east of the Survey Area.

During the field survey otter spraint, badger scat and pine marten scat were all recorded within the main windfarm boundary. The HSI returned a score of 0.59, classifying the pond as 'below average' suitability for great crested newt.

Along the isolated access track section to the north west of the main wind farm site, a disused outlier badger sett, snuffle holes and a latrine were recorded. There were also instances of trees that had bat roost potential found along this proposed track.

No evidence of any other protected species was recorded across the Survey Areas however incidental observations of common frog, common lizard, small female newt, field and bank vole, wood mouse, hare sp., roe deer, hedgehog and fox were noted.

---

# 1 Introduction

## 1.1 Aims and Objectives

Gavia Environmental Ltd. ('GEL') was commissioned Energie Kontor ('the Client') to undertake a Protected Species Walkover Survey at the proposed Craiginmoddie Wind Farm, ('the Site') which is located at Grid Reference NX 31200 98500 , approximately 5.5 km north east of Barr in South Ayrshire (Figure 1.1). Following the original Site visit in September 2019, further additions to this area were also evaluated after being commissioned by the Client. These areas consisted of:

- An extension to include the open ground over Doughty Hill, east of the original Site redline boundary. This area was surveyed in June, July and September 2020 (Figure 1.2);
- An extension to the south west to account for the proposed access track route. This area was surveyed in October 2020 (Figure 1.3); and
- Additional isolated section of access track to the north west of the Site surveyed in October 2020 (Figure 1.4).

All survey areas are presented in Figures 1.1-1.4 and correspond to the relevant boundary area at the time of survey. The 'survey area' encompasses all areas of redline boundary and additional 250m buffer where land access was agreed.

It should be noted that information specific to bat species within the main windfarm boundary (Figure 1.3) is not included in this report and is addressed in Technical Appendix 9.3. Only trees found with Bat Roost Potential (BRP) along the isolated track section (Figure 1.4) have been discussed in this report.

## 1.2 Legislation

### 1.2.1 Protected Species

The Wildlife and Countryside Act 1981 (as amended) covers the protection of a wide range of protected mammal species including hares, pine marten, red squirrel, and water vole (Under Schedule 5). Amphibian and reptile species found naturally in Scotland such as common frog, common toad, palmate newt, smooth newt, common lizard, slow worm and adder are given limited protection under the Wildlife and Countryside Act 1981 (as amended).

The Conservation (Natural Habitats, &c.) Regulations 1994 implement two pieces of European law and provide for the designation and protection of 'Special Protection Areas' (SPAs) and 'Special Areas of Conservation' (SACs), together with the designation of 'European Protected Species', which include otter, beaver and wildcat.

### 1.2.2 Badger

Badgers are protected by the Protection of Badgers Act (1992), which protects them against deliberate cruelty and incidental effects of otherwise lawful activities. It is an offence, amongst others<sup>1</sup>, to:

- kill, injure, take, possess, or cruelly ill-treat a badger or attempt to do so;
- damage, destroy or obstruct access to a badger sett or part of a sett; and
- disturb a badger when it occupies a sett.

The Nature Conservation (Scotland) Act 2004 also made the above actions unlawful if carried out recklessly (as opposed to intentionally). The Wildlife and Natural Environment (Scotland) Act (2011) (the WANE Act) has strengthened the protection afforded to badgers further by

making it an offence, amongst others, to knowingly cause or permit an unlawful act to be carried out.

### 1.2.3 Great Crested Newts (GCN)

Great Crested Newts are protected under The Conservation of Habitats and Species Regulations 2017 (Section 42), Habitats Regulations 1994 Schedule 2 – European protected species of animal and Annex IV of the Habitats Directive. Those species of animals listed in Annex IV(a) to the Habitats Directive (such as GCN) have a natural range which includes any area in Great Britain. Great crested newt ponds are protected all year round, as long as newt activity is recorded for some of the time throughout the year. For European protected species, including GCN, it is an offence to deliberately or recklessly:

- capture, injure or kill such an animal;
- harass an animal or group of animals;
- disturb an animal while it is occupying a structure or place used for shelter or protection; and
- disturb an animal while it is rearing or otherwise caring for its young.

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## 2 Methodology

### 2.1 Desk Study

Prior the field survey, a desk study was undertaken to provide up to date ecological information on statutory designated sites (within 10km), and European and UK protected species within 5km of the Site as well as the proposed northern access track (from the last 10 years). Information was sought from the following sources:

- Nature Scot Site Link;
- A search of publicly available information of the National Biodiversity Network (NBN), available for commercial purposes, on protected species records in the 5 km grid square the Site is situated in;
- Scottish Biodiversity List;
- Existing field data obtained from the Client on the Doughty Hill planting scheme;
- Multi-Agency Geographical Information for the Countryside (MAGIC); and
- South Ayrshire Local Biodiversity Action Plan (LBAP) (2010).

### 2.2 Field Survey

#### 2.2.1 Protected Species Walkover

The walkover survey recorded evidence (where present) of any EU or UK protected species including amphibians, reptiles, and mammals.

Survey effort was focused on prominent features such as trees with bat roost potential (BRP) (only along the isolated section of access track to the north west of the main wind farm boundary), woodland edges, existing paths, buildings or structures and habitat boundaries, all of which can provide shelter and/or commuting routes for wildlife.

All surveys were conducted during clear/sunny conditions and with good visibility.

##### 2.2.1.1 Mammals

The walkover survey recorded evidence of all mammals with particular focus on species listed in Schedule 2 of the Habitat Directive (European Protected Species), Schedule 5 of the Wildlife & Countryside Act 1981 (UK Protected Species), and/or the Scottish Biodiversity List/Local Biodiversity Action Plan; and Badger Protection Act, 1992.

The walkover did not constitute any species specific surveys, but followed methodologies for mammal surveys outlined by MacDonald et al. (1998) with reference to Chanin (2003) and Strachan & Moorhouse (2006) respectively for otter and water vole, Scottish Badgers (2018) for badger.

Specifically, the searches sought to identify (listed below) of protected species:

- Trees with bat roost potential (BRP);
- Faeces;
- Footprints;
- Hair, especially at all restricted passageways through undergrowth or fences;
- Scratch posts;
- Squirrel dreys;
- Places of shelter (dens, setts, holts or burrows) and

- Feeding signs (gnawed cones, fish remains, etc.).

Registrations of interest were noted as Grid Referenced Target Notes (with the aid of a handheld GPS).

#### 2.2.1.2 Amphibians - GCN: Habitat Suitability Index

The initial desk study identified any ponds within the main wind farm boundary and the 250m buffer zone of the Proposed Development areas at the main Site. Ponds were scored through Habitat Suitability Index (HSI) as described by Oldham et al. (2000). The HSI is a numerical index, between 0 and 1. Values close to 0 indicate unsuitable habitat, 1 represents optimal habitat. The HSI for the great crested newt incorporates ten suitability indices: geographic location, pond area, permanence, water quality, % shade, waterfowl presence, fish presence, pond count, terrestrial habitat and macrophyte cover. All of which are factors known to affect great crested newt populations.

HSI Pond suitability scores are categorised as below, following the Lee Brady System (Amphibian and Reptile Group, 2010):

- < 0.5 = poor
- 0.5-0.59 = below average
- 0.6-0.69 = average
- 0.7-0.79 = good
- >0.8 = excellent

#### 2.2.1.3 Reptiles

No formal search was undertaken for reptiles however a watching brief was maintained for reptile species (included under the Wildlife and countryside act 1981) were included in the walkover. These included any rank grasslands, heathlands, ponds and refugia such as log piles and wood debris.

### 2.3 Limitations

- Large sections of the Site featured dense coniferous plantation limiting the access into some areas of the plantation within the main Survey Area;
- The surveys carried out on the main Site were restricted to walking the plantation rides and edges to identify mammal tracks and territory boundary markings;
- Access for surveys of the site extension in June, July & September 2020 and additional access track in October 2020 was only available on areas within the development boundary and not within the 250m buffer;
- Due to the time of survey in 2019 and late commissioning of the isolated access track section in 2020, no evidence of reptile or amphibian species were recorded during the surveys undertaken later in the year; and
- The protected species walkover only identified field signs does not constitute a detailed species specific survey for each protected species recorded.

---

## 3 Results

### 3.1 Desk Study

#### 3.1.1 Designated Sites

No statutory designated sites with qualifying protected species features, were identified within 10 km for the main Site or the proposed north access track section.

#### 3.1.2 Protected Species

Records from within the last 10 years did not indicate any protected species within the main wind farm boundary, nor within the isolated section of access track.

The following protected mammal records (excluding bats) were identified within 5km of the main windfarm Site:

- 5 records of brown hare *Lepus europaeus*;
- 1 record of pine marten *Martes martes*; and
- 7 records of red squirrel *Sciurus vulgaris*.

No amphibian or reptile records were found.

Data obtained from the Client in relation to the Doughty Hill planting scheme returned the following protected species records:

- An active Natal badger *Meles meles* sett, outside the Site redline boundary. Signs of active use (bedding cleaned out) were observed in May and June 2019. (Full details provided in Confidential Annex 9.1: Badger Survey Results);
- 5 areas of badger foraging signs within the open hillside east of Doughty Hill; and
- 3 otter *Lutra lutra spraint* were recorded along the Ferly Burn in grid square NX32 98 on the east side of the burn, south of the road bridge, along the east boundary of the proposed wind farm, observed in March and April 2019.

Data for the 2019 Doughty Hill badger and otter records are presented in Figure 2 (removed for confidentiality reasons and presented in Confidential Annex 9.1: Badger Results).

### 3.2 Protected Species Walkover

All mammal target notes (TN) (including non-protected mammals) are presented in Appendix C and all protected species records are presented in Figure 3.1-2.3.

#### 3.2.1 First Site Visit (September 2019)

The plantation edge was walked to identify any mammal tracks, territory boundary markings or outlier setts, however, no evidence of either was recorded and no evidence of otter was recorded along the water courses

Similarly, while commuting across the Site, no pine marten or red squirrel field signs were recorded along the existing forestry access track. No places of shelter or spraints were identified along the water courses and drains. No burrows or evidence of water vole were recorded.

#### 3.2.2 Site Extension Visit (June and July 2020)

Two signs of otter spraint were recorded underneath the road bridge along the Ferly Burn to the east of the Survey Area Boundary (TN 6 & 9, Plate 1). One spraint was recorded to the north-east and the other to the south-east of the Site, fish bones were observed within the scat indicating a readily available food source along the Burn. Several badger scat were recorded

along the plantation edge centrally within the Survey Area and badger run in/out of the plantation was also located to the north west (TN 3, 7 & 10).

No evidence of red squirrel or water vole was recorded.

Additionally, a small newt was recorded in a small ephemeral waterbody along the plantation edge, centrally within the Survey Area (TN 4, Plate 2), as well as a common frog.

One observation of common lizard was recorded along the plantation edge, south of Doughty Hill (TN 5), and another observed to the east, outside the Survey Area boundary (TN11).

### 3.2.3 Site Extension Visit (September 2020)

Three signs of otter spraint (TN 52-54, Plates 3 & 4) were recorded adjacent to the Ferly Burn, along the east boundary of the Survey Area.

One well-worn badger run in/out of the plantation and scat was identified (TN41 and Plate 5), along the plantation edge to the south west of the Survey Area.

A regularly used pine marten scatting area (TN43, Plate 6) was identified adjacent to an existing access track through the plantation, centrally within the Survey Area. Several different scats were identified suggesting the area is frequently used as a foraging route, or territory boundary.

No evidence of red squirrel or water vole was recorded.

### 3.2.4 North Section of Access Track (October 2020)

No protected species field signs were recorded along the area designated for the main Site access track (the open ground east of Delamford Hill).

An inactive outlier badger sett was recorded within the survey area of the isolated track section, north of the main Site, approximately 200m north of the proposed trackway (TN 59, Plate 7), leaf litter was blown into the entrance of the sett suggesting this is not regularly cleaned out and therefore not regularly used. A latrine with several dried scats, foraging signs (snuffle holes) and worn mammal runs were also recorded north of the proposed trackway in this area, however no evidence of recent activity was recorded (TN 60 & 62, Plate 8 & 9).

There were several mature trees present along this proposed access track that had features suitable to support roosting bats (TN 61, 63 & 65-68, Plate 10) (Figure 2.4)

No evidence of otter, pine marten, water vole or red squirrel were recorded.

### 3.2.5 Great Crested Newt Habitat Suitability Index

One pond within the Survey Area was identified from aerial imagery, along the forestry track within the plantation to the south of the Survey Area, approximately NX 31241 97765 (TN 70, Plate 11) (Figure 2.3). The pond was assessed during the September 2020 walkover and data was recorded for the suitability indices. The ten habitat indices were entered into DEFRA's (2020) Biodiversity Metric 2.0 spread sheet and multiplied together to provide the Pond Suitability (HSI) score. The output was as follows:

| Habitat Suitability Index |                     |                                   | SI value          |               |
|---------------------------|---------------------|-----------------------------------|-------------------|---------------|
| SI1.                      | Map location        | A/B/C                             | B                 | 0.50          |
| SI2.                      | Surface area        | rectangle/ellipse/irregular       | ellipse           |               |
|                           |                     |                                   |                   |               |
|                           |                     | $area (m^2) =$                    | 286               | 0.57          |
| SI3.                      | Dessication rate    | never/rarely/sometimes/frequently | rarely            | 1.00          |
| SI4.                      | Water quality       | good/moderate/poor/bad            | moderate          | 0.67          |
| SI5.                      | Shade               | % of margin shaded 1m from bank   | 20                | 1.00          |
| SI6.                      | Waterfowl           | absent/major/minor                | absent            | 1.00          |
| SI7.                      | Fish population     | absent/possible/minor/major       | absent            | 1.00          |
| SI8.                      | Pond density        | number of ponds within 1km        | 0.3               | 0.09          |
| SI9.                      | Terrestrial habitat | good/moderate/poor/isolated       | good              | 1.00          |
| SI10.                     | Macrophyte cover    | %                                 | 0                 | 0.31          |
|                           |                     |                                   | HSI=              | 0.59          |
|                           |                     |                                   | Pond Suitability* | Below average |

*\*Following the Lee Brady system*

**Table 1: Great crested newt Habitat Suitability Index**

The output provided a score of 0.59, which is below average suitability. No other ponds were identified within the Survey Area (It should be noted, 0.3 was the minimum score able to be entered into the calculator), and no records for GCN were identified, within the last 10 years, within 5 km of the Survey Area during the desk study. As such, no further surveys (such as eDNA or bottle trapping) were undertaken to assess GCN presence.

### 3.3 Incidental Sightings

A variety of small mammal field signs were recorded across the Survey Area, including field vole *Microtus agrestis* burrows, droppings and feeding remains, bank vole *Myodes glareolus* sighting and wood mouse *Apodemus sylvaticus*.

A small mustelid burrow (stoat *Mustela erminea* or weasel *Mustela nivalis*) was identified within the north section of the Survey Area and a hedgehog *Erinaceus europaeus* scat was identified along the plantation boundary of the main wind farm Site.

Hare *Lepus sp.* droppings were recorded north east of Doughty Hill and rabbit *Oryctolagus cuniculus* were observed along the north access track section.

Roe deer *Capreolus capreolus* were occasionally observed grazing within the Survey Areas of both the main wind farm boundary and the northern access track and several fox *Vulpes vulpes* scat were recorded along the forestry rides centrally within the Survey Area

All incidental sightings are presented in Figure 4.2-4.5.

#### 4 Valued Ecological Receptors (VER's)

Evidence of otter was recorded on the Ferly Burn, along the east boundary of the Area, no places of shelter were identified and no evidence of otter was recorded on the other water courses within the Survey Area or 250m boundary.

An active sett, located outside the 250 m buffer, south east of the Survey Area was identified from the desk study, and several scat were identified along the plantation edge of Doughty Hill during the 2020 surveys, indicating a likely clan territory boundary. A disused outlier sett was identified c. 2.5km north west of the west Survey Area boundary (>5 km from the active set), and no other active setts were identified to indicate the presence of a second clan within the Survey Area.

An active pine marten scatting site was recorded along the forestry track to the north of the Survey area. The presence of several scat in the same area suggest this could mark a territory boundary. A second individual scat was identified along the south edge of the plantation, indicative of a foraging route.

Several trees with suitable features to support roosting bats were identified along the water courses within the isolated track way section, however no further assessment was made.

Table 2 below highlights the protected species recorded during the walkover survey as valued Ecological Receptors and details their protections.

| Species                                                                                       | Evidence within Survey Area                                                                                                                                                                                                                                                                                 | Status                                                                                                                                                                                                              |
|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Badger                                                                                        | An active set and latrine was identified outside of the Survey Area Boundary and disused outlier set north identified to the north of the isolated access track. Several scats identified along plantation edge centrally within Survey Area and foraging signs and old latrine within isolated track area. | The Protection of Badgers Act 1992 set outs legislation on the protection of badgers. This legislation is intended to prevent the persecution of badgers. The act protects both individual badgers and their setts. |
| Otter                                                                                         | Spraint identified on Ferly Burn. No further evidence on any other water course                                                                                                                                                                                                                             | European Protected Species (EPS) as part of the EC Habitats Directive 92/43/EEC and transposed through Scots Law through the Conservation (Natural Habitats, &c.) Regulations 1994.                                 |
| Pine marten                                                                                   | Prominent scatting area identified within plantation, and an individual scat along south plantation boundary, within Survey Area.                                                                                                                                                                           | Schedule 5 of the Wildlife and Countryside Act 1981 (as amended)                                                                                                                                                    |
| Bats                                                                                          | Several trees with roost potential identified along north access track Survey Area.                                                                                                                                                                                                                         | Protected by the Wildlife and Countryside Act (1981) (as amended) and Conservation of Habitats and Species Regulations (2017) (as amended).                                                                         |
| Hare sp., rabbit, weasel/stoat, field vole, bank vole, wood mouse, hedgehog, roe deer and fox | Incidental observations of individual species, feeding remains, droppings and burrows.                                                                                                                                                                                                                      | Protected under the Wildlife and Countryside Act 1981 (as amended)                                                                                                                                                  |
| Common lizard, Common frog and small newt                                                     | Incidental observations of these species were recorded within the open ground centrally within the Survey Area.                                                                                                                                                                                             | Protected by the Wildlife and Countryside Act 1981 (as amended)                                                                                                                                                     |

Table 2: Valued Ecological Receptors

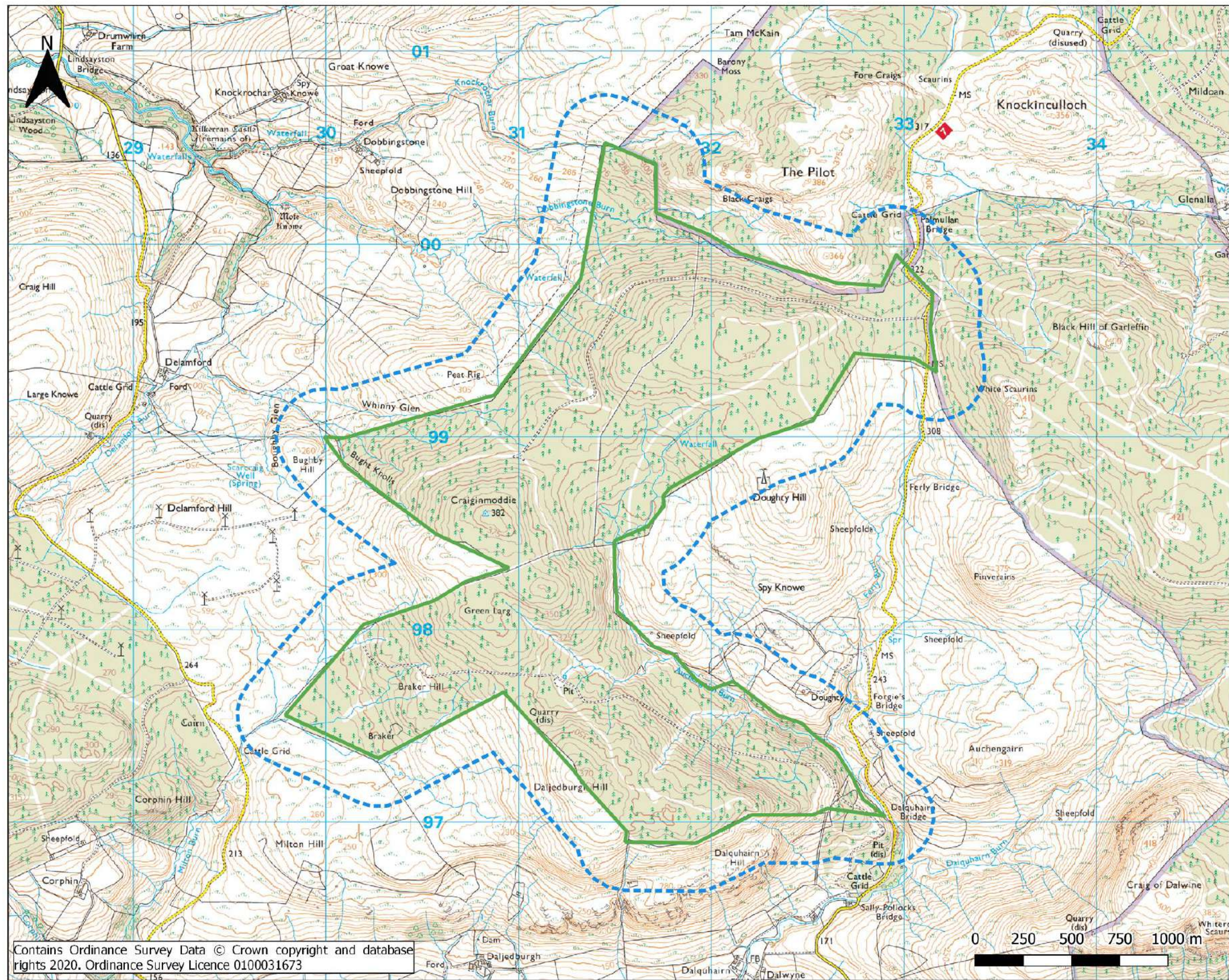
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## Appendices

### Appendix A: Figures



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# Key

- Site Boundary (2019)
- 250m Survey Buffer

**Project:**  
GEL19119  
Craiginmoddie Wind Farm

**Technical Appendix 9.2:**  
Protected Species

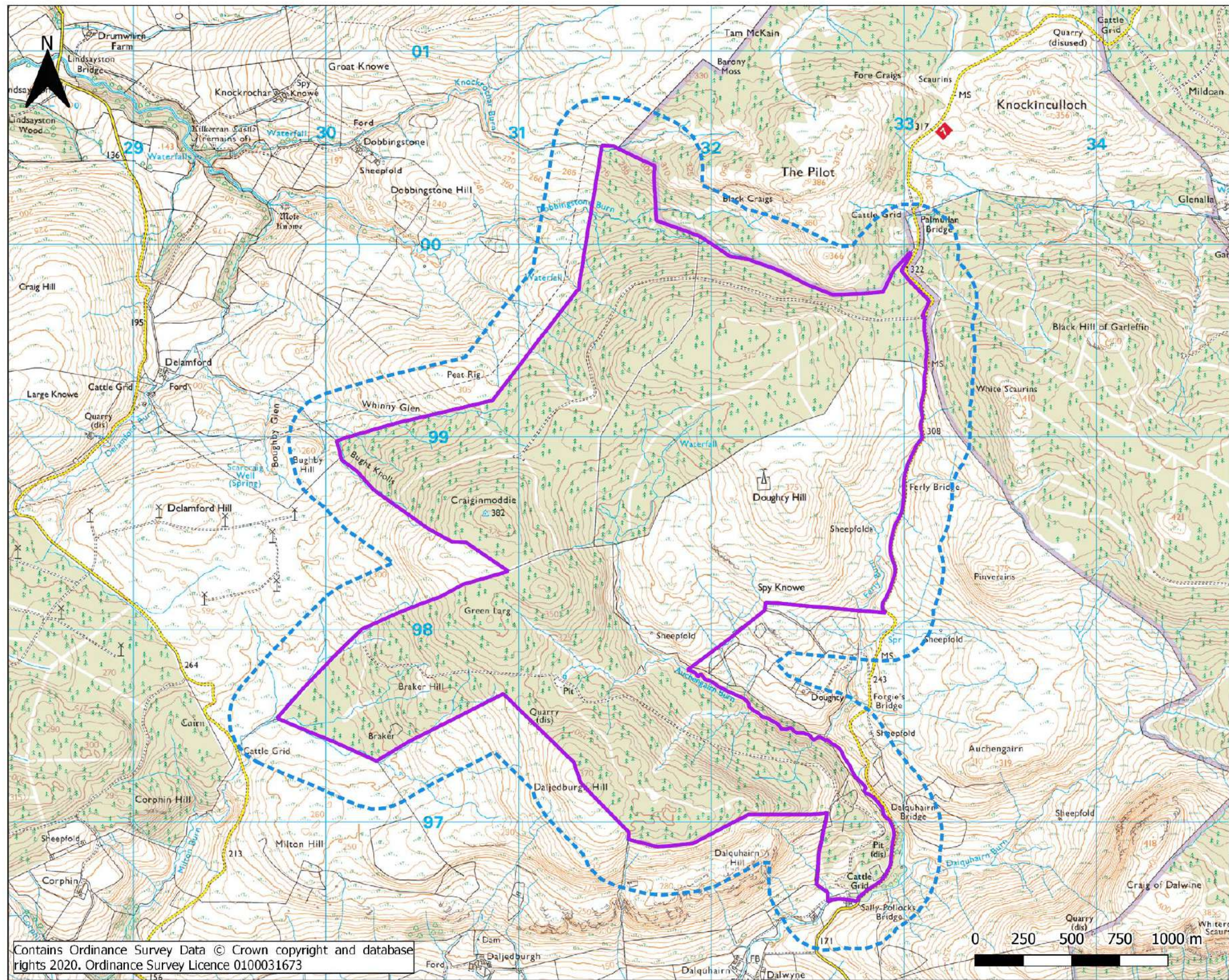
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Energe Kontor

**Title:**  
Figure 1.1  
Site boundary (2019)

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| <b>Drawn By:</b><br>AT  | <b>Reviewed By:</b><br>CB | <b>Date:</b><br>26/11/2020 |



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Key

- Site Boundary
- Extended (2020)
- 250m Survey Buffer

Project:  
**GEL19119**  
**Craiginmoddie Wind Farm**

Technical Appendix 9.2:  
**Protected Species**

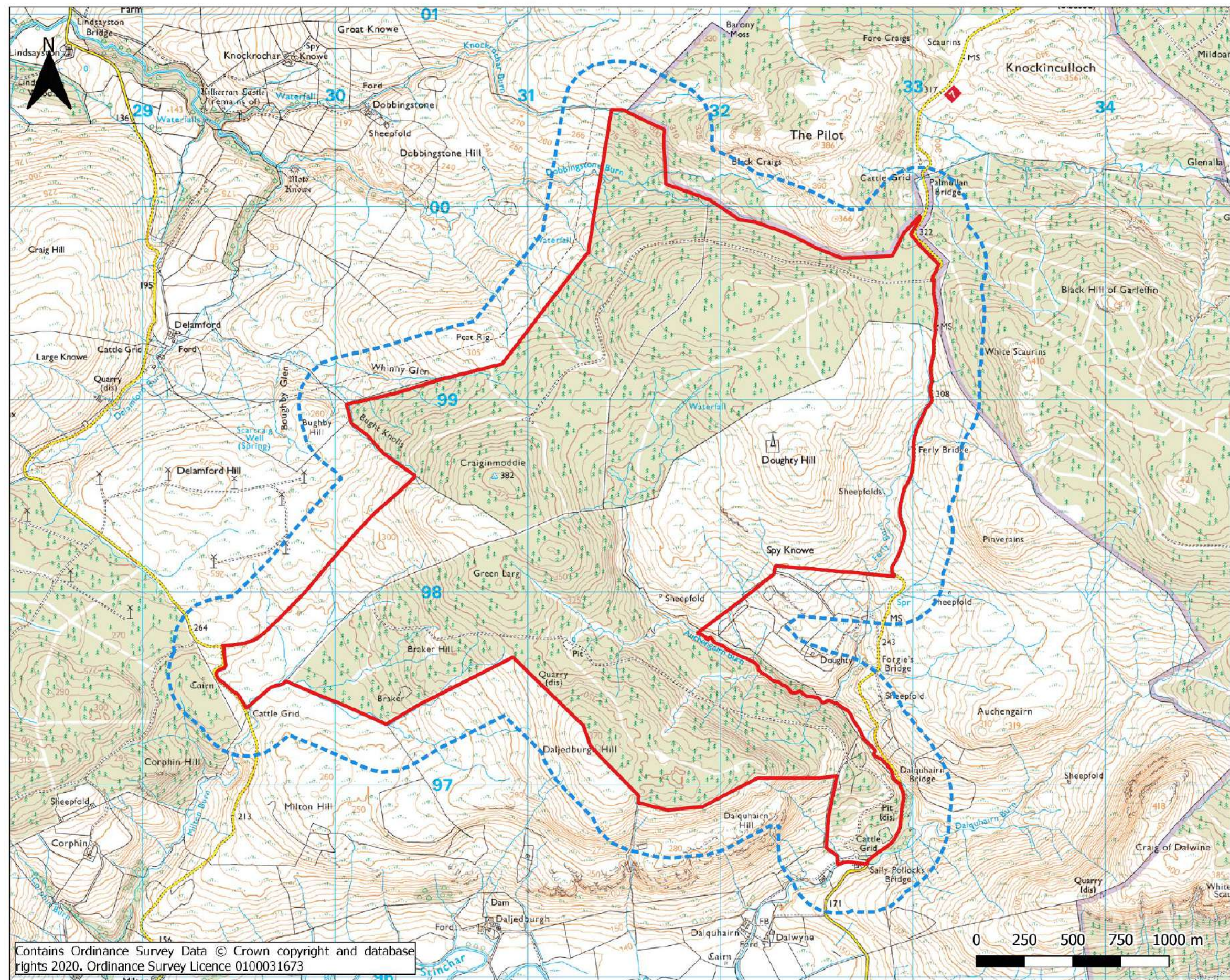
Client:  
**Energie Kontor**

Title:  
**Figure 1.2**  
**Site boundary extended**  
**(2020)**

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## Key

-  Site Boundary  
 Access Track  
 Extention (2020)  
 250m Survey buffer

**Project:**  
**GEL19119**  
**Craigimoddie Wind Farm**

## Technical Appendix 9.2: Protected Species

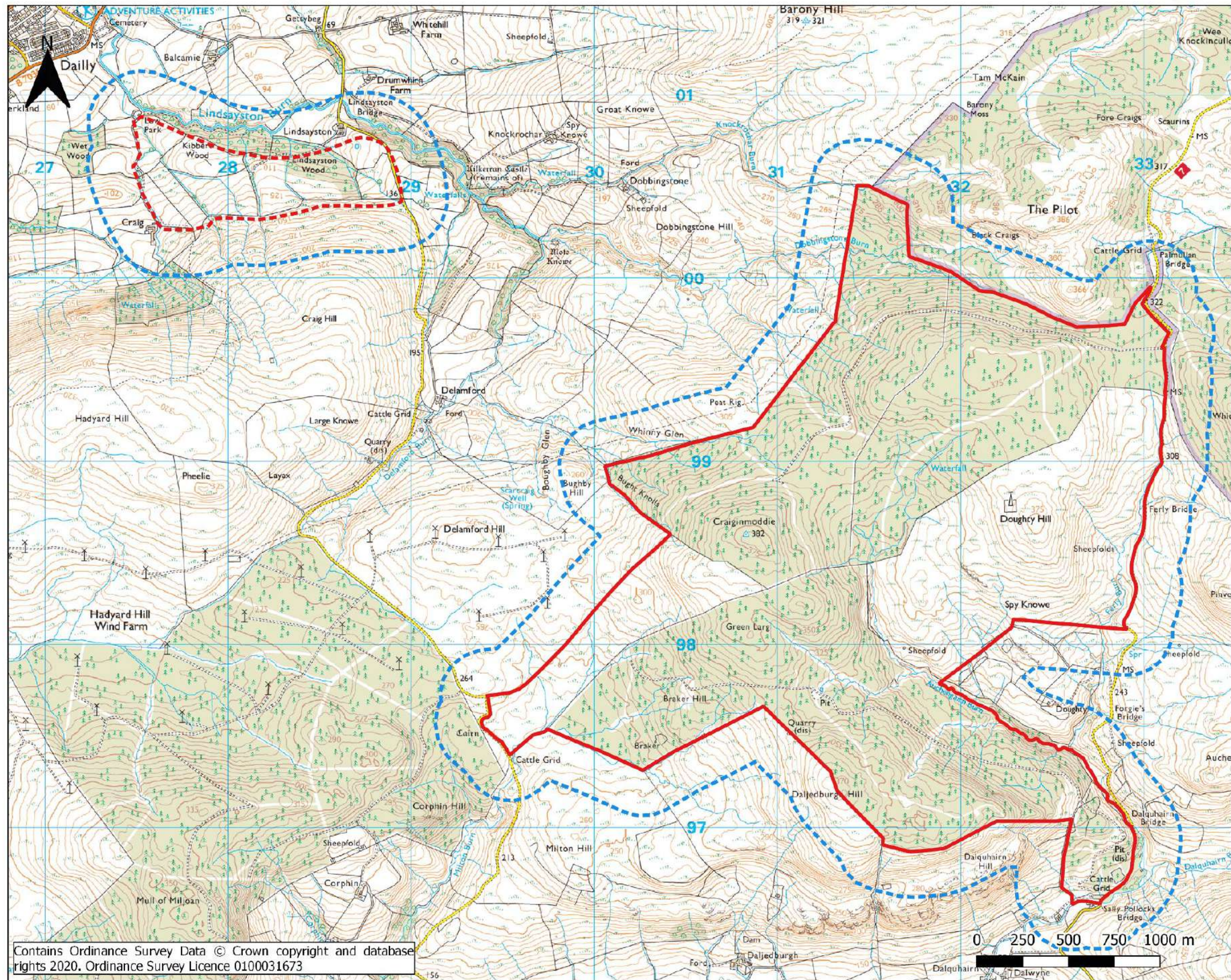
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**Energie Kontor**

**Title:**  
**Figure 1.3**  
**Site boundary Access Track**  
**Extention (2020)**

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## Key

- Approximate Additional Access Track Boundary
- Site Boundary
- Access Track Extention (2020)
- 250m Survey buffer

NB: At time of survey, additional track layout was not set, hence an approximate boundary area.

**Project:**  
GEL19119  
Craiginmoddie Wind Farm

**Technical Appendix 9.2:**  
Protected Species

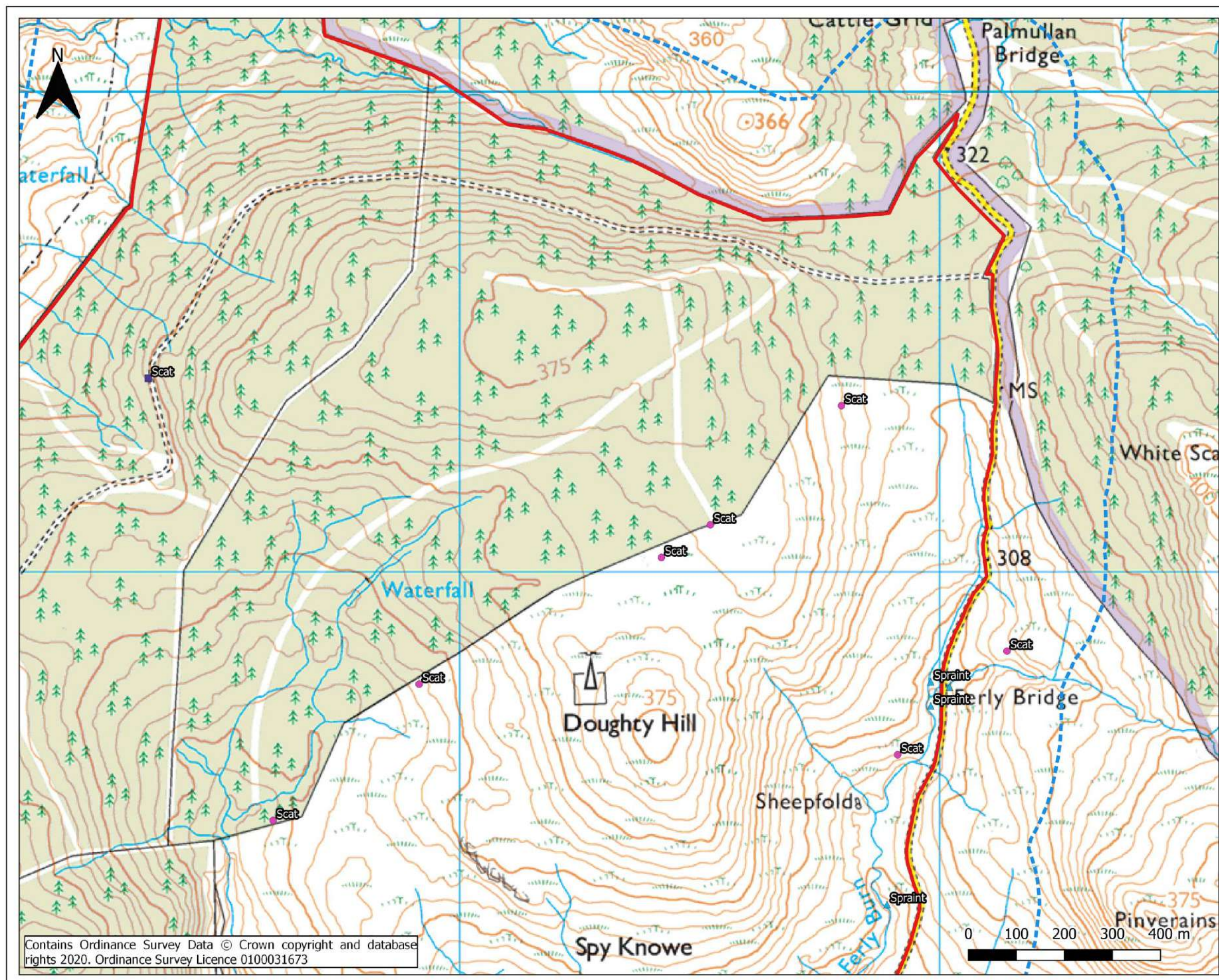
**Client:**  
Energie Kontor

**Title:**  
Figure 1.4  
Site boundary and additional Access Track Area (2020)

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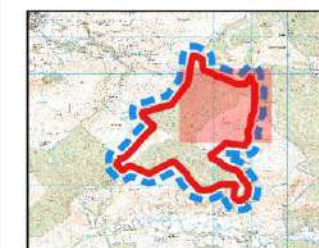


## Key

- Site Boundary
- Access Track
- Extension (2020)
- 250m Survey Buffer

## Field Survey: Protected Species

- Badger
- ▲ Otter
- Pine marten



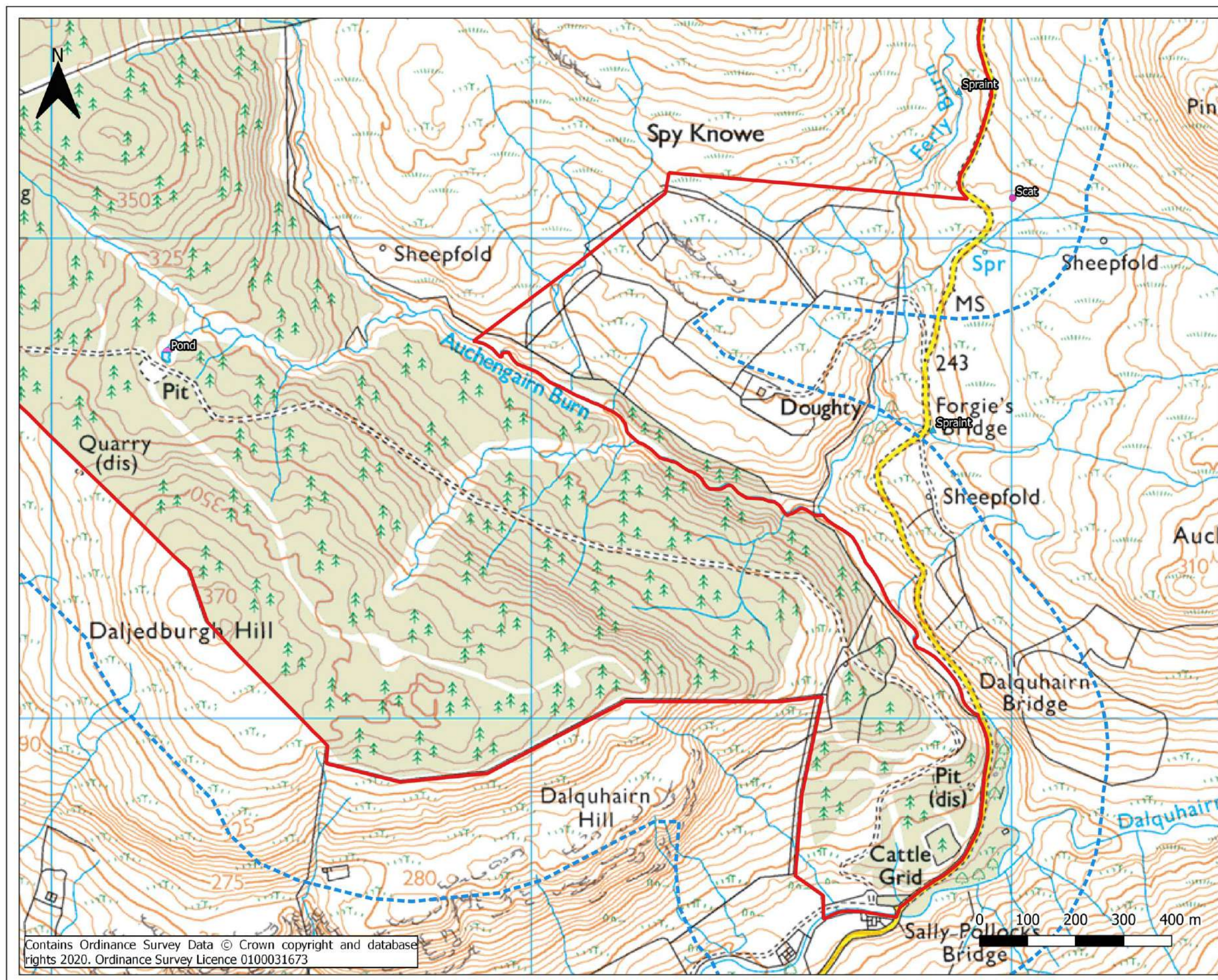
**Project:**  
GEL19119  
Craiginmoddie Wind Farm

**Technical Appendix 9.2:**  
**Protected Species**

**Client:**  
Energie Kontor

**Title:**  
**Figure 3.1**  
**Field Study: Protected Species**

|                         |                           |                            |
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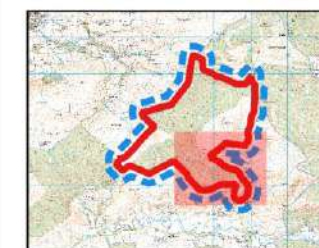


## Key

- Site Boundary
- Access Track
- Extension (2020)
- 250m Survey Buffer

## Field Survey: Protected Species

- Badger
- ▲ Otter
- Great crested newt



**Project:**  
GEL19119  
Craiginmoddie Wind Farm

**Technical Appendix 9.2:**  
**Protected Species**

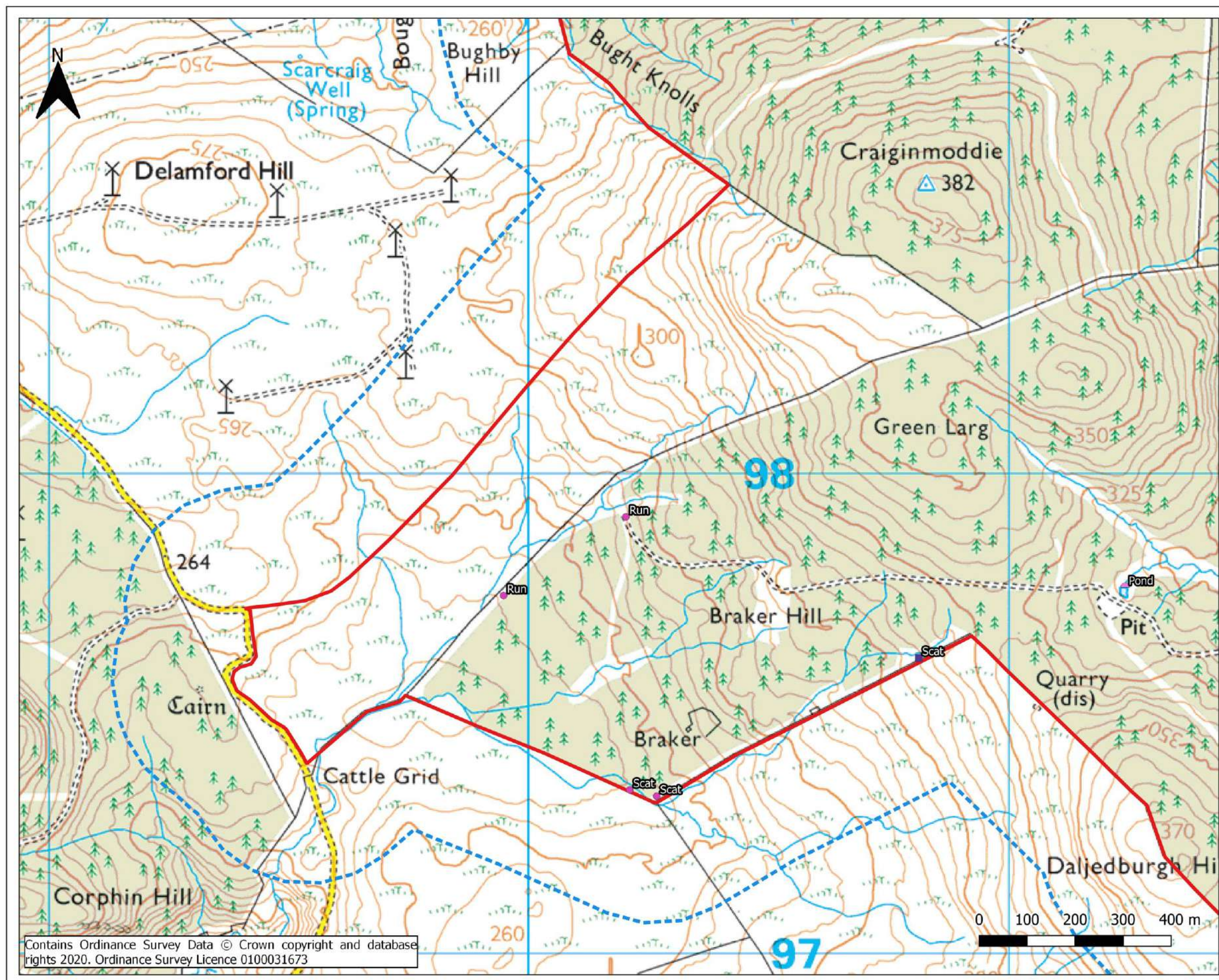
**Client:**  
Energie Kontor

**Title:**  
**Figure 3.2**  
**Field Study: Protected Species**

|                         |                           |                            |
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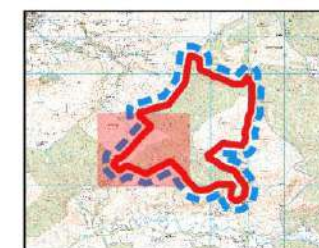
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## Key

- Site Boundary
- Access Track
- Extension (2020)
- 250m Survey Buffer

## Field Survey: Protected Species

- Badger
- Great crested newt
- Pine marten



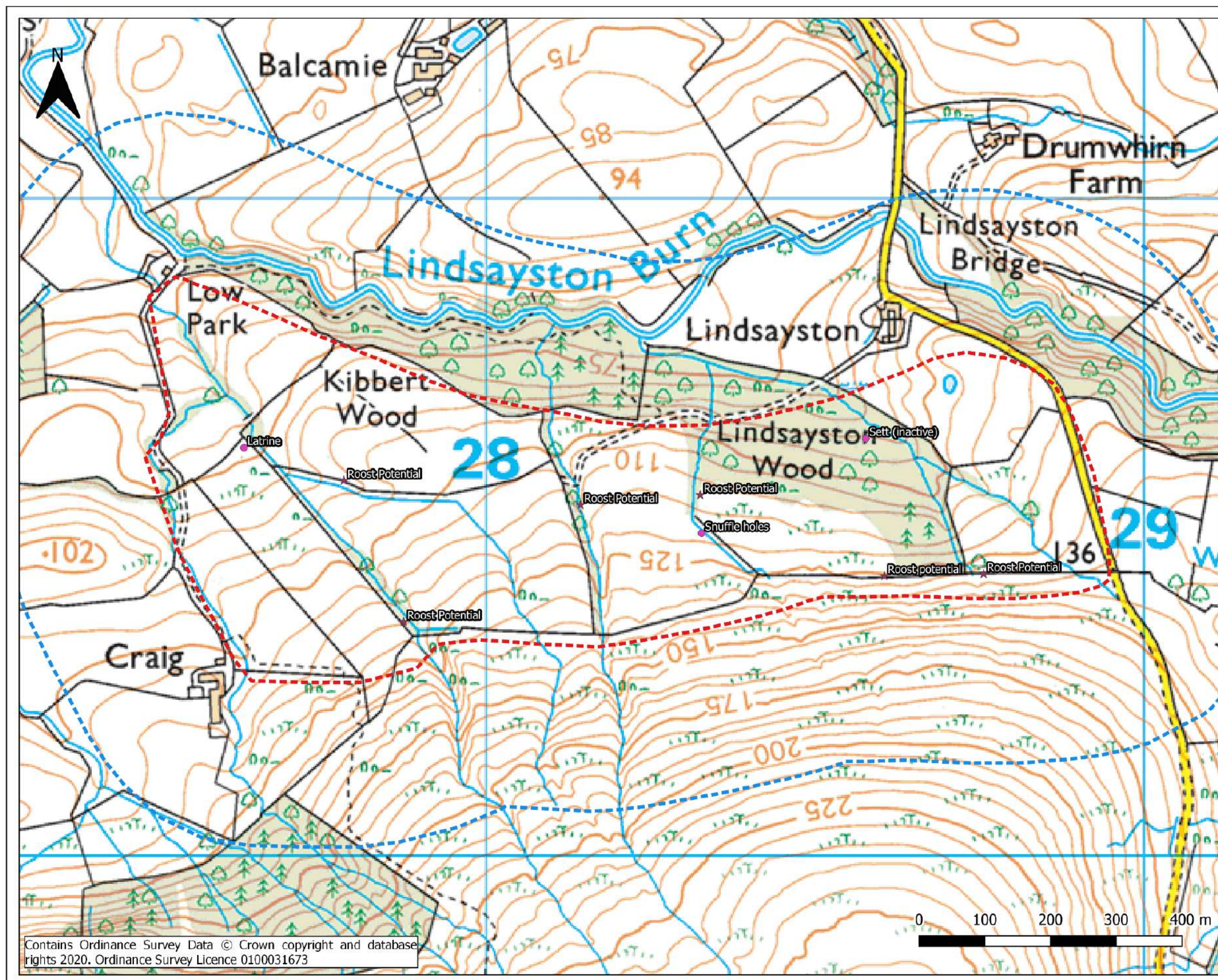
**Project:**  
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Craiginmoddie Wind Farm

**Technical Appendix 9.2:**  
**Protected Species**

**Client:**  
Energie Kontor

**Title:**  
Figure 3.3  
Field Study: Protected Species

|                         |                           |                            |
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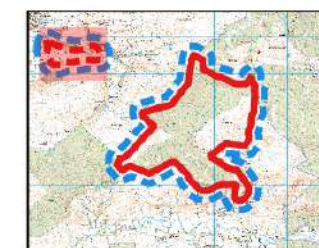


## Key

- Approximate Additional Access Track Boundary

## Field Survey: Protected Species

- Badger
- ★ Bats



**Project:**  
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Craiginmoddie Wind Farm

**Technical Appendix 9.2:**  
**Protected Species**

**Client:**  
Energe Kontor

**Title:**  
**Figure 3.4**  
**Field Study: Protected Species**

|                         |                           |                            |
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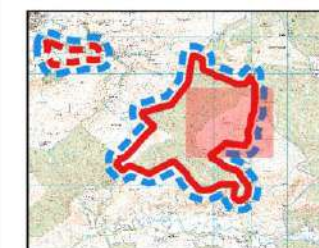


## Key

- Site Boundary
- Access Track
- Extention (2020)
- 250m Survey buffer

## Field Survey: Other Species

- Bank vole
- Common frog
- Common lizard
- Field vole
- Fox
- Hare
- Roe deer
- Small newt
- Vole sp.



**Project:**  
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Craiginmoddie Wind Farm

**Technical Appendix 9.2:**  
**Protected Species**

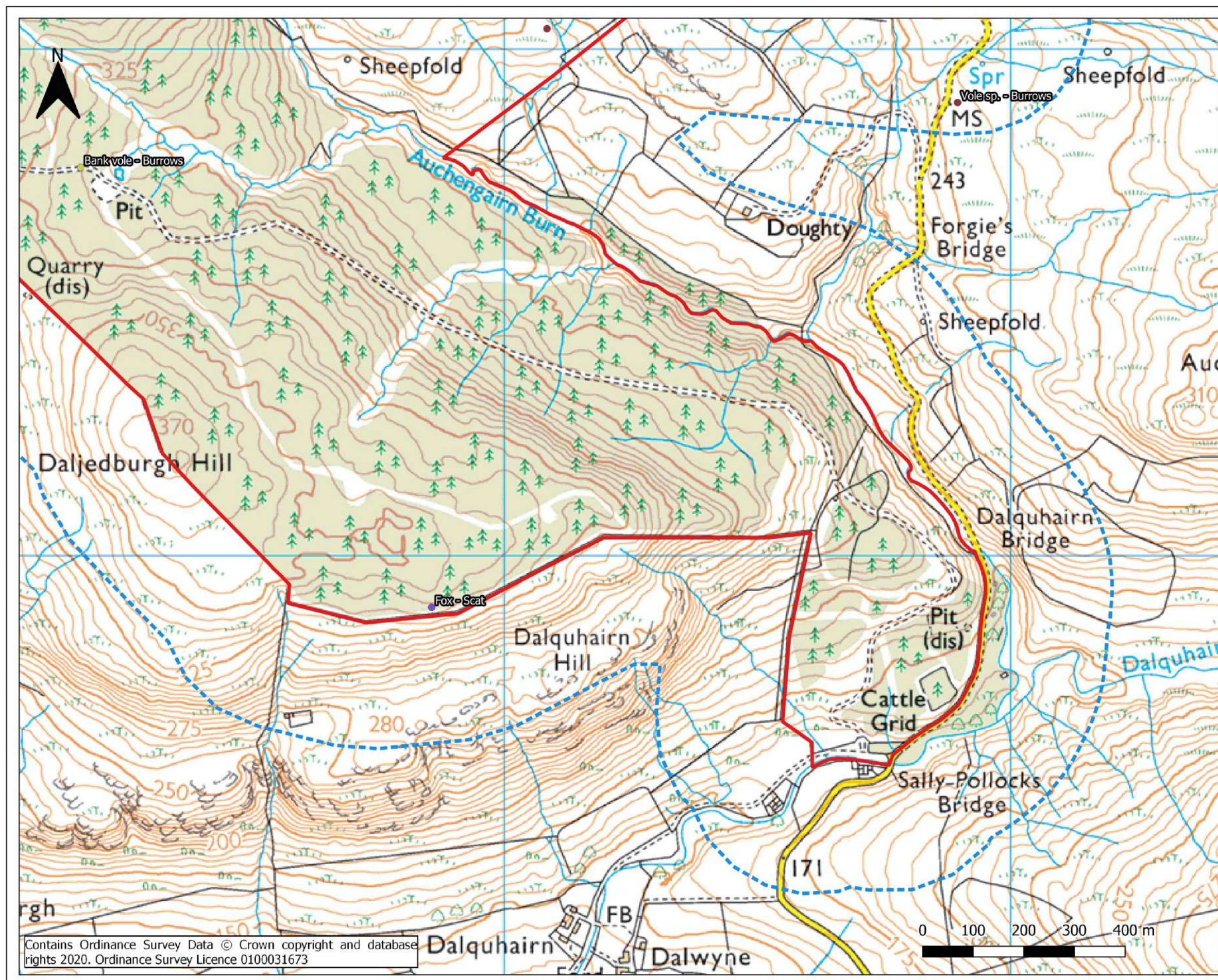
**Client:**  
Energie Kontor

**Title:**  
Figure 4.1  
Incidental Species  
Observations

|                         |                           |                            |
|-------------------------|---------------------------|----------------------------|
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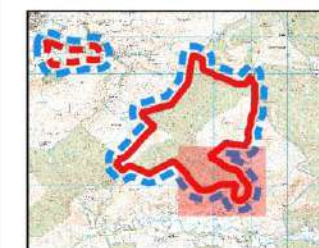


## Key

- Site Boundary
- Access Track
- Extention (2020)
- 250m Survey buffer

## Field Survey: Other Species

- Bank vole
- Fox
- Vole sp.



**Project:**  
GEL19119  
Craiginmoddie Wind Farm

**Technical Appendix 9.2:**  
**Protected Species**

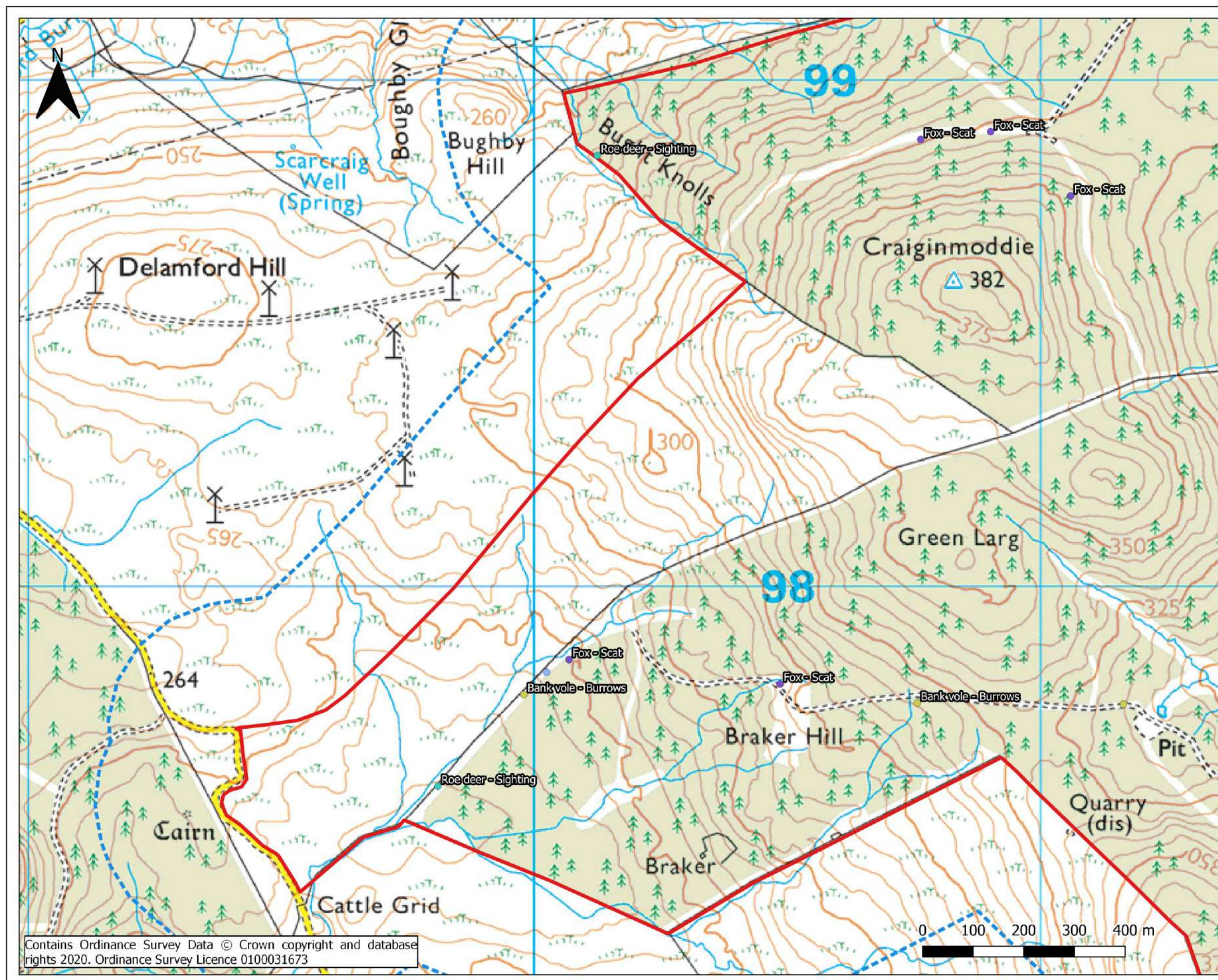
**Client:**  
Energie Kontor

**Title:**  
**Figure 4.2**  
**Incidental Species**  
**Observations**

|                         |                           |                            |
|-------------------------|---------------------------|----------------------------|
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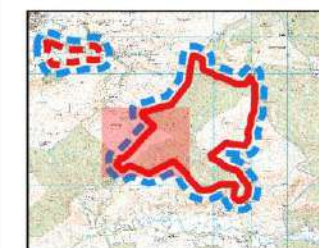


## Key

- Site Boundary
- Access Track
- Extention (2020)
- 250m Survey buffer

## Field Survey: Other Species

- Bank vole
- Fox
- Hedgehog
- Roe deer



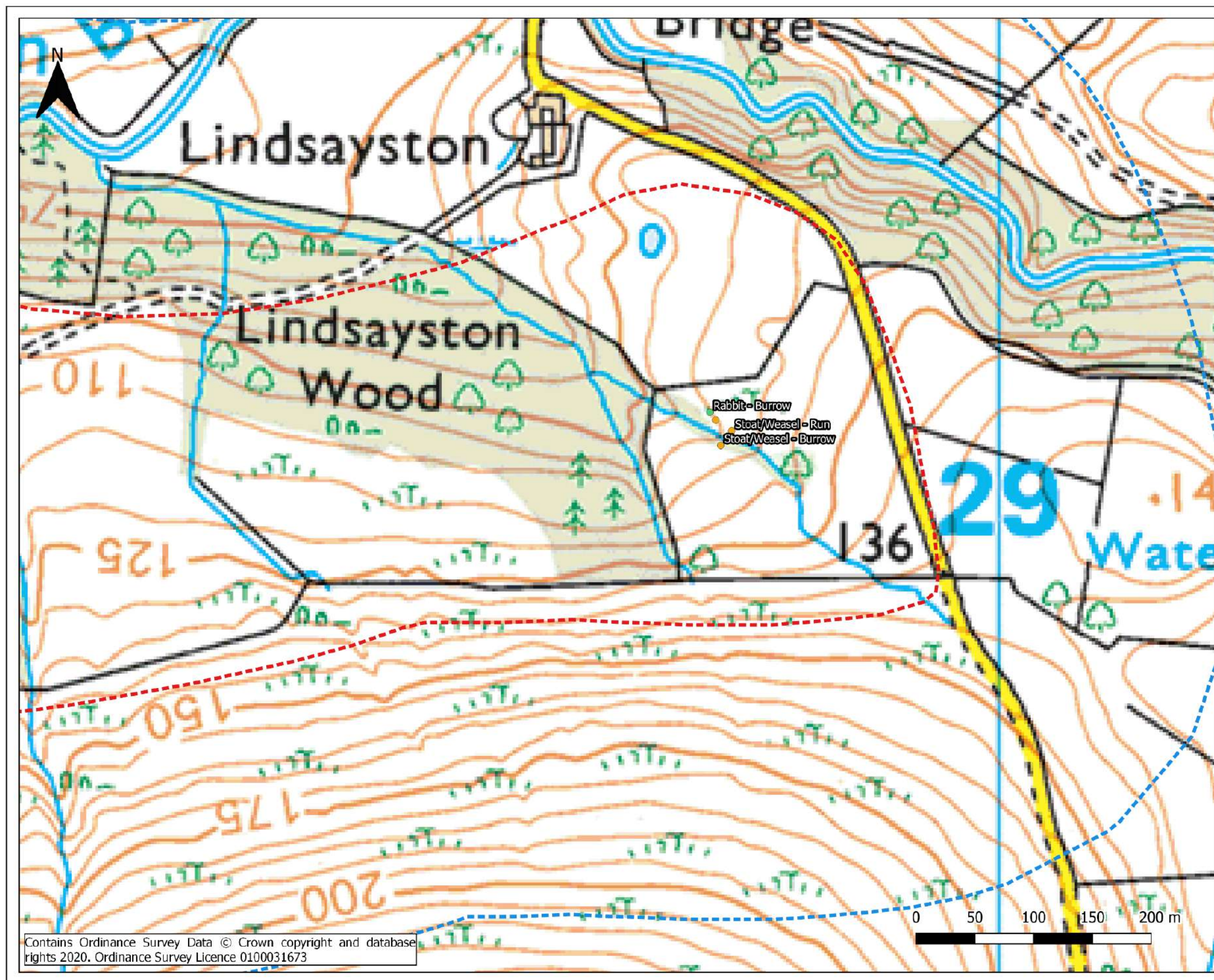
**Project:**  
GEL19119  
Craiginmoddie Wind Farm

**Technical Appendix 9.2:**  
**Protected Species**

**Client:**  
Energie Kontor

**Title:**  
Figure 4.3  
Incidental Species  
Observations

|                         |                           |                            |
|-------------------------|---------------------------|----------------------------|
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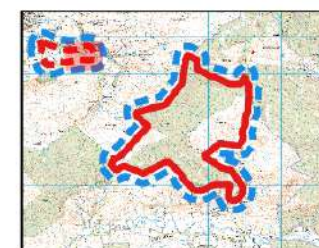


## Key

- Approximate Additional Access Track Boundary
- 250m Survey Buffer

## Field Survey: Other Species

- Rabbit
- Stoat/Weasel



**Project:**  
GEL19119  
Craiginmoddie Wind Farm

**Technical Appendix 9.2:**  
**Protected Species**

**Client:**  
Energe Kontor

**Title:**  
**Figure 4.4**  
**Incidental Species**  
**Observations**

|                         |                           |                            |
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## Appendix B: Plates



*Plate 1: TN 6 Road bridge across Ferly Burn, otter scat underneath.*



*Plate 2: TN 4 Small female newt identified along plantation edge*



*Plate 3: TN 53 Otter spraint staining found under Ferly Bridge on the main Site extension.*



*Plate 4: TN 54 – Otter spraint on boulder adjacent to the Ferly Burn, observed on the main Site extension boundary.*



*Plate 5: TN 41 Badger scat on western boundary at plantation edge, of the main wind farm boundary.*



*Plate 6: TN43 Pine marten scat on access track through main plantation.*



*Plate 7: TN59 – Entrance to unused outlier sett, located within the Survey Area of the isolated access track section, north west of main wind farm area.*



*Plate 8: TN60 Snuffle holes located within the Survey Area of the isolated access track section, north west of main wind farm area.*



*Plate 9: – TN62 Badger latrine located within the Survey Area of the isolated access track section, north west of main wind farm area*



*Plate 10: TN61 Tree with bat roost potential located within the Survey Area of the isolated access track section, north west of main wind farm area.*



*Plate 11: TN 70 Pond identified within the plantation, south of the Survey Area. Limited bank side coverage*

## Appendix C: Target Notes

| TN Number | OS Grid Square | Easting | Northing | Species       | Notes                                       |
|-----------|----------------|---------|----------|---------------|---------------------------------------------|
| 1         | NX             | 32821   | 99392    | Vole sp.      | Many small mammal runs                      |
| 2         | NX             | 32820   | 99395    | Field vole    | Field vole burrow, dropping                 |
| 3         | NX             | 32420   | 99031    | Badger        | Badger dropping and path                    |
| 4         | NX             | 31811   | 98697    | Small newt    | Smooth newts                                |
| 5         | NX             | 31632   | 98426    | Common lizard | Common lizard sighting                      |
| 6         | NX             | 33020   | 98761    | Otter         | Otter spraint under road bridge             |
| 7         | NX             | 33140   | 98836    | Badger        | Badger dropping                             |
| 8         | NX             | 32895   | 97896    | Vole sp.      | Many small mammal burrows                   |
| 9         | NX             | 32836   | 97603    | Otter         | Otter spraint under road bridge             |
| 10        | NX             | 33002   | 98085    | Badger        | Badger dropping                             |
| 11        | NX             | 33080   | 98165    | Common lizard | Common lizard sighting                      |
| 12        | NX             | 32795   | 99347    | Badger        | Badger dropping                             |
| 13        | NX             | 32789   | 99251    | Vole          | No planting area extent + many vole burrows |
| 14        | NX             | 32522   | 99099    | Badger        | Badger dropping                             |
| 15        | NX             | 32634   | 98897    | Hare          | Hare droppings                              |
| 16        | NX             | 32603   | 98899    | Vole sp.      | Vole droppings, feeding remains + burrows   |
| 17        | NX             | 32174   | 98930    | Roe deer      | Female red deer                             |
| 18        | NX             | 31915   | 98767    | Badger        | Badger dropping + acid grassland            |
| 19        | NX             | 32058   | 98523    | Common frog   | Common frog                                 |
| 20        | NX             | 31611   | 98483    | Badger        | Badger dropping                             |
| 21        | NX             | 32084   | 98042    | Vole sp.      | Vole burrows                                |
| 22        | NX             | 32120   | 98072    | Vole sp.      | Vole burrows                                |
| 23        | NX             | 32282   | 98209    | Vole sp.      | Vole feeding remains                        |
| 24        | NX             | 32380   | 98204    | Bank vole     | Bank vole sighting                          |
| 25        | NX             | 32912   | 98620    | Badger        | Badger dropping                             |
| 26        | NX             | 32981   | 98977    | Bank vole     | Vole sighting                               |
| 27        | NX             | 31163   | 97768    | Bank vole     | Bank vole burrow                            |
| 28        | NX             | 31162   | 97773    | Likely rat    | Likely rat dropping                         |
| 29        | NX             | 30965   | 97756    | Likely rat    | Likely rat dropping                         |
| 30        | NX             | 30887   | 97767    | Likely rat    | Likely rat dropping                         |
| 31        | NX             | 30756   | 97770    | Bank vole     | Bank vole dropping + dropping               |
| 32        | NX             | 30485   | 97808    | Fox           | Fox scat                                    |
| 33        | NX             | 30451   | 97820    | Dog print     | Dog print                                   |
| 34        | NX             | 30202   | 97911    | Badger        | Badger run                                  |
| 35        | NX             | 30068   | 97856    | Fox           | Fox scat                                    |
| 36        | NX             | 30036   | 97842    | Unknown sp.   | Mammal run                                  |
| 37        | NX             | 30024   | 97831    | Hedgehog      | Likely hedgehog poo                         |
| 38        | NX             | 29979   | 97787    | Bank vole     | Bank vole burrows                           |
| 39        | NX             | 29947   | 97747    | Badger        | Mammal run                                  |
| 40        | NX             | 29809   | 97606    | Roe deer      | Roe deer sighting                           |
| 41        | NX             | 30210   | 97342    | Badger        | Badger scat & run                           |

| TN Number | OS Grid Square | Easting | Northing | Species            | Notes                                                                                                                     |
|-----------|----------------|---------|----------|--------------------|---------------------------------------------------------------------------------------------------------------------------|
| 42        | NX             | 30266   | 97329    | Badger             | Badger scat                                                                                                               |
| 43        | NX             | 30812   | 97617    | Pine martin        | Scatting area, several different scat                                                                                     |
| 44        | NX             | 31610   | 96913    | Sheep              | Sheep hair on fence                                                                                                       |
| 45        | NX             | 31856   | 96899    | Fox                | Vole burrow with fox scat (hunting)                                                                                       |
| 46        | NX             | 31325   | 99187    | Fox                | Fox scat                                                                                                                  |
| 47        | NX             | 31059   | 98772    | Fox                | Fox scat                                                                                                                  |
| 48        | NX             | 30901   | 98899    | Fox                | Fox scat                                                                                                                  |
| 49        | NX             | 30858   | 98901    | Fox                | Fox scat                                                                                                                  |
| 50        | NX             | 30199   | 98797    | Unknown sp.        | Mammal path                                                                                                               |
| 51        | NX             | 30124   | 98852    | Roe deer           | Roe deer sighting                                                                                                         |
| 52        | NX             | 32981   | 98772    | Otter              | Old, large spraint on boulder on left bank of Ferly Burn upstream of road bridge.                                         |
| 53        | NX             | 32981   | 98722    | Otter              | Signs of old spraint (staining) under road bridge.                                                                        |
| 54        | NX             | 32890   | 98308    | Otter              | Old, large spraint on boulder on left bank of Ferly Burn downstream of road bridge.                                       |
| 55        | NS             | 28757   | 00568    | Rabbit             | Small/med rabbit burrow                                                                                                   |
| 56        | NS             | 28759   | 00565    | Stoat/Weasel       | Stoat/weasel burrow found under the base of a tree                                                                        |
| 57        | NS             | 28758   | 00565    | Stoat/Weasel       | Path leading to burrow (TN 165) (stoat/weasel), found at the base of a tree                                               |
| 58        | NS             | 28744   | 00563    | Stoat/Weasel       | burrow found under tree (stoat/weasel)                                                                                    |
| 59        | NS             | 28577   | 00636    | Badger             | Badger outlier sett with 2 entrances, one main and one smaller. Inactive                                                  |
| 60        | NS             | 28327   | 00492    | Badger             | snuffle holes (badger)                                                                                                    |
| 61        | NS             | 28143   | 00535    | Bats               | Tree with bat roost potential.                                                                                            |
| 62        | NS             | 27631   | 00622    | Badger             | Badger latrine with old dung (north of fence)                                                                             |
| 63        | NS             | 28756   | 00430    | Bats               | Mature Alder along burn. Mature Ash by dyke - has fissures in bark = BRP - would need checked.                            |
| 64        | NS             | 23618   | 00443    | Stoat/Weasel       | Weasel scat? On rock.                                                                                                     |
| 65        | NS             | 28325   | 00550    | Bats               | Fallen mature ash (still growing) with BRP. Alder (something) spp., some hawthorn and ash.                                |
| 66        | NS             | 27783   | 00572    | Bats               | Mature ash, split trunk and hollow - BRP. Also crevice higher up. Another mature ash with BRP, ~8m along. Roe deer flush. |
| 67        | NS             | 27874   | 00357    | Bats               | Bat roost potential                                                                                                       |
| 68        | NS             | 28605   | 00427    | Bats               | Bat roost potential                                                                                                       |
| 69        | NX             | 31351   | 99404    | Pine martin        | Scat                                                                                                                      |
| 70        | NX             | 31242   | 97764    | Great crested newt | Large pond, limited bank cover                                                                                            |