APPENDIX 7.1: FIELD SURVEY METHODOLOGY

Habitats and Vegetation

7.1.1 Fieldwork was carried out in September 2018 within 250 m of the Proposed Development, with additional visits undertaken in May and September 2019 to survey additional areas following further refinement of the proposed route.

7.1.2 Habitats across the Study Area were mapped using the Phase One Habitat Classification (JNCC 2010)[1], with habitat boundaries and classification being recorded onto 1:10,000 scale Ordnance Survey maps. Where appropriate, maps are supplemented with target notes which provide specific information on habitats present that are too limited in extent to map at the scale at which data is presented, or the presence of species and habitats of ecological interest.

7.1.3 Following the field survey, the conservation status of each habitat recorded was identified based on the following:

- Annex I habitats listed on the EC Habitats Directive, as translated into British and Scottish law by The Conservation (Natural Habitats, &c.) Regulations 1994 and subsequent legislation;
- UK Biodiversity Action Plan (UKBAP) priority habitats. Although superseded by the UK Post-2010 Biodiversity Framework in 2012, the UKBAP remains a useful resource for assessing UK conservation status and informs regional conservation priorities; and
- Scottish Biodiversity List (SBL) priority habitats for conservation.

7.1.4 Plant species of national significance (as defined below) where present, were recorded as target notes:

- Higher plant species of Lower plants (bryophytes) listed as Critically Endangered (CR), Endangered (EN) or Vulnerable (VU), on the respective red data lists for Great Britain as based on International Union for Conservation of Nature (IUCN) criteria;
- Nationally rare (NR) – occurring in 15 hectares or fewer in Great Britain; or
- Nationally scarce (NS) – occurring in 16-100 hectares in Great Britain; and
- UK Biodiversity Action Plan (UKBAP) priority species.

7.1.5 Any wetland habitats were evaluated in terms of their potential to be groundwater-dependent terrestrial ecosystems (GWDTEs). This was done based on the hydrogeological setting of each habitat community identified, and with reference to SEPA guidance (SEPA, 2014)[2] modified from the United Kingdom Technical Advisory Group (UKTAG) list of National Vegetation Classification (NVC) communities and associated groundwater dependency scores.

7.1.6 Nomenclature for vascular plants follows Stace (2010)[3], bryophytes and liverworts follow Atherton et al (2010)[4] and for lichens Dobson (2011)[5]. Phase 1 habitat maps were digitised using the ArcView 10.1 GIS package.

[1] JNCC (2010), Handbook for Phase 1 Habitat Survey – a technique for environmental audit. Joint Nature Conservation Committee: Peterborough

[2] Scottish Environmental Protection Agency (2014) Land Use Planning System: Guidance Note 31: Guidance on Assessing the Impacts of Windfarm Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems

[3] Stace, C. A. (2010). New Flora of the British Isles, 3rd Edition. Cambridge University Press.

[4] Atherton, I. et al. (2010). Mosses and Liverworts of Britain and Ireland: a field guide. British Bryological Society.

[5] Dobson, F. S. (2011), Lichens: An Illustrated Guide to the British and Irish Species, 6th edition. The Richmond Publishing Co. Ltd, Slough.

Invasive / non-native Species

7.1.7 Non-native and / or invasive terrestrial plants and algae were recorded onto 1:10,000 scale survey maps in the field. The locations of all non-native / invasive species were also recorded via the use of a handheld GPS and photographs taken to visually catalogue the record.

Protected Species

7.1.8 Protected species surveys were undertaken in suitable habitats within 250 m of the Proposed Development in September 2018, however at this time the watercourses within the site were in spate due to heavy rainfall, therefore further survey work was undertaken in May 2019 specifically for otters, as signs of their presence may not have been apparent during the initial surveys. Protected species surveys followed the methodologies described below.

Otter

7.1.9 Otter field signs that were searched for, as described in Bang & Dahlstrøm (2001)[6] and Sargent & Morris (2003)[7], include:

- holts – these are underground features where otters live. They can be tunnels within bank sides, underneath root plates or boulder piles, and even man-made structures such as disused drains. Holts are used by otters to rest up during the day and are the usual site of natal or breeding sites. Otters may use holts permanently of temporarily;
- couches – these are above ground resting-up sites. They may be partially sheltered, or fully exposed. Couches may be regularly used, especially in reed beds and on in-stream islands. They have been known to be used as natal and breeding sites. Couches can be very difficult to identify and may consist of an area of flattened grass or earth. Where rocks or rock armour are used as couches, these can be almost impossible to identify without observing the otter in situ;
- prints – otters have characteristic footprints that can be found in soft ground and muddy areas;
- spraints – otter faeces are often used to mark territories, usually deposited on in-stream boulders. They can be present within or outside the entrances of holts and couches. Spraints have a characteristic smell and often contain fish remains;
- feeding signs – the remains of prey items may be found at preferred feeding stations. Remains of fish, crabs or skinned amphibians can indicate the presence of otter;
- paths – these are terrestrial routes that otters take when moving between resting-up sites and watercourses or during high flow conditions when they will travel along bank sides in preference of swimming; and
- slides and play areas – slides are typically worn areas on steep slopes where otters slide on their bellies, often found between holts / couches and watercourses. Play areas are used by juvenile otters in play and are often evident by trampled vegetation and the presence of slides. These are often positioned in sheltered areas adjacent to the natal holt.

7.1.10 Any of the above signs are diagnostic evidence of the presence of otter, however, it is often not possible to identify couches with confidence unless other field signs are also present. Spraint is the most reliable identifiable evidence of the presence of this species.

[6] Bang, P. & Dahlstrom, P. (2001). Animal Tracks and Signs. Oxford University Press, Oxford.

[7] Sargent, G & Morris, P. (2003). How to Find and Identify Mammals. 2nd Edition. The Mammal Society.

7.1.11 Any evidence of otter presence was recorded onto 1:10,000 scale survey maps in the field. The location of all signs was also recorded via the use of a handheld GPS and photographs taken to visually catalogue the record.

Scottish Wildcat

7.1.12 Field signs of Scottish wildcat are described in Davis & Gray[8] and SNH (2011)[9]. Field evidence searched for includes:

- dens;
- prints;
- scat;
- scratching posts; and
- sightings.

7.1.13 Any of the above signs can be taken as diagnostic evidence that cats are present in the area. Further surveys are required in order to identify if the cats present are wildcat or are a hybridisation with domestic cats i.e. feral cats.

7.1.14 If signs were found then further field survey methods would be required in order to establish if a den is present and active. This can take several days / weeks depending upon the potential numbers of cats and habitat suitability. In areas where there are signs of wildcats camera traps can be used to try and verify presence and also to prove if a wildcat / hybrid or feral cat is present based on pelage (coat) characteristics. This would be the third step in the survey process if required (following the initial site assessment).

7.1.15 The key criteria for identifying Scottish wildcat are complex due to their ability to interbreed with domestic and feral cats. Scottish wildcat features and recognition are summarised in research by Kitchener *et al.,* 2005 with clear methods for identification based on pelage from the study of dead cats. However with live cats in the field this is more problematic due to the difficulty of observing cats. In addition it is believed from field research that true wildcats are now very rare in the field with very low populations in many areas with much larger feral populations now present. Detailed field research is still required to accurately determine wildcat densities in many areas.

7.1.16 Any evidence of Scottish wildcat presence was recorded onto 1:10,000 scale survey maps in the field. The location of all signs was also recorded via the use of a handheld GPS and photographs taken to visually catalogue the record.

Badger

7.1.17 Badger field signs that were searched for, as described in Neal & Cheeseman[10], Bang & Dahlstrøm[11] and SNH (2002)[12], included:

- setts;

[8] Davis A.R., Gray D. (2010). The distribution of Scottish wildcats (Felis silvestris) in Scotland (2006-2008).

[9] Scottish Natural Heritage. (2011).Scottish Wild Cat Naturally Scottish Series. SNH Battleby. http://www.snh.org.uk/pdfs/publications/naturallyscottish/wildcats.pdf

[10] Neal, E. & Cheeseman, C. (1996). Badgers. Poyser Natural History, London

[11] Bang, P. & Dahlstrom, P. (2001). Animal Tracks and Signs. Oxford University Press, Oxford.

[12] Scottish Natural Heritage. (2002). Badgers and Development. Scottish Wildlife Series. SNH. http://www.snh.gov.uk/publications-data-and-research/publications/searchthe-catalogue/publication-detail/?id=65

- prints;
- latrines (and dung pits used as territorial markers);
- hairs; and
- feeding signs (snuffle holes).

7.1.18 Any of the above signs can be taken as diagnostic evidence of the presence of badger.

7.1.19 Any evidence of badger presence was recorded onto 1:10,000 scale survey maps in the field. The location of all signs was also recorded via the use of a handheld GPS and photographs taken to visually catalogue the record.

Water vole

7.1.20 The methodology prescribed in Strachan & Moorhouse (2011)[13] was followed in order to search for field signs of water vole. The field signs searched for included:

- faeces – recognisable by their size, shape and content. If not too dried-out these are also distinguishable from rat droppings by their smell;
- feeding stations – food items are often brought to feeding stations along pathways and hauled onto platforms. Recognisable as neat piles of chewed vegetation up to 10cm long;
- furrows – appear as a series of holes along the water's edge distinguishable from rat burrows by size and position;
- lawns – may appear as grazed areas around land holes;
- nests – where the water table is high, above ground woven nests may be found;
- footprints – tracks may occur at the water's edge and lead into bankside vegetation. May be distinguishable from rat footprints by size; and
- runways – low tunnels pushed through vegetation near the water's edge, less obvious than rat runs.

7.1.21 Any of the above signs can be taken as diagnostic evidence that water vole are present in the area. Any evidence of water vole presence was recorded onto 1:10,000 scale survey maps in the field. The location of all signs was also recorded via the use of a handheld GPS and photographs taken to visually catalogue the record.

Red Squirrel

7.1.22 Through areas of woodland, signs of feeding and evidence of active squirrel dreys were recorded. Field signs that were searched for, as described in Bang and Dahlstrøm (2001) included:

- dreys – comprised of an outer shell of twigs and branches, with an inner layer of mosses, leaves, grass and conifer needles. Dreys are usually built close to the main stem of a tree;
- feeding signs – can be stripped and nibbled conifer cones, split hazelnuts, nibbled fungus and berries; and
- prints – the forefoot has four long narrow toes with claws and its print is approximately 4 cm long and 2 cm wide. The hindfoot has 5 clawed toes and its print is approximately 5 cm long and 3 cm wide. The track lies close together in a jump group, with the fore-prints close together and behind the more widely spread hind-prints.

7.1.23 Grey squirrel (*Sciurus carolinensis*) is known to be present within the region of the Study Area. Any signs of squirrel located during surveys were considered to be those of red squirrel for the purposes of this assessment.

[13] Strachan, R. (2011). The Water Vole Conservation Handbook. EA/EN/WildCRU, Oxford. Water vole Conservation handbook (3rd edition)

7.1.24 Any evidence of red squirrel presence was recorded onto 1:10,000 scale survey maps in the field. The location of all signs was also recorded via the use of a handheld GPS and photographs taken to visually catalogue the record.

Pine marten

7.1.25 Pine marten signs that were searched for, as described in Bang and Dahlstrøm (2001) included:

- scats – these are typically dark in colour and 4-12 cm long x 0.8-1.8 cm in diameter. They often have a coiled twisted appearance, typical of many mustelid scats. Scats will often contain food remains including fur, feathers, bone, plant content and seeds. Scats vary in size, shape and colour and it's difficult for even experts to identify some pine marten scats. Scats are placed in latrines at well-used dens, as well as at sites elsewhere in an individual's home range, where they probably fulfil a social communication role;
- footprints – the five-toes but slightly cat-like forefoot imprints measure approximately 40x45 mm for females and 55-65 mm for males; fur on the underside of the feet in winter may blur prints and make them look larger, especially in soft snow. Indistinct trails of bounding martens (stride length 60-100 cm) may resemble those of hares, with prints in groups of two or three where one or both hind feet have registered over prints of forefeet; and
- den sites – dens are usually not distinctive unless revealed by visible concentration of scats. Elevated den sites are preferred to keep martens safe from predators and provide insulation and shelter from the elements, and so hollow trees, owl boxes and the roofs of dwelling houses are often used as well as purpose-built pine marten den boxes. Where such elevated dens are absent, they may den on the ground in rabbit burrows, rocky outcrops or under tree root plates.

7.1.26 Any evidence of pine marten presence was recorded onto 1:10,000 scale survey maps in the field. The location of all signs was also recorded via the use of a handheld GPS and photographs taken to visually catalogue the record.

Bats

7.1.27 The methodology prescribed involved a habitat assessment – walking over the Study Area and inspecting areas of potential interest as foraging and roosting habitat for bat species. The survey took into account the following:

- the extent and quality of foraging and commuting habitat within the Study Area;
- the proximity of the Proposed Development to areas designated for bats (SSSI and SAC); and
- the presence of buildings, bridges, trees or other features that may support or are known to support bat roosts.

7.1.28 Any potential roost features were recorded onto 1:10,000 scale survey maps in the field. The location of all signs and potential roost features was also recorded via the use of a handheld GPS and photographs taken to visually catalogue the record.

7.1.29 Non-native and / or invasive terrestrial plants and algae were recorded onto 1:10,000 scale survey maps in the field. The location of all non-native/invasive species was also recorded via the use of a handheld GPS and photographs taken to visually catalogue the record.