

APPENDIX 10.1: SURVEY METHODOLOGY AND DETAILED RESULTS

1.1 Field Survey Methodology

Extended Phase 1 Habitat Survey

- 1.1.1 The Extended Phase 1 habitat survey was undertaken by Ramboll ecologists between April and June 2013. The survey involved a site walkover and preliminary assessment of key habitats, land use and ecological features, particularly focusing on areas of natural interest that would be affected by the Development. The main habitats present were recorded using standard Phase 1 Habitat survey methodology as described in JNCC (2010). Target notes were used to record habitats and features of particular interest. In addition to general habitat classification, a list was compiled of all observed plant species. The abundance of each species was estimated for each habitat respectively. The ecological study area was also inspected for signs of any invasive plant species subject to legal controls and assessed for its potential to support protected species, in order to identify potential ecological constraints and to guide recommendations for further survey requirements for these species.
- 1.1.2 A further survey to update the previous results was undertaken by Ramboll ecologists in January 2018, following the above methodology.

National Vegetation Classification Survey

- 1.1.3 A National Vegetation Classification (NVC) survey was completed between April and June 2013. The survey followed the standard approach to NVC as set out in Rodwell (2006). The Scottish and Northern Ireland Forum for Environmental Research's (SNIFFER, 2009) 'A Functional Wetland Typology for Scotland' was used to help identify all wetland areas, with groundwater dependent terrestrial ecosystems (GWDTE) confirmed through NVC surveys. The methodology was adapted so that instead of multiple static quadrats randomly chosen in each habitat area, surveyors compiled species lists for each distinct habitat area and confirmed the NVC community present. Distinct habitat areas were chosen based on the habitat areas identified during the Phase 1 habitat survey, with differing features within identified habitats surveyed where those areas might be distinct NVC habitats.

Great Crested Newt Survey

- 1.1.4 An initial assessment of the potential for the ponds in the ecological study area to support great-crested newt *Triturus cristatus* was undertaken by means of a Habitat Suitability Index (HSI) assessment (Oldham *et al.*, 2000), which was completed in April 2013. The score for each of the ten habitat criteria can be used to ascertain a HSI score for each pond. The HSI score can be used to predict the suitability of the habitat to support great crested newts. An HSI score of less than 0.5 indicates a pond of poor suitability for great crested newt, a score of between 0.5 and 0.59 indicates a pond of below average suitability, a score of between 0.6 and 0.69 indicates a pond of average suitability, a score of 0.7 to 0.79 indicates a pond of good suitability and a score of above 0.8 indicates a pond of excellent suitability. The final HSI score, however, was not used to prove that great crested newts were present or absent from the ponds.
- 1.1.5 Following the completion of the HSI assessment, all suitable ponds in the ecological study area and within 500 m of the site boundary were surveyed for the presence or absence of great crested newts following best practice guidelines (English Nature, 2001), as shown on Figure 10.5: GCN Survey. Three different survey techniques were used for each presence/absence survey: standard torchlight, bottle trapping and netting surveys. All surveys were conducted under the supervision of a licensed surveyor, or one of his agents named on the license, with four visits being made to each pond between May and July 2013.

Bat Survey

- 1.1.6 A programme of bat surveys was developed to gather data of usage by bat species, both in the ecological study area and in the surrounding area. The programme of bat surveys was undertaken between the end of April and October 2013. These surveys involved a variety of approaches, as set out in the Bat Conservation Trust (BCT) guidelines (Hundt, 2012), and included two separate transect routes completed each month, static monitoring at both ground level and at height, and surveys of nearby habitat features identified as having high suitability for bats.
- 1.1.7 Two transect routes, with stopping points approximately every 500 m, were selected to incorporate all of the habitats present in the ecological study area, as shown on Figure 10.6: Bat Transect Survey. The transect survey was completed each month between April and October 2013. The surveys were recorded each time using a Batbox Duet Heterodyne/Frequency Division bat detector connected to an Edirol recorder.
- 1.1.8 Static monitoring was completed from three locations in the ecological study area, as shown on Figure 10.7: Static Bat Survey. Static monitoring was conducted using Wildlife Acoustics SM2+ passive detectors between late April and October 2013.
- 1.1.9 The surveys did not involve the capture of any bats and, as such, the identification to species level has been completed via analysis of echolocation calls recorded during the surveys. SM2 recordings were analysed using AnaLook and the Batbox Duet recordings were analysed using Wavesurfer. Particular characteristics of each species' call allows them to be distinguished in most cases but where this was not possible, identification was completed to genus level. For the *Myotis* and *Nyctalus* species, there are many overlaps in the calls and, as such, identification to species level is an indication of the probable species rather than a confirmation of its presence.

Protected Species Surveys

- 1.1.10 Protected species surveys were undertaken alongside the Phase 1 habitat survey between April and June 2013 and updated in January 2018.
- 1.1.11 Water vole *Arvicola amphibius* survey comprised a search of riparian and pond edge habitat for characteristic signs of water vole activity. The survey assessed all watercourses and waterbodies within the site boundary and for a distance of 200 m up and downstream of the site boundary, in accordance with good practice guidelines (Strachan, 2012). The signs sought were:
- burrows;
 - latrines;
 - feeding stations;
 - runs; and
 - sightings.
- 1.1.12 Otter *Lutra lutra* survey involved a detailed search of all watercourses within the site, in accordance with good practice guidelines (Chanin, 2003). The field signs sought were:
- holts;
 - couches;
 - spraints;
 - feeding remains;
 - footprints;
 - slides; and
 - sightings.
- 1.1.13 Pine marten *Martes martes* survey involved a detailed search of trails and structures for field signs of:

- scats;
- footprints;
- sightings; and
- burrows.

1.1.14 Wildcat *Felis sylvestris* survey involved a detailed search of field signs for:

- droppings;
- footprints;
- scratch markings; and
- used dens.

1.1.15 Visual red squirrel *Sciurus vulgaris* surveys were carried out within the forestry in the ecological study area following good practice guidelines (Gurnell *et al*, 2001). Each surveyor walked along predetermined survey transects recording all squirrels observed, evidence of feeding and evidence of active dreys. Each transect was a minimum length of 500 m and was situated along rides or inspection tracks, or between rows of trees within suitable squirrel habitat. A single qualified observer walked each transect, starting as soon after first light as possible, as this is when squirrels are most likely to be active. All squirrel sightings, or other evidence of presence, were recorded, together with time, place observed and behaviour.

1.1.16 Badger *Meles meles* surveys involved a detailed search of the ecological study area and a minimum distance of 30 m outwith the site boundary for the following signs of badger activity:

- badger setts;
- foraging signs;
- dung pits/latrines;
- scratching posts;
- snuffle marks; and
- paths.

1.1.17 Any setts recorded during the survey were monitored using camera traps to determine the usage of setts by badgers.

Aquatic Invertebrate Survey

1.1.18 An aquatic invertebrate survey was completed in October 2013. Samples were collected for later analysis from six sites in the ecological study area, as shown on Figure 10.10: Freshwater Invertebrate Survey. The survey used standard kick sampling methodologies employed by Scottish Environment Protection Agency (SEPA, 2001). Kick sampling at all sites was conducted in riffle-type habitat, if possible. Riffles are one of the most productive habitats in rivers and streams and are the standard habitat for water quality biomonitoring (SEPA, 2001). The sampling procedure involved a total of three minutes of kick sampling at each site. Sampling covered the whole width of the stream and the range of habitats within the riffle area. A further one-minute period of hand sampling was carried out, searching on and under stones and rocks for attached invertebrates, such as molluscs and cased caddis flies. Samples were preserved together in sealed containers filled with surgical spirit and analysed using the following methods:

- Biological Monitoring Working Party (BMWP) scoring;
- Average Score Per Taxon (ASPT); and
- Percentage Silt Intolerance (PSI).

Freshwater Pearl Mussel Survey

1.1.19 Freshwater pearl mussel *Margaritifera margaritifera* surveys were undertaken in October 2013. Surveys followed guidelines for initial general survey for freshwater pearl mussels (Hastie & Cooksley, 2003). Seven areas were selected in the ecological study area to be checked for mussels using a bathyscope in good light conditions, as shown on Figure 10.11: Freshwater Pearl Mussel Survey. Areas with the most suitable substrate were searched first in order to determine absence or presence of freshwater pearl mussels.

Fish Survey

1.1.20 Electrofishing surveys were undertaken by Dr Jon Watt of Waterside Ecology in August 2013 using standards and approaches specified by the Scottish Fisheries Coordination Centre (SFCC, 2007) and recorded using the agreed formats. Full details of the methodology can be found in Appendix 10.4: Fish Habitat Survey Report. The main method of determining the fish population is by the use of electrofishing surveys. Electrofishing surveys involved the stunning of fish using an electric current, which enabled the operator to remove the fish from the water. Once captured, the fish recovered in a holding container. They were then anaesthetised using a specific fish anaesthetic, identified, measured and recorded, and once recovered, returned unharmed to the area from which they were captured. Four areas were surveyed for fish within the ecological study area, as shown on Figure 10.12: Fish Survey. Two large burns drain the ecological study area, Tangy Burn and Allt nan Creamh and two minor streams, the Allt a' Ghoirsten and Allt na Ceardaich drain the western periphery of the ecological study area.

1.1.21 The surveys were agreed by the Argyll District Salmon Fishery Board (DSFB) before being undertaken and a license was obtained from the Scottish Government.

Reptile Survey

1.1.22 Surveys for reptiles were performed opportunistically during other surveys within the ecological study area and all reptile observations recorded along with GPS coordinates.

1.2 Results

NVC Survey

1.2.1 Table 10.1.1: NVC Habitats details the NVC habitats recorded within the ecological study area that were considered not to be GWDTE. Figure 10.3: NVC Survey shows the locations of all the NVC habitats recorded in the ecological study area.

Habitat Code	Name	Area (ha)	Details	Sensitivity	Importance
H12	<i>Calluna vulgaris</i> - <i>Vaccinium myrtillus</i> heath	9.57	Several of the fire breaks located in the middle of the conifer plantation have extensive coverage of H12 heath	Low	Site
M19	<i>Calluna vulgaris</i> - <i>Eriophorum vaginatum</i> blanket mire	13.17	Large areas of the fire breaks in the middle of the ecological study area, including a few	Moderate	Local

Table 10.1.1: NVC Habitats					
			fields on the northern part of the existing wind farm, are M19 blanket mire.		
M20	<i>Eriophorum vaginatum</i> blanket and raised mire	25.03	Large parts of the existing wind farm, including a small section of a fire break in the middle of the conifer plantation, are M20 blanket and raised mire communities.	Moderate	Local
MG7	<i>Lolium perenne</i> leys and related grasslands	45.27	Large parts of the fields in the southern area are composed of MG7 leys and related grasslands.	Low	Site
U4	<i>Festuca ovina-Agrostis capillaris-Galium saxatile</i> grassland	12.71	Several fire breaks as well as fields on the south-eastern part of the ecological study area contain U4 grasslands.	Moderate	Local
U20	<i>Pteridium aquilinum-Galium saxatile</i> community	0.04	Several sections along the Allt nan Creamh in the northern part of site contain U20 communities.	Low	Site
W23	<i>Ulex europaeus-Rubus fruticosus</i> scrub	4.76	Large areas along the Allt nan Creamh contain W23 scrub.	Low	Site

Great Crested Newts and Other Amphibians

1.2.2 A total of three ponds were identified through the HSI assessment with potential for great crested newt presence as shown on Figure 10.5: GCN Survey. No great crested newts were recorded in the ponds surveyed. Other amphibians recorded are presented below in Table 10.1.2: Amphibian Survey Results.

Table 10.1.2: Amphibian Survey Results									
Visit		1		2		3		4	
Date		1st May		30th May		20th June		29th July	
	Location	GCN	Other	GCN	Other	GCN	Other	GCN	Other
Pond 1	NR 67798 28653	0	0	0	0	0	0	0	0
Pond 2	NR 68230 28482	0	0	0	0	0	0	0	0
Pond 3	NR 68262 28329	0	0	0	15 Lh	0	0	0	7 Lh
Key: Lh = <i>Lissotriton helvetica</i> (palmate newt)									

Bat Surveys

1.2.3 Further analysis of the bat surveys is provided in Appendix 10.2: Bat Survey Analysis.

Otter and Water Vole

1.2.4 No otter resting places in the form of holts or couches were recorded in the ecological study area.

1.2.5 No evidence of water vole was recorded. The ecological study area is considered to have minimal importance for this species, although there were field signs of smaller vole species present throughout the ecological study area.

Red Squirrel

1.2.6 No red squirrel signs or sightings were observed and the ecological study area is not considered to have any importance for this species.

Freshwater Invertebrates

1.2.7 The results of the freshwater invertebrate survey are summarised in Appendix 10.3: Freshwater Invertebrate Results.

Freshwater Pearl Mussel

1.2.8 No freshwater pearl mussels were recorded during surveys and the ecological study area is not considered to have any importance for this species.

Fish Survey

1.2.9 The fish survey report is provided in Appendix 10.4: Fish Habitat Survey Report.

Reptile Survey

1.2.10 A total of four observations of common lizard *Zootoca vivipara* were recorded on-site. As can be seen on Figure 10.13: Reptile Survey, three common lizards were recorded in the southern part of the planted coniferous woodland, and a single record was observed on the existing wind farm to the west of the existing site compound.