Appendix 11C
Protected Species Survey

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1. Introduction

1.1 Purpose of this report

Wood Environment and Infrastructure Solutions UK Limited (Wood) has been commissioned by RWE to undertake a series of surveys in order to identify the presence, or likely presence of protected species at a remote upland forested site called Enoch Hill 2 (referred to as the Site) which is located approximately 6km south-west of New Cumnock in East Ayrshire.

Protected species surveys were previously undertaken at the Site by EnvironCentre in 2011[1] and by Wood in 2016[2]. A summary of the findings of those surveys, together with relevant survey information from other RWE projects in proximity to the Site, is provided below (Section 3.1).

NatureScot (previously SNH) consider protected species information older than 18 months to be out of date (even less than this for some ecological receptors). As a result updated protected species surveys were undertaken by Wood in 2020. This report sets out the methods used, the current baseline in relation to protected species, namely otter (*Lutra lutra*), water vole (*Arvicola amphibius*), badger (*Meles meles*), red squirrel (*Sciurus vulgaris*), pine marten (*Martes martes*) and great crested newt (GCN) (*Triturus cristatus*). Surveys for the latter were undertaken in 2016 only as no GCN were found as part of the GCN surveys on-Site and they were concluded to be absent from the Site. The report also includes an assessment of watercourses for fish habitat suitability.

The report therefore provide up to date baseline protected species information for the Site (as appropriate) to inform the assessment of potential effects of the proposed wind farm development at Enoch Hill 2. The results of bat surveys are reported separately in Appendix 11E to the EIA Report.

[1] Envirocentre (2011). *Monquhill Wind Farm: Protected Species Survey*. Report #4841 prepared on behalf of Wind Prospect, November 2011.
[2] Amec Foster Wheeler (2016). *Monquhill Wind Farm: Protected Species Report 2016.*

2. Methods

2.1 Study Area

The study area for the 2016 and 2020 protected species surveys is shown in Figure 11C.1 and 11C.2 and is defined by the Site (red line boundary) and up to 250m around the Site boundary. Surveys of the access track are presented in a separate report.

Of all the potential receptors considered during the planning of the current surveys, otter has the largest recommended survey distance, and survey guidance for wind farm developments require that a survey radius of 250m around all proposed wind turbines and associated infrastructure (including Site compounds, laydown areas, borrow pit search areas and substations) are searched[3]. The recommended study area for water vole surveys has been defined as being up to 500m from large scale developments which affect several hundred metres of habitat[4], however, the effects on watercourses are taken to be smaller in scale (affecting a small number of minor watercourses) and therefore the same study area as defined for otter is considered appropriate. Watercourse assessments were also undertaken for fish habitat suitability. Aquatic surveys were undertaken by the Nith District Salmon Fisheries Board (NDSFB) and the results of these surveys are reported separately in Appendix 11F to the EIA Report.

In terms of non-riparian habitat, a study area which extended to the Site boundary was considered appropriate to capture signs of badger, pine marten and/or red squirrel, the rationale being that this encompasses a radius of at least 250m around the developable area.

Two ponds located within the Site boundary were subject to a GCN Habitat Suitability Index (HSI) survey[5] on the basis that they may be located within 500m of proposed wind farm infrastructure (see Figure 11C.1):

- Pond 1 (nr Monquhill): NS 58924 06510; and
- Pond 2 (nr Strandlud): NS 58291 06216.

A 500m buffer is used for GCN because, whilst GCN live in ponds during the springtime breeding season, they live in terrestrial habitat within approximately 500m of their breeding pond for the rest of the year.

2.2 Field Survey

Standard survey methods were followed for potential receptors in accordance with published guidance (see Table 2.2).

Surveys of watercourses, forestry rides and plantation areas were undertaken by Wood Senior Ecologist Claire Hopkins MCIEEM on 5 – 8 September 2016. Claire is an experienced protected species surveyor and, at the time of survey, held a NatureScot (SNH) otter survey licence (no. 53099). Surveys of rides and forested areas were completed by Wood Consultant Ecologist David Knox MCIEEM on 12-14 September 2016.

Surveys of watercourses, forestry rides and plantation areas were undertaken by Wood Senior Ecologist Jenny Sneddon on July 2020 assisted by Assistant Consultant Ecologist Shaun Hollern. Jenny is an experienced protected species surveyor and meets the criteria set out in the CIEEM survey guidelines.

[3] http://www.snh.org.uk/publications/on-line/wildlife/otters/effects.asp. Accessed 21 November 2016.

[4] Poulsom, L., Griffiths, M., Broome, A. & Mayle, B. (2005). Identification of priority woodlands for red squirrel conservation in North and Central Scotland: a preliminary analysis. Scottish Natural Heritage Commissioned Report No. 089 (ROAME No. F02AC334).

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

Surveys of rides and forested areas were completed by Wood Consultant Ecologist David Knox MCIEEM on July 2020. David is an experienced protected species surveyor and meets the criteria set out in the CIEEM survey guidelines.

A hand-held GPS device was used to locate features of particular ecological value, while a digital camera was used to take representative photographs of ecological features.

Table 2.2 Methods for protected species survey

Receptor	Information recorded	Relevant guidance referred to / surveyor competency requirements
Otter	Notes were taken on the general suitability of watercourses and water bodies to support otter as well as signs, including depths, flow, bank and substrate material, food resources spraints (faeces) and footprints. Records were made of potential otter laying up sites, e.g. holts – underground structures which are deep enough that the back of the cavity cannot be readily seen.	CIEEM: Competencies for Species Survey: Eurasian Otter6. Monitoring the Otter[7].
Water vole	Notes were taken on the general suitability of watercourses to support water vole, including details of burn geomorphology and riparian and emergent vegetation.	CIEEM: Competencies for Species Survey: Water Vole8. Water vole conservation handbook[9].
Badger	Notes were taken on the general suitability of terrestrial habitats to support badger, e.g. woodland, grassland, arable land. The location of any evidence (e.g. setts, badger paths, footprints, fence push-ups, foraging marks, latrines and hair). The orientation/direction of travel of any paths. The number of setts/ sett entrances, and their usage (active; no recent use; disused). Sett category (outlier, subsidiary, annexe, main sett). Potential locations for main setts if only outliers are found.	CIEEM: Competencies for Species Survey: Badger[10] Surveying Badgers[11].
Pine marten	Notes were taken on the general suitability of woodland blocks to support this species; observations of scats, prints and dens.	CIEEM: Competencies for Species Survey: Pine Marten[12]

[6] http://www.cieem.net/data/files/Resource_Library/Technical_Guidance_Series/CSS/CSS_-_EURASIAN_OTTER_April_2013.pdf. Accessed March 2016.

[7] Chanin, P. (2003). Monitoring the Otter *Lutra lutra*. Conserving Natura 2000 Rivers Monitoring Series No. 10. English Nature: Peterborough.

[8] http://www.cieem.net/data/files/Resource_Library/Technical_Guidance_Series/CSS/CSS_-_WATER_VOLE_April_2013.pdf.

[9] Strachan, R., Moorhouse, T. and Gelling, M. (2011). Water Vole Conservation Handbook. 3rd Edition, Wildlife Conservation Research Unit, Oxford.

[10] http://www.cieem.net/data/files/Resource_Library/Technical_Guidance_Series/CSS/CSS_-_BADGER_April_2013.pdf.

[11] Harris S, Cresswell P and Jefferies D (1989). Surveying Badgers. Mammal Society.

[12] Cresswell, W.J., Birks, J.D.S., Dean, M., Pacheco, M., Trewhella, W.J., Wells, D. & Wray, S. (2012). UK BAP Mammals: Interim Guidance for Survey Methodologies, Impact Assessment and Mitigation. Southampton, UK: The Mammal Society; also http://www.cieem.net/data/files/Resource_Library/Technical_Guidance_Series/CSS/CSS_-_PINE_MARTEN_April_2013.pdf.

Receptor	Information recorded	Relevant guidance referred to / surveyor competency requirements
Red squirrel	Notes were taken on the general suitability of woodland blocks to support this species; observations of feeding signs i.e. chewed pine cones; and dreys.	CIEEM: Competencies for Species Survey: Red Squirrel[13]; Gurnell et al. (2009).
Amphibians, excluding GCN	The suitability of habitats (including ponds and other water bodies) for amphibians including the proximity, quality and accessibility of surrounding terrestrial habitats as amphibian refugia.	Herpetofauna Workers Manual[14]. Specific surveys for GCN were also carried out, see separate section below.
Reptiles, including adder (Vipera berus), grass snake (Natrix natrix), slow worm (Anguis fragilis) and common lizard (Zootoca vivipara)	Notes on the general suitability of habits to support reptiles were made.	

Great crested newt surveys

Great crested newt surveys were undertaken as part of the Enoch Hill 2 protected species surveys in May – June 2016.

A HSI assessment[15] was undertaken on two ponds within the Site during March 2016 (see Section **Error! Reference source not found.**, Figure 11C.1) to determine the suitability of the habitat for GCN.

Following this initial assessment for the ponds' suitability to support GCN, Amec Foster Wheeler Consultant Ecologist Jenny Sneddon collected water samples for environmental DNA (eDNA) analysis[16] on both ponds on 04 May 2016. The eDNA analysis was undertaken by ADAS.

The results of the eDNA analysis produced a positive result for the presence of GCN in Pond 1. Pond 2 had a negative result following the eDNA analysis and was discounted from further surveys for GCN. As a result of the positive result for GCN DNA at pond 1, it was necessary to undertake six survey visits, which is the number of visits required to determine GCN population size, between May-June 2016 (dates provided in Table 2.3). All surveys were undertaken in peak survey season, except bottle trapping and netting which become less effective during June.

[13] http://www.cieem.net/data/files/Resource_Library/Technical_Guidance_Series/CSS/CSS_-_RED_SQUIRREL_April_2013.pdf.

[14] Gent, T. and Gibson, S. (2003). *Herpetofauna Workers Manual.* JNCC.

[15] Based on Oldham RS, Keeble J., Swan M.J.S. and Jeffcote, M. (2000). Evaluating the suitability of habitat for the great crested newt *(Triturus cristatus). Herpetological Journal.* 10: 143-155.

[16] eDNA analysis is a new method for species monitoring in water bodies, approved by SNH for the determination of GCN presence/absence. eDNA analysis provides a GCN presence/absence result from a water sample which is collected following a species protocol. Full details of the eDNA sampling methodology followed during these surveys can be found on the ADAS website http://www.adas.uk/Service/edna-analysis-for-great-crested-newt.

Table 2.3 Details of GCN surveys

Date	Wood Ecologist (assisted by)
31 May – 1 June 2016	Consultant Ecologist David Knox (James Martin)
2 June - 3 June 2016	Principal Ecologist Anita Hogan (Alexia Chapman)
5 June - 6 June 2016	Consultant Ecologist David Knox (James Martin)
9 June - 10 June 2016	Consultant Ecologist David Knox (James Martin)
14 June - 15 June 2016	Consultant Ecologist Jenny Sneddon (Natalie Hirst)
19 June - 20 June 2016	Consultant Ecologist David Knox (James Martin)

In accordance with recommendations in the GCN mitigation guidelines[17], Herpetofauna Workers' Manual[18] and CIEEM guidance[19] four survey techniques, considered to be most effective for undertaking a presence/absence survey of a pond were attempted at Pond 1 during each visit.

The methods used were as follows:

- Bottle trapping: Twenty bottle traps were placed at various points around the margins of each pond where the habitat was considered most likely to support newts and the water depth was adequate. Traps were set around the edge of the pond at 2m intervals (or as close to this as health and safety allowed) to maximise trapping efficiency. The traps were set at dusk and inspected the following morning;
- Torch survey and / or visual surveys: torch surveys involve walking slowly around the perimeter of a pond, shining a powerful torch (1 million candlepower) into the water and recording the number and species of any newts observed;
- Artificial and natural refugia searches for newt species were made in land that closely borders the ponds. Natural refugia included tussocks of grass and rush species, stones and dead wood, as well as litter and dumped material; and
- Egg search: suitable receptor plants for egg laying are those that have broad, pliable submerged leaves such as certain grasses and broad-leaved herbs; however, floating man-made debris was also checked, as this can be utilised by newts where egg laying material is not available. Rushes and sedges provide poor egg laying habitat due to the erect nature and the relatively small size of the stems and leaves, nonetheless these were checked where they offered the only suitable egg laying vegetation in a particular pond. Vegetation suitable for egg laying was limited around the edge of the pond, however, any suitable vegetation was checked for the presence of newt eggs.

[17] English Nature (2001). *Great Crested Newt Mitigation Guidelines.* English Nature, Peterborough.
[18] Gent, T. & Gibson, S. (2003). *Herpetofauna Workers' Manual.* JNCC, Peterborough.
[19] http://www.cieem.net/data/files/Resource_Library/Technical_Guidance_Series/CSS/CSS_-_GREAT_CRESTED_NEWT_April_2013.pdf.

Surveys were carried out under NatureScot (SNH) licence (number 79559) held by Amec Foster Wheeler Principal Ecologist Anita Hogan; Jenny Sneddon, who led the surveys, is an agent on this licence. All survey activities were carried out in compliance with procedures outlined by Amphibian and Reptile Group (ARG) UK in their Advice Sheet 4[20]. This included disinfection of protective clothing and equipment and the allocation of a designated set of field equipment for each site.

Watercourses and fish habitat assessment

Watercourse target notes were made to assess their likely suitability to support fish species during the 2016 surveys. The descriptions from the 2016 surveys were checked for their accuracy during the 2020 protected species surveys to determine if any changes had occurred to the watercourses on site.

2.3 Constraints and limitations

The majority of the Site comprises immature growth commercial conifer plantation (monoculture Sitka spruce *Picea sitchensis*). In places the forestry was inaccessible due to the low hanging branches, dense planting pattern and frequent fallen and wind thrown trees which is impenetrable for survey purposes. Where possible, access was taken to all forestry rides and walked transects were taken through accessible parts of the forest with extensive searching for field signs as detailed in Table 2.2 above. Survey efforts focused on open parts of the Site, together with drier and better drained areas more likely to be suitable for targeted species e.g. badgers.

The current surveys are considered suitably robust to be used to assess the potential effects of any proposed wind farm development on protected species at the Site.

[20] ARG UK (2010). Amphibian disease precautions: a guide for UK fieldworkers. Version 1. http://www.arguk.org/info-advice/advice-notes/8-amphibian-disease-precautions-a-guide-for-uk-fieldworkers-arg-advice-note-4.

3. Results

3.1 Desk study

Ecological surveys were undertaken in 2011 to inform a potential wind farm development at Enoch Hill 2[21]. The 2011 survey did not include surveys of any proposed access track route and, as such, the study area boundary was the same as that described in Section 2.1. The following summarises the findings of that report:

- No signs of otter were recorded along any of the watercourses or other water features;
- River banks were reported as being very shallow and unsuitable for burrowing and no signs of water vole were recorded;
- No badger setts or other signs of badger were found and the Site was considered to be largely unsuitable for badger sett building, given the wet nature of the ground;
- The woodland was considered to have limited suitability for red squirrel and no squirrel feeding remains were recorded in rides or fire breaks; and
- The woodland/grassland mosaic present on-site was found to be theoretically suitable for adder, however, the Site lacks dry conditions important for hibernation and was therefore considered sub-optimal for this species.

Protected species surveys were undertaken within a study area encompassing the proposed Enoch Hill Wind Farm site (which adjoins the Enoch Hill 2 Site) in 2013[22], 2014[23], 2015[24] and 2016 by Wood ecologists. Signs of otter were recorded on key watercourses which were concluded to provide commuting and foraging opportunities, particularly in their lower reaches, where potential resting sites were also found. No signs of water vole were recorded in the Enoch Hill site and watercourses were concluded to have limited suitability upstream of low lying areas of Knockburnie and Polmath Burns (over 2km north west of the Enoch Hill 2 Site). No signs of badger were recorded.

Surveys for freshwater pearl mussel (*Margaritifera margaritifera* - FWPM) and electrofishing surveys were carried out in 2014 along the main watercourses within the Enoch Hill Site,[25] and concluded that "the habitats and watercourses surveyed [within the Enoch Hill Site] offered limited potential for FWPM and no FWPM were recorded during the targeted surveys completed." Salmon, trout, stone loach, minnow and lamprey were recorded during the surveys.

Surveys for protected species were also carried out for the proposed Benbrack Wind Farm in 2013 by Wood ecologists[26]. As well as the above mentioned species, badger signs including setts were found within approximately 5km south west of the boundary of the Enoch Hill 2 Site.

[21] Envirocentre (2011). *Monuqhill Wind Farm: Flora, Habitats and Vegetation.*
[22] Wood (2013) Enoch Hill Wind Farm Protected Species Report.
[23] Wood (2014) Enoch Hill Wind Farm Protected Species Report
[24] Wood (2015) Enoch Hill Wind Farm Protected Species Report
25 NDSFB (2014) Electrofishing Survey to assess Juvenile Salmonid Populations and other species of fish in watercourses in the vicinity of the proposed Enoch hill Wind Farm
[26] Wood (2013) Benbrack Wind Farm Protected Species Report

3.2 Field survey

Watercourses and fish habitat assessment

A summary of the watercourse descriptions are presented in **Table 3.2**. There were no changes in these habitats noted between the 2016 and 2020 surveys. Target notes (WTN) have been prepared describing the watercourses within the study area (WC1 – WC 5) and these are presented in **Table 3.3**. The locations of watercourse target notes are shown in **Figure 11C.1.**

The Site is situated on the watershed between the Nith and the Dee catchments, with the majority of the Site draining to the north east into the Nith Glen via Carcow and Connel Burns, and only a minor part of the Site draining to the south west into the Water of Deugh via a minor tributary called Bitch Burn. All watercourses on-site are minor upland burns and rise in areas of wetland now dominated by conifer plantation forestry (**Table 3.3**).

In general, watercourses are very narrow, shallow and fast-flowing reflecting the proximity to the sources of these watercourses; whilst gravels and pools are present in some areas the burns are typically rocky and have low suitability to support migratory salmonids.

However, a full fisheries and aquatic invertebrate survey has been undertaken by the Nith District Salmon Fishery Board (NDSFB) and the results are presented in a separate report (Appendix 11F).

Table 3.3 Water course target notes

Target note	Watercourse name	Grid reference	Description
WC1	NS 59473 07213	Carcow Burn	Carcow Burn rises at Carcow Hass (moss/peatland) within commercial (Forestry Commission Scotland [FCS]) plantation on the Site boundary at Carcow Hass; confluence with Glenhastel Burn is also on site boundary downstream of Blood Moss after which it continues northwards as Carcow Burn. Burn is shallow (<20cm mean depth), narrow (<50cm mean width) and fast-flowing. Banks typically comprise earth/cobble with occasional undercutting; bed is cobble and rocks and surrounding land use is conifer plantation and upland wetland, marshy grassland and moorland grazed by sheep and, to a lesser extent, roe deer. Burn and minor tributaries are culverted twice near Monquhill Farm.
WC2	NS 59433 06910	Glenhastel Burn	Glenhastel Burn rises over 1km south east of the Site boundary within the plantation forestry of Auchintow Hill, flowing approximately north to its confluence with Carcow Burn within the Site boundary. Predominant land use is commercial forestry plantation and there is a 1m culvert where forestry track crosses the burn. Banks typically comprise earth/cobble with occasional undercutting; bed is cobble and rocks. Burn is shallow (<20cm mean depth), narrow (<50cm mean width) and fast-flowing.
WC3	NS 58317 07081	Small Burn	Small Burn rises in the centre of the Site and drains Strandlud Hill to the north of its confluence with Connell Burn at the northern edge of the Site boundary. The burn is less than 1m wide along its approx. 2km length and follows a well-defined channel across open moorland and wetland grazed extensively by sheep with rocky substrate

Target note	Watercourse name	Grid reference	Description
			and earth/peat/cobble banks and occasional vegetated islands. No evidence of artificial channelling activities. .
WC4	NS 57881 07056	Connel Burn	Connel Burn rises close to the western Site boundary in a steep natural bowl and flows between and adjacent to the Site boundary and High Chang Hill. Wetland and moorland vegetation dominates in the river valley and the channel itself is very narrow and poorly defined in the uppermost reaches (at its source); the stream substrate is cobble/boulder with earth/peat banks and the burn is <1m wide and <20cm deep at the point where it flows out of the study area. There are no barriers present within the area surveyed.
WC5	NS 57742 06082	Tributary of Bitch Burn	This minor tributary of Bitch Burn is the only watercourse within the study area which drains to the south/west (i.e. the Dee catchment). The channel is narrow and deeply hemmed in by overhanging grassy earth banks and close-planted Sitka spruce trees. Heavily shaded, the channel is considered unsuitable for fish passage. The upper reaches are indistinct and rise in wet marshy vegetation approximately 500m west of Strandlud Hill.

3.3 Protected species survey results

The results of the protected species surveys undertaken in 2016 are presented in **Table 3.4** and **Figure 11C.1**; the results of the 2020 surveys are presented in **Table 3.5** and **Figure 11C.2.**

Table 3.4 Protected species survey results 2016 (Figure 11C.1)

Target Note	Grid reference	Description	Nearest WTN
PS1	NS 59484 07370	Otter spraint	WC1
PS2	NS 59456 07195	Otter potential holt	WC1
PS3	NS 59018 06744	Badger print	n/a
PS4	NS 58330 07160	Otter spraint	WC3
PS5	NS 58374 07277	Otter spraint	WC3
PS6	NS 58384 07347	Otter spraint	WC3

Table 3.5 Protected species survey results 2020 (Figure 11C.2)

Target Note	Grid reference	Description	Nearest WTN
PS1	NS 59327 06985	Otter spraint	WC1
PS2	NS 59468 07091	Otter spraint	WC1

Target Note	Grid reference	Description	Nearest WTN
PS3	NS 59484 07265	Otter spraint	WC1
PS4	NS 59477 07300	Otter spraint	WC1
PS5	NS 59488 07347	Otter spraint	WC1
PS6	NS 59484 07373	Otter spraint	WC1
PS7	NS 59236 06826	Potential otter couch	WC1
PS8	NS 58374 07277	Otter spraint	WC3
PS10	NS 58731 06105	Common lizard	N/A

Otter

During the 2016 surveys otter activity was recorded on Carcow Burn and on Small Burn, and all signs recorded were on the periphery of the study area (see **Figure 11C.1**). A total of four spraints of various ages were recorded (PS1, PS4, PS5, PS6), and a single potential holt site in the form of a shelf or depression in bank-side substrate adjacent to the water (**Figure 11C.1,** PS2) was recorded. Less conspicuous laying-up opportunities exist in dense grass and in the root boles of wind thrown trees on the edges of forestry rides and watercourse valleys; these being too numerous to map.

The otter activity recorded on Site in 2020 was very similar to that recorded during the 2016 surveys as the majority of the otter activity was recorded on either the Carcow Burn or the Small Burn, and all signs recorded were on the periphery of the study area (see **Figure 11C.2**). A total of seven spraints of various ages were recorded (**Figure 11C.2**, PS1-PS7) and two potential otter couches were recorded, one on the Carcow Burn and the other on a tributary to the Bitch Burn.

No evidence to indicate overland routes or connectivity between the two river catchments was found, although there is no physical barrier to movement between the uppermost reaches of the Connel Burn and the unnamed tributary of the Water of Deugh on the south western boundary of the study area and it cannot be ruled out that otter would make use of this route for passing between the two catchments.

Water vole

As in the 2016 surveys, no signs of water vole were recorded during 2020 such as feeding remains, latrine sites, tunnel entrances or runs were recorded during surveys. In general, suitability for water vole was very low. Whilst a number of suitable food plants are present adjacent to the narrow watercourse, banks are typically low and unsuitable for burrowing with little if any, in-channel vegetation.

Badger

A single badger print was recorded on an access track close to Monquhill farmhouse (PS3, Figure 11C.1). The presence of the print confirms that the Site is within the home range of at least one individual or group of badgers although no setts or activity typically attributed to an actively defended territory were recorded. The home range of a group (i.e. the total area that group will visit within its lifetime) tends to be larger in relatively unproductive or marginal areas (i.e. those where the badger's preferred habitat of arable, deciduous woodland, or grassland are absent[27], such as is the case at Monquhill) or where well-drained strata suitable

[27] E.g. Kruuk, H. and Parish, T. (1982). Factors affecting population density, group size and territory size of the European badger Meles meles. Journal of Zoology Vol 196 issue 1, p. 31-39.

for sett-building are scarce; and as such it may be greater than 120ha in size[28]. Incidentally the print was identified in September 2016; coinciding with a period during which badger movements between territories have been observed to increase and when mating often takes place. The Site generally lacks suitable sett-building areas, with dry ground present in small areas at the upper reaches of Connel Burn.

Pine marten

No signs of pine marten such as prints, scats (droppings), dens or sightings were recorded. Pine martens are thought to only recently have been expanding their range in southern Scotland after 200 years of absence[29] and are now concentrated in four distinct areas which include a well-documented reintroduction programme in Galloway (west of the Site) and Annandale/ Eskdalemuir (east of the Site). Between these areas pine marten has been reported lower in the Nith Valley (over 20km east of the Site) although the otherwise isolated nature of the known populations suggests that human intervention as well as natural dispersal have aided their spread. Woodland cover within the Enoch Hill 2 Site, as with many afforested areas in Southern Scotland, is dominated by relatively young plantations at the closed canopy forest stage, which provide poor habitat quality for pine martens, lacking the essential resources i.e. den sites and prey items (particularly field vole *Microtus agrestis*)[30].

Red squirrel

No signs of red squirrel such as discarded cones, dreys and sightings were recorded during the surveys. Red squirrel habitat requirements are well-documented[31]: Trees have to be old enough to produce seeds, and woodlands with a mix of tree species of different ages are preferred as they provide a more dependable supply of seed food. At the Site although the forestry blocks are over the 2,000 hectares indicated as providing opportunities for long term red squirrel conservation, the blocks are even-aged and dominated by Sitka spruce, therefore if red squirrels are present they are likely to be only at very low densities[32]. The Site is within an area where both red squirrel and the non-native grey squirrel are present[33] and where active trapping of grey squirrel has taken place. Whilst grey squirrel will tend to outcompete red in broadleaved and mixed woodland, red squirrel have an advantage in coniferous plantations.

Great crested newts

The results of HSI assessment of the two ponds within the Site are reported in full in **Annex 11C.1** of this report. Pond 1 produced a score of 'average' and Pond 2 produced a score of 'below average'.

Although the results of the eDNA analysis in May 2016 produced a positive result for the presence of GCN in Pond 1, no records of GCN were made during the 2016 population surveys. Only palmate newts (*Lissotriton helveticus*) were recorded during surveys, including adult male and females and immature "efts" [34]. During Visit 2 and 5 'small newts' were recorded during torching. This is the collective name for palmate newt and smooth newt (*L. vulgaris*) and is used when the species cannot be identified during the survey. In both cases

[28] E.g. http://www.snh.org.uk/pdfs/publications/wildlife/badger.pdf.
[29] Croose, E., Birks, J.D.S., Schofield, H.W. & O'Reilly, C. (2014). *Distribution of the pine marten (*Martes martes*) in southern Scotland in 2013.* Scottish Natural Heritage Commissioned Report no. 740. Also http://www.bbc.co.uk/news/uk-scotland-south-scotland-27308955.
[30] Caryl, F.M., Quine, .P. & Park, K.J. (2012). Martens in the matrix: the importance of non-forested habitats for forest carnivores in fragmented landscapes. *Journal of Mammalogy* 93, 464-474.
[31] E.g. http://www.snh.org.uk/pdfs/publications/naturallyscottish/redsquirrel.pdf.
[32] http://www.red-squirrels.org.uk/habitat.asp.
[33] Tonkin, m., Garritt, J., Bryce, J. and Cole, M. (2014). *Species management in Scotland 2007 – 2012: Red and grey squirrel.* http://www.snh.gov.uk/docs/A2064164.pdf.
[34] Wood (2016). *Monquhill Wind Farm Protected Species Survey Report.*

it was during torching as the newt was only visible a few seconds. The results of the 2016 population surveys of Pond 1 are provided in **Annex 11C.2.**

The positive eDNA result for GCN analysis at Pond 1 may be a false positive or may be as a result of the high sensitivity of the test. It is considered possible that the eDNA tests can detect GCN DNA brought in from wildfowl or from historic GCN presence. All surveys were undertaken during the peak survey times except for netting and bottle trapping surveys undertaken in June which is considered to be a less effective time to use these methods. However, given the average rating of the pond for its suitability to support breeding GCN, its isolation from other suitable ponds and no records of GCN within at least 2km (Appendix A) of the Site, GCN are considered to be absent from the Study Area,

The results of the eDNA survey were negative for Pond 2, and no further surveys were undertaken.

Several invertebrate species were recorded in the ponds including: great diving beetles (*Dytiscus marginalis);* water beetles (*Laccophilus poecilus);* and dragon fly nymphs. Other amphibians recorded included the common frog (*Rana temporaria)*; this species was encountered frequently during watercourse surveys.

Reptiles

An incidental record of a common lizard was made (**Figure 11C.2**, PS10) and the Site which contains open rides and occasional dry stone walls, may provide suitable refugia for reptiles including adder and common lizard.

4. Discussion

A summary of notable and/or protected species that were recorded on site and/or for which suitable habitat was recorded is provided in **Table 4.1**. It also provides a summary of further survey requirements as well as general recommendation, e.g. implications for site design and construction.

Table 4.1 Summary of recommendations for protected species receptors at Enoch Hill 2

Receptor	Legal context	Suitability of the Site for this species/species group	Recommendations
Fish and freshwater habitats	Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003. This Act provides the legal basis behind protection of rivers with fisheries interests and grants powers to district salmon fisheries boards to enforce this protection. Freshwater Pearl Mussel is a European protected species (EPS) and is fully protected under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) which protects mussels in the same way as otter below.	The watercourses included in the fish habitat assessment were considered largely unsuitable to support migratory fish such as salmon and trout, lacking spawning habitat such as gravels and pools, and dominated by steep rocky and/or peaty channel and banks. Juveniles of these species may occasionally inhabit the lower reaches of Carcow/Glenhastel Burns, these being the most substantial watercourses within the study area. FWPM is unlikely to be present on the basis of no recent historic records within these river catchments; the low suitability of watercourses for migratory fish species; the absence of FWPM during surveys at the proposed Enoch Hill Wind Farm and the presence of an impassable man-made barrier to fish at Kendoon Dam (this affects only the watercourses which drain to the south west).	Water crossing construction to follow SEPA and Scottish Government culvert design requirements and avoid sensitive time period for salmonids (spawning, egg deposition & fry emergence).
Otter	Otters are a European protected species and are fully protected under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended). This lists a number of offences in relation to otters and the places in which they live. It is an offence to deliberately or recklessly: capture, injure or kill an otter; harass an otter or group of otters; disturb an otter in a holt or any other structure or place it uses for shelter or protection;	Generally, watercourses on site provide limited suitability for foraging otter, although a potential overland route between the Nith and Dee catchments exists at Carcow Hass. Otter is evidently present on-site, with spraints noted on several peripheral burns. No confirmed laying-up sites were recorded and burns and two small ponds are considered to be of low suitability to otter, with the exception of Glenhastel/ Carcow Burns.	Since otter signs were recorded across the Site, at least a 50m buffer should be assigned to all watercourses, apart from water crossings. Water crossings should avoid potential or confirmed resting sites and should be constructed in a manner so as to allow through passage of otter. Pre-construction surveys should be undertaken. Construction mitigation will need to be included, such as water quality protection and protection of otters from

Receptor	Legal context	Suitability of the Site for this species/species group	Recommendations
	disturb an otter while it is rearing or otherwise caring for its young; obstruct access to a holt or other structure or place otters use for shelter or protection or to otherwise deny the animal use of that place; disturb an otter in a manner that is, or in circumstances which are, likely to significantly affect the local distribution or abundance of the species; and disturb an otter in a manner that is, or in circumstances which are, likely to impair its ability to survive, breed or reproduce, or rear or otherwise care for its young. It is also an offence to: damage or destroy a breeding site or resting place of such an animal (note that this does not need to be deliberate or reckless to constitute an offence); and keep, transport, sell or exchange or offer for sale or exchange any wild otter or any part or derivative of one (if obtained after 10 June 1994).		accidental injury (i.e. by covering exposed pipes etc.).
Water vole	Under the Wildlife and Countryside Act 1981 (as amended) it is an offence to intentionally or recklessly damage, destroy or obstruct access to a water vole burrow or to disturb a water vole whilst it's occupying its burrow. The animal itself is not covered by the legislation.	Suitable water vole habitat (i.e. containing substrate suitable for burrowing and/or food plants) was limited within the Site and no signs of water vole were found. In conjunction with an absence of nearby records of water vole this species is not thought to be present, although there is potential for future colonisation.	The above recommendations for otter would also be suitable for water vole.
Badger	Offences under the Protection of Badgers Act 1992 (as amended) include: wilfully taking, injuring or killing badgers; cruelty; intentionally or recklessly interfering with a badger sett; selling and possession, marking and ringing.	No signs of badger were found on-site and there is limited suitable habitat for sett-building and foraging given the waterlogged and densely afforested nature of the Site. Suitable sett-building habitat is limited to the upper reaches of Connel Burn and areas of dense plantation forestry.	Pre-construction surveys should be undertaken to ensure badgers have not moved into the Site from surrounding areas.
Pine marten	The following provides a summary of the offences in the Wildlife and Countryside Act	No signs of pine marten were recorded and the Site is generally considered to have	Pre-construction surveys should be undertaken to ensure that pine marten have

Receptor	Legal context	Suitability of the Site for this species/species group	Recommendations
	1981 (as amended) in relation to pine marten. It is an offence to intentionally or recklessly: kill, injure or take a pine marten; damage, destroy or obstruct access to any structure or place which a pine marten uses for shelter or protection; disturb a pine marten when it is occupying a structure or place for that purpose; possess or control, sell, offer for sale or possess or transport for the purpose of sale any live or dead pine marten or any derivative of such an animal. Knowingly causing or permitting any of the above acts to be carried out is also an offence.	low suitability and be outside the known areas of pine marten range in south west Scotland although it is within an area of potential expansion.	not moved into the Site from the surrounding area.
Red squirrel	Protected as per pine marten above.	Although densely afforested the study area is considered sub-optimal for red squirrel due to the monoculture of Sitka spruce and the relatively young age of the trees. No red squirrel signs were recorded within the Study Area. However, the Site is situated within the range of this species and it cannot be ruled out that red squirrel may exist at low density in the forestry blocks.	Further survey effort will be required as tree felling (key-holing) is proposed.
Reptiles	Common reptile species, which include common lizard, adder and slow worm, are afforded protection under the Wildlife and Countryside Act 1981 against being killed or injured.	Waterlogged soils and densely afforested plantations have negligible potential for reptile species; forestry rides, woodland tracks and other drier areas have potential support common reptile species such as adder and common lizard. An incidental record was made during the protected species surveys and they are likely to utilise the forest rides within the Development Area.	Measures to protect hibernating reptiles during construction and to enhance the Site for reptiles should be considered. This could include supervised removal of brash or dense heather by an ecologist and/or provision of hibernation sites (e.g. woodpiles).
Amphibians	Great crested newt are a European protected species and are fully protected under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended). Common amphibian species including common frog and	Two ponds within the Site have been subject to HSI and eDNA surveys and only one pond (pond 1) was subject to full GCN surveys. Despite positive eDNA results, Pond 1 was not found to have any GCN despite thorough	Measures to protect amphibians during construction should be considered. This could include supervised removal of brash or dense heather by an ecologist.

Receptor	Legal context	Suitability of the Site for this species/species group	Recommendations
	smooth newt are protected against sale and trade only in the Wildlife and Countryside Act 1981 (as amended).	surveying and GCN are not considered to be present at the Site. Common frog, palmate newt and potentially smooth newt are present on-site. The network of drainage channels and watercourses present on site together with overall waterlogged nature of the Site provides some suitable breeding habitat; shelter for hibernation is present on woodland edges in tree roots, and dry stone walls around Monquhill farmhouse.	

Annex 11C.1
Great Crested Newt HSI Forms

Table 11C.1 HSI Scores for Pond 1 at Enoch Hill 2

Ref	Pond Parameter	HSI Description	HSI	Photo
Pond 1	Geographic Location	Zone B: NS 58924 06510	0.5	
	Pond Area	Approximately 120m^2.	0.15	
	Permanence	The pond was assessed as never dries.	0.9	
	Water Quality	The pond was assessed as having moderate invertebrate diversity*.	0.67	
	Shaded	The shoreline is estimated to experience <10% shading.	1	
	Water fowl	No evidence of waterfowl was detected at the pond.	1	
	Fish	No fish were observed during the survey and it is unlikely that fish are present.	1	
	Ponds	1 pond within 1km.	0.4	
	Terrestrial Habitat	Good	1	
	Macrophytes	Estimated at 30%.	0.6	
	HSI Score		0.63 = Average	

Water quality was assessed by visual observation only, no pond netting was carried out.

Table 11C.2 HSI Scores for Pond 2 at Enoch Hill 2

Ref	Pond Parameter	HSI Description	HSI	Photo
Pond 2	Geographic Location	Zone B: NS 58291 06216	0.5	
	Pond Area	Approximately 10m².	0.05	
	Permanence	The pond was assessed as never dries.	0.9	
	Water Quality	The pond was assessed as having low invertebrate diversity*.	0.33	
	Shaded	The shoreline is estimated to experience <10% shading.	1	
	Water fowl	No evidence of waterfowl was detected at the pond.	1	
	Fish	No fish were observed during the survey and it is unlikely that fish are present.	1	
	Ponds	1 pond within 1km.	0.4	
	Terrestrial Habitat	Good	1	
	Macrophytes	Estimated at 30%.	0.6	
	HSI Score		0.53 = Below average	

* Water quality was calculated by visual observation only, no pond netting was carried out.

Annex 11C.2 Amphibian Recording Forms

DATE	**31 May to 1 June 2016 - Visit 1**
ECOLOGISTS	David Knox assisted by James Martin
PROJECT	Enoch Hill 2
CONTRACT No.	38388
WEATHER/TEMP	Very good conditions on both days.

	TORCHING							EGGS										REFUGIA			BOTTLES					
	GCN			SMOOTH			PALMATE	GCN			SMOOTH			PALMATE				GCN	SM	PA	GCN			SMOOTH			PALMATE
Ref	M	F	J	M	F	J	Unknown sex	M	F	J	M	F	J	M	F	J	Y	Y	Y	Y	M	F	J	M	F	J	Unknown sex
1	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27

DATE	**2 June to 3 June 2016 - Visit 2**
ECOLOGISTS	Anita Hogan assisted by Alexia Chapman
PROJECT	Enoch Hill 2
CONTRACT No.	38388
WEATHER/TEMP	Very good conditions on both days – dry and warm with a light wind. .

	TORCHING										EGGS									REFUGIA			BOTTLES								
	GCN			SMOOTH			PALMATE			Small Newt	GCN			SMOOTH			PALMATE			GCN	SM	PA	GCN			SMOOTH			PALMATE		
Ref	M	F	J	M	F	J	M	F	J	Unknown	M	F	J	M	F	J	M	F	J	Y	Y	Y	M	F	J	M	F	J	M	F	J
1	0	0	0	0	0	0	**7**	**5**	0	**13**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**12**	**11**	**1**

DATE	**5 June to 6 June 2016 - Visit 3**
ECOLOGISTS	David Knox assisted by James Martin

PROJECT	Enoch Hill 2
CONTRACT No.	38388
WEATHER/TEMP	Very good conditions on both days.

	TORCHING							EGGS										REFUGIA			BOTTLES						
	GCN			SMOOTH			PALMATE	GCN			SMOOTH			PALMATE				GCN	SM	PA	GCN			SMOOTH			PALMATE
Ref	M	F	J	M	F	J	Unknown sex	M	F	J	M	F	J	M	F	J	Y	Y	Y	Y	M	F	J	M	F	J	Unknown sex
1	0	0	0	0	0	0	**20**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**36**

DATE	**9 June to 10 June 2016 - Visit 4**
ECOLOGISTS	David Knox assisted by James Martin
PROJECT	Enoch Hill 2
CONTRACT No.	38388
WEATHER/TEMP	Very good conditions on both days.

	TORCHING							EGGS										REFUGIA			BOTTLES						
	GCN			SMOOTH			PALMATE	GCN			SMOOTH			PALMATE				GCN	SM	PA	GCN			SMOOTH			PALMATE
Ref	M	F	J	M	F	J	Unknown sex	M	F	J	M	F	J	M	F	J	Y	Y	Y	Y	M	F	J	M	F	J	Unknown sex
1	0	0	0	0	0	0	**15**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**16**

DATE	**14 June to 15 June 2016 - Visit 5**

ECOLOGISTS	Jenny Sneddon assisted by Natalie Hirst
PROJECT	Enoch Hill 2
CONTRACT No.	38388
WEATHER/TEMP	Very good conditions on both days. Air temperature 10ºC Water temperature 10ºC

	TORCHING									EGGS									REFUGIA				BOTTLES								
	GCN			SMOOTH			PALMATE			GCN			SMOOTH			PALMATE			GCN	SM	PALMATE		GCN			SMOOTH			PALMATE		
Ref	M	F	J	M	F	J	M	F	J	M	F	J	M	F	J	M	F	J	Y	Y	Y		M	F	J	M	F	J	M	F	J
1	0	0	0	0	0	0	0	**3**	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	**11**	**19**	**2**

DATE	**19 June to 20 June 2016 - Visit 6**
ECOLOGISTS	David Knox assisted by James Martin
PROJECT	Enoch Hill 2
CONTRACT No.	38388
WEATHER/TEMP	Very good conditions on both days.

	TORCHING							EGGS										REFUGIA			BOTTLES									
	GCN			SMOOTH			PALMATE	GCN			SMOOTH			PALMATE				GCN	SM	PA	GCN			SMOOTH			PALMATE			
Ref	M	F	J	M	F	J	Unknown sex	M	F	J	M	F	J	M	F	J	Y	Y	Y		M	F	J	M	F	J	Unknown sex			
1	0	0	0	0	0	0	**10**	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	**11**			

257000 258000 259000 260000

607000 606000

PS1 PS2 PS3 PS4 PS5 PS6

Pond 1 Pond 2

1 2 3 4 5

Sheepfold Polga Burn Craig of Bahoun Monquhill Monquhill Burn Blood Moss Blood Burn Strandlud Hill Carcow Hill Auchinca Hill Auchintow Hill Milray Hill Glenhastel Water of Dewgh West Strand Quarry

Key

- Site boundary
- Study area
- Proposed turbine location
- Access tracks
- Cranepad hardstanding
- Substation
- Temporary construction compound
- Watercourse crossing
- Pond

Protected Species

- Badger print
- Otter potential holt
- Otter spraint
- Watercourse target note

0 100 200 300 400 500 600 m

Scale at A3: 1:10,000

Client

RWE

Enoch Hill 2 Wind Farm
Environmental Impact Assessment Report
Chapter 11 Ecology
Appendix 11C Protected Species Survey Report 2016 and 2020

Figure 11C.1
Watercourse target notes and protected species survey results 2016

September 2020

wood.

38388-Gos265

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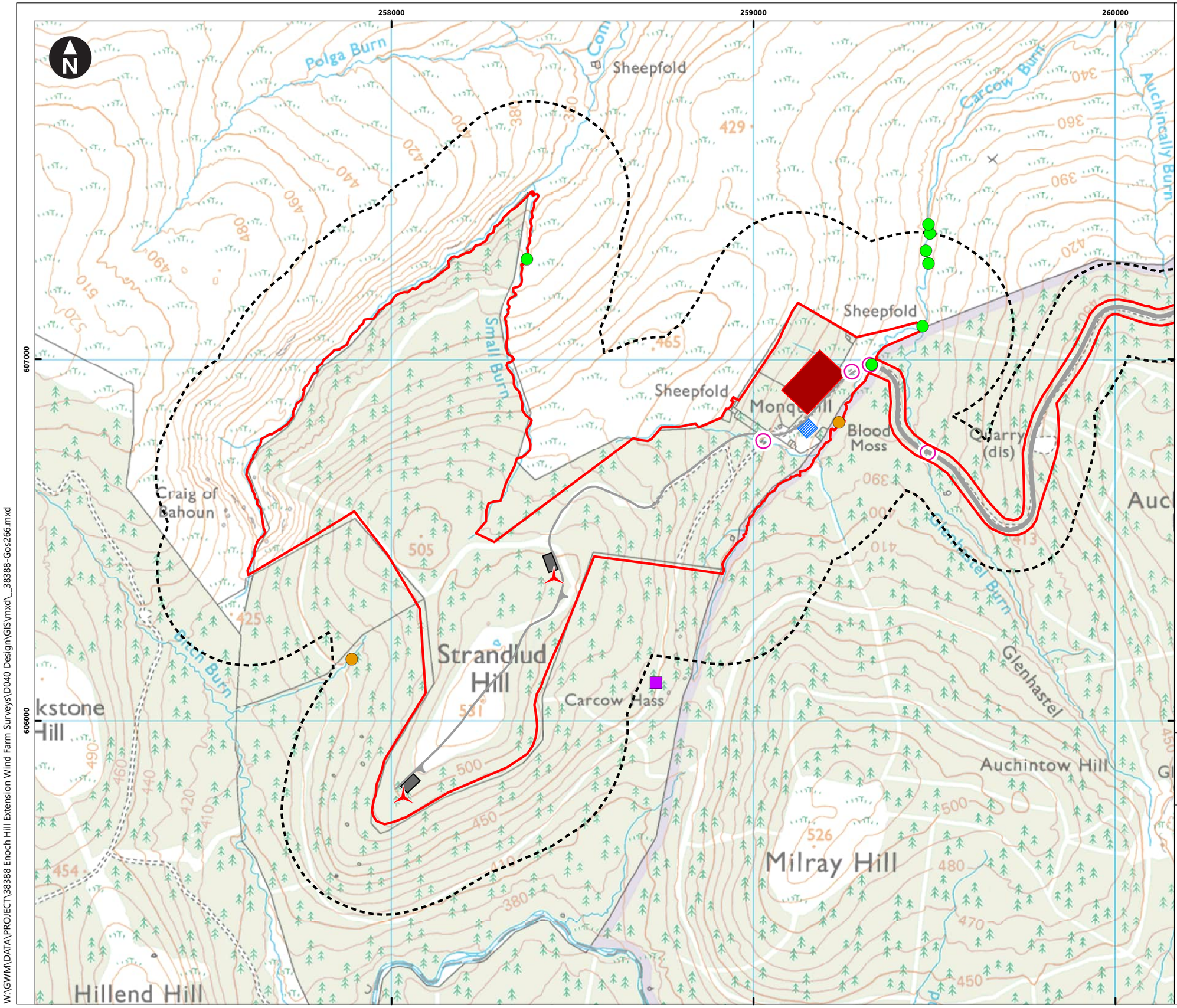

Client

RWE

Enoch Hill 2 Wind Farm
Environmental Impact Assessment Report
Chapter 11 Ecology
Appendix 11C Protected Species Survey Report 2016 and 2020

Figure 11C.2
Protected species survey results 2020

September 2020

wood.

38388-Gos266

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