Appendix 8.1

Extended Phase 1 Habitat Survey Report

Appendix 8.1: Extended Phase 1 Habitat Survey Report

Introduction

1.1 This Appendix relates to an Extended Phase 1 Habitat Survey undertaken at the Glenlee Substation Extension site. It includes an account of the methods adopted, baseline findings and an interpretation of results. The Appendix should read in conjunction with **Chapter 8: Ecology** of the EIA Report.

Scope of Survey

1.2 The Extended Phase 1 Habitat Survey was undertaken to identify all broad habitat types within, and adjacent to, the Glenlee Substation Extension site. Where habitats were identified as potentially having groundwater dependency, detailed National Vegetation Classification (NVC) survey methods were applied.

1.3 The survey was 'extended' in that it also included a search for direct evidence of, or suitable habitat for, protected species.

1.4 Detailed surveys of proposed passing places, along the US2 to the south-west of Glenlee Substation and the A762 between Glenlee and Allangibbon Bridge, were not undertaken. However these locations were visited to identify potential ecological constraints.

Survey Method

Desk Study

1.5 In order that field surveys were fully informed, a desk study was undertaken to identify existing statutory[i] and non-statutory[ii,iii,iv] designated sites within 2km of the site boundary. Existing records of protected species within 2km of the site boundary were also sought[v].

Field Survey

Habitats and Vegetation (including GWDTEs)

1.6 An Extended Phase 1 Habitat Survey was completed by competent field ecologists in March and April 2018, with further updates in October 2018.

1.7 Following current good practice methods[vi], all broad habitats within the site boundary and 50m buffer were classified, photographed and mapped on GIS-referenced field tablets. Habitat classification depended on the identification of important indicator species. A range of identification keys were used for this purpose.

1.8 Where Phase 1 habitat types had potential to support Groundwater Dependent Terrestrial Ecosystems (GWDTEs) vegetation communities[vii], they were subject to more detailed botanical investigation. The NVC method[viii] was used to identify potential GWDTE communities. In addition to the identification of relevant NVC communities, consideration was given to topographical features which may indicate an alternative surface water dependency. Landscape features which may indicate surface water influence, rather than groundwater influence, include ridges, slopes, watercourses/flood plains and/or ombrogenous bog systems.

Protected Species

1.9 During the Extended Phase 1 Habitat Survey, the site's suitability to support a range of protected species, as determined by desk studies and the field surveyors' professional experience, was undertaken. 'Suitability' was considered to mean opportunities to shelter, rest, forage and commute. Suitability for each species was informed by range of standard species texts. Where habitat was considered suitable, direct evidence of species was searched for. Evidence generally included resting sites, tracks/trails and paths, defecation and foraging remains, within the Phase 1 Habitat Survey Study Area.

1.10 Species considered were:

- badger;
- red squirrel;
- pine marten;
- otter; and
- water vole.

1.11 Current best practice methods were applied in the search for each species[ix]. In relation to otter, the Study Area was extended to 250m and all watercourses in this area were searched.

1.12 Bat surveys were also undertaken and these are reported in detail in **Appendix 8.2** of the EIA Report. Fisheries surveys were also undertaken and these are reported in **Appendix 8.3**.

Constraints and Limitations

1.13 All ecological surveys represent a snap-shot in time. Habitats and species assemblages are dynamic and change over time in response to range of variables. Data presented in this report should not be considered a long-term interpretation of ecological data and should not be relied upon as such.

1.14 In specific relation to the field surveys reported here, there were no significant constraints to the implementation of standard survey methods.

Desk Study Findings

1.15 There are no statutory designated sites[1] within the Site boundary. However, the following non-statutory designated area was identified within the Site Boundary:

- Black Bank Wood Ancient Woodland Inventory (AWI) Site: located partly with the Site, at the Site's southern boundary. Although this woodland feature is designated as an AWI site, the part of the designation within the Site had been felled and recently replanted with broadleaved stock. Although located within the Site, no works are proposed within or adjacent to the designation.

1.16 Statutory designated sites within 2km of the Site boundary include:

- Water of Ken Woods Site of Special Scientific Interest (SSSI): comprising five distinct woodland units over a wider area, this SSSI is designated for its lichen assemblages and upland oak woodland. Glenlee Substation is located between two of these blocks. Carse wood is located approximately 200m north-west, while Glenlee Park is located approximately 50m to the east. Despite their proximity, there is no structural or functional connectivity between the Site and the SSSI woodlands.

1.17 A wider network of AWI sites were also identified in the north-west of the Study Area, particularly around Dunveoch, however there was no structural of functional connectivity between these stands and Glenlee Substation Extension site.

1.18 The spatial arrangement of designated sites within the Study Area is presented in **Figure 1**.

1.19 There were no existing protected species records within the site boundary, however the following species have previously been (records from 2000 onwards) recorded within 2km[2]:

- badger; and
- red squirrel.

[1] There are no sites designated for ornithological features within or directly adjacent to the site. Ornithology has been scoped out of detailed assessment as explained in Chapter 2: Approach to the EIA of the EIA Report.
[2] Only records made since 2000 are recorded here.

Field Survey Findings

Study Area Overview

1.20 The Study Area is located within the immediate vicinity of the existing Glenlee substation and adjacent hydro power station. It is bound to the north by the Water of Ken and local access roads, to the east by the settlement of Glenlee, to the south by the Black Bank Wood and to the west by open pasture land.

1.21 Located within a wider context of rolling lowland pasture punctuated by woodland, the site is typical of its surroundings. The habitats in the Study Area are heavily influenced by current livestock grazing patterns which have resulted in the domination of improved and semi-improved grasslands. These, in turn, are influenced by surface water, draining across a slope from south/south-west to north-west, which supports the development of swamp/marshy vegetation in pooling areas and more level ground. The Study Area also supports small areas of broadleaved woodland, particularly to the north.

1.22 Detailed habitat descriptions are provided below, according to their Phase 1 Habitat nomenclature. When considering habitat descriptions, reference should be made to the Phase 1 Habitat Map in **Figure 2** and to the photographs provided in **Appendix 1**.

Habitats

A1.1.1 and A1.1.2 Semi-natural and Plantation Broadleaved Woodland

1.23 Woodland has a canopy cover greater than 30% of trees more than 5m high when mature. Semi-natural woodland includes areas that do not obviously originate from planting.

1.24 There are several areas recorded as semi-natural broadleaved woodland. All fall within the 50m buffer of the Glenlee substation extension site. Species include: predominantly Oak *Quercus robur* and Beech *Fagus sylvatica*, however, there was also a small number of Birch Species *Betula* spp., Hawthorn *Crataegus monogyna,* Alder *Alnus glutinosa* and Sycamore *Acer pseudoplatanus* present. The understory of the two western areas of woodland consisted of improved grassland heavily grazed by livestock.

1.25 The north eastern sections consisted of a more enclosed canopy of birch with an understory of young sapling trees, bramble *Rubus* spp., *Willow* spp., and some elder *Sambucus negra*.

1.26 Similar to the western area of the Site, within the 50 m buffer to the east of the Site is a small cluster of oak *Quercus robur* trees on a mound. The understory is heavily improved and grazed by livestock.

1.27 To the south of the site the broadleaved woodland plantation is characterised by having been fairly recently restocked. There are a few stands of mature trees but the majority of the sloping hillside is dominated by young broadleaved trees (within tree tubes). A typical species mix of Oak *Quercus robur*, elder *Sambucus negra* and hawthorn *Crataegus monogyna* was noted developing in the tree tubes.

A1.3.2 Mixed Woodland

1.28 The south-west corner of the site boundary contains a small pocket of mixed plantation woodland. The wood is comprised of predominantly Sitka spruce *Picea sitchensis* along with the planted broadleaved species listed above.

A2.1 Dense/Continuous Scrub

1.29 Scrub is vegetation dominated by native shrubs, usually smaller than 5m in height. It was recorded to the north-east of the site on the periphery of the woodland. The scrub was dominated by Bramble *Rubus* sp. and a mixture of small trees (less than 5m), *Prunus* spp., *Willow* spp., and elder *Sambucus negra*.

B2.2 Semi-improved Neutral Grassland

1.30 Neutral grassland covers a wide range of communities typically comprising enclosed areas with an element of management occurring, or having occurred in the recent past.

1.31 The field immediately behind the existing substation consists of semi-improved neutral grassland. The dominant species being tufted hair-grass *Deschampsia cespitosa,* abundant false oat-grass *Arrhenatherum elatius,* and frequent Cock's-foot grass *Dactylis glomerata*.

B4 Improved Grassland

1.32 Improved grasslands are areas of grass dominated habitat which have been so heavily influenced by agriculture, drainage, or other applications that the species present is limited to a few productive grasses. This type of habitat was found in an area located within the north west of the site. At the time of survey, the area was used by grazing sheep. Perennial Ryegrass *Lolium perenne* and Crested Dog's-tail *Cynosurus cristatus* were the dominant species. *Ranunculus* species and *Rumex* species were abundant throughout the area.

B5 Marshy Grassland

1.33 Marshy grassland is a diverse set of habitats including those dominated by rushes, sedges, and tall herbs where water is close the surface but not obviously visible like swamp.

1.34 Marshy grassland dominated the area south and south-west of the Site. Typical marsh species were noted and Purple moor-grass *Molinia caerulea* and *Juncus spp.* being dominant. The marshy grassland is fed from the sloping topography south of the site and in the north is fed from the many small watercourses.

C1.1 Continuous Bracken

1.35 A dense area of continuous bracken was recorded on the slopes of the hill to the south of the site; with a further smaller area recorded to the east. Bracken has filled the gap created by the existing overhead line and now dominates over any other species.

C3.1 Other Tall Herb and Fern (Ruderal)

1.36 Tall ruderal vegetation consists of stands of tall perennial or biennial dicotyledons. Within a small area of land to the north-east of the site within the 50m buffer Rosebay-Willowherb *Chamaenerion angustifolium* and common nettle *Urtica dioica,* were present as the dominant flowering plants.

C3.2 Other Tall Herb and Fern (Non-ruderal)

1.37 An area adjacent to the large watercourse running into the hydro station and the staff car park was noted as being dominated with non-wooded stands of vegetation including Great wood-rush *Luzula sylvatica*.

F1 Swamp

1.38 Swamp habitat was recorded in a couple of locations within the 50m buffer of the site. Swamp vegetation is characterised by tall emergent vegetation which is typically standing in water for the majority of the year. *Typha, Pharagmites ausralis* and *Carex* Spp. were recorded to the north east of the site. The western area of swamp was characterised by the high water table and the dominant vegetation being flag iris *Iris pseudacorus*.

G2 Running Water

1.39 Running water is present in the form of a river tributary of the Water of Ken and as wet ditches/small streams. The small stream water course is to be diverted as part of the proposed extension to the substation. The river leading into the Hydro power station is a permanent feature while the small streams and ditches to the south of the site are periodically dry, as was noted from subsequent visits to the site following the initial field survey. The river was bordered by typical marshy grassland species and dominated by Purple moor-grass *Molinia caerulea*. The small streams were dominated by Juncus species notably soft rush *Juncus effusus*.

J5 Other Habitat

1.40 A large percentage of the land within the site and the 50m buffer consisted of other habitat. This included areas of hard-standing, the Substation compound, buildings, car parks and private domestic dwellings/gardens.

1.41 **Table 1** sets out the total area of each habitat within the Study Area, along with their relative proportion of the Study Area.

Table 1: Habitats Area and Percentage Coverage

Habitat type	Area within Study Area (Ha)	Proportion of Study Area (%)
A1.1.1 Broadleaved woodland (semi-natural)	2.512	15.08%
A1.1.2 broadleaved woodland (plantation)	0.826	4.96%
A1.3.2 Mixed woodland (plantation)	0.083	0.49%
A2.1 Scrub (dense/continuous)	0.617	3.70%
B2.2 Neutral grassland (semi-improved)	0.197	1.18%

Habitat type	Area within Study Area (Ha)	Proportion of Study Area (%)
B2.2 Neutral grassland (semi-improved)/ A3.1 Broadleaved scattered trees	1.573	9.44%
B4 Improved grassland	2.423	14.54%
B5 Marshy grassland	3.751	22.51%
B5 Marshy grassland/ A2.2 Scrub (scattered)	0.063	0.38%
C1.1 Bracken (continuous)	0.136	0.91%
C1.1 Bracken (continuous)/ A3.1 Broadleaved scattered trees	0.016	0.1%
C3.1 Other tall herb and fern (ruderal)	0.062	0.38%
C3.2 Other tall herb and fern (non-ruderal)	0.131	0.78%
F1 Swamp	0.064	0.38%
G2 Running water	0.527	3.16%
HS Hard standing	0.784	4.71%
J5 Other habitat	2.895	17.37%
Total	**16.662**	**100.00%**

1.42 As noted above, the habitats in the proposed passing places were not surveyed in detail. Instead, a brief site walkover was undertaken to identify any potential constraints, particularly in relation to protected species. Habitats within proposed passing places were broadly typical of roadsides, comprising amenity grassland (heavily influenced by salt enrichment) and scrub with occasional semi-mature and mature trees.

1.43 The majority of the habitats within the Study Area were considered to be common and widespread within the lowland agricultural context and are scoped out of the assessment. However, **Table 2** provides further details of those habitats of conservation concern[3] identified during field surveys.

Table 2: Habitats of Conservation Concern

Phase 1 Habitat Type	Policy Priority	Description	Total Habitat Area (ha)
Broadleaved woodland	Scottish Biodiversity List and Dumfries and Galloway Biodiversity Action Plan	Woodland cover on site is primarily limited to the peripheries. In general, it is typical of the surrounding countryside.	3.338
Marshy Grassland	Dumfries and Galloway Biodiversity Action Plan	The marshy grassland within the site varies little and is dominated by purple-moor grass and soft rush. It is located throughout the site and can be attributed primarily to the topography. Water run-off from the slopes south of the site flows down to more level areas before feeding into Coom burn and the Water of Ken.	3.751
Rivers (Water of Ken)	Scottish Biodiversity List	The river system supports a wide variety of flora and fauna but will not be directly affected by the proposed development.	0.527

1.44 Marshy grassland habitats include NVC communities that could indicate groundwater dependency. However, the steeply sloped nature of the habitat of the Study Area and its clear relationship with the Water of Ken suggests that these habitats are the consequence of surface water flow. GWDTEs are not considered to be present.

Protected Species

Badger

1.45 Badger is known to be present in the wider landscape, particularly to the south of Glenlee where studies undertaken in support of the KTR Project identified viable badger populations and extensive territories.

1.46 The Study Area provided optimal habitat for badger. The network of agricultural grassland and broadleaved woodland, connected to the wider landscape by the Water of Ken and Coom Burn, provide opportunities for sett excavation, foraging, and commuting. Of particular value was an area of broadleaved woodland to the east of an existing overflow carpark which provided many suitable features. However, despite the Study Area's suitability for the species, no evidence of presence of the species was identified.

Red squirrel

1.47 Central Dumfries and Galloway is often considered a 'hot spot' for red squirrel. This is normally associated with the County's extensive coniferous forestry habitats, however the Desk Study identified a single record adjacent to the site. Extensive records were collected during field surveys undertaken in support of the KTR project and the Desk Study identified existing records.

1.48 The Study Area offers some suitable habitat for the species, primarily in the form of broadleaved woodland, which offers sheltering and foraging opportunities. Of particular interest was woodland associated with the adjacent Water of Ken, which offered a dispersal route to other areas of suitable habitat.

1.49 No dreys were identified in any trees within the Study Area and no foraging signs were recorded. However, a single red squirrel was recorded in the north–west of the Study Area during the Extended Phase 1 Habitat Survey. The squirrel was observed running along the US2 road, immediately adjacent to the hydro power station. The location of the red squirrel sighting is shown in **Figure 3**.

1.50 Although no dreys were recorded, it should be recognised that surveys were undertaken during spring and summer months when canopies were at their densest and may have obscured dreys from observation.

Otter and Water vole

1.51 Extensive otter evidence was collected during field surveys undertaken in support of the KTR Project. Otter was recorded throughout the KTR Study Area with numerous resting sites identified. No water vole evidence was recorded during KTR Project surveys, or via the Desk Study.

1.52 There are a number of drainage ditches within the site boundary. However, at the time of survey, many of these were dry. Those that weren't dry were shallow with a maximum width of 1m. In-stream vegetation was lacking while bankside vegetation, largely rush, was poached and trampled by livestock in many locations. An existing culvert beneath the substation creates a functional break between the drainage ditches and the Water of Ken. No evidence of otter or water vole was recorded along the drainage ditches.

1.53 In the north, the Study Area supports the Water of Ken and Coom Burn. Both offer suitable habitat for otter, particularly in terms of sheltering and foraging. Otter spraint was recorded on both watercourses, within the Study Area. The spraint was relatively recent, suggesting the Study Area forms part of an active territory. The locations of the otter evidence are shown in **Figure 3**.

1.54 The fast flow of water in these watercourses largely precludes water vole.

Interpretation

Habitats and Vegetation

1.55 The Study Area supports a habitat assemblage typical of lowland agricultural landscapes in the south west of Scotland.

1.56 Heavily influenced by grazing, the habitat composition is dominated by grasslands. Surface water flows further influence the species assemblages of these habitats, with marshy species, primarily *Juncus* species and purple moor grass dominant in some areas.

1.57 Broadleaved woodland within the Study Area is largely associated with the adjacent Water of Ken, where a mature canopy gives way to a dense understory. Broadleaved woodland in the north-west of the site is mature and dominated by oak, however it lacks shrub, ground and field layers as a consequence of grazing. Woodland in the south of the Study Area comprises AWI features and supports a dense, species-rich assemblage.

[3] As listed in Annex 1 of the Habitats Directive; the Scottish Biodiversity List and the Dumfries and Galloway Biodiversity Action Plan.

1.58 Habitats of conservation concern were identified during surveys, including broadleaved woodland and marshy grassland, however no GWDTEs were observed.

Protected Species

1.59 The Study Area supports relatively few protected species and no resting sites were identified.

1.60 While otter spraint was recorded, the absence of resting sites suggests that watercourses within the Study Area only form a non-core part of a larger otter territory.

1.61 Although no red squirrel dreys were identified, a visual observation suggests that the species is active within the Study Area, although the Study Area itself is likely to be of limited importance for the viability of the local population.

Appendix 1
Figures

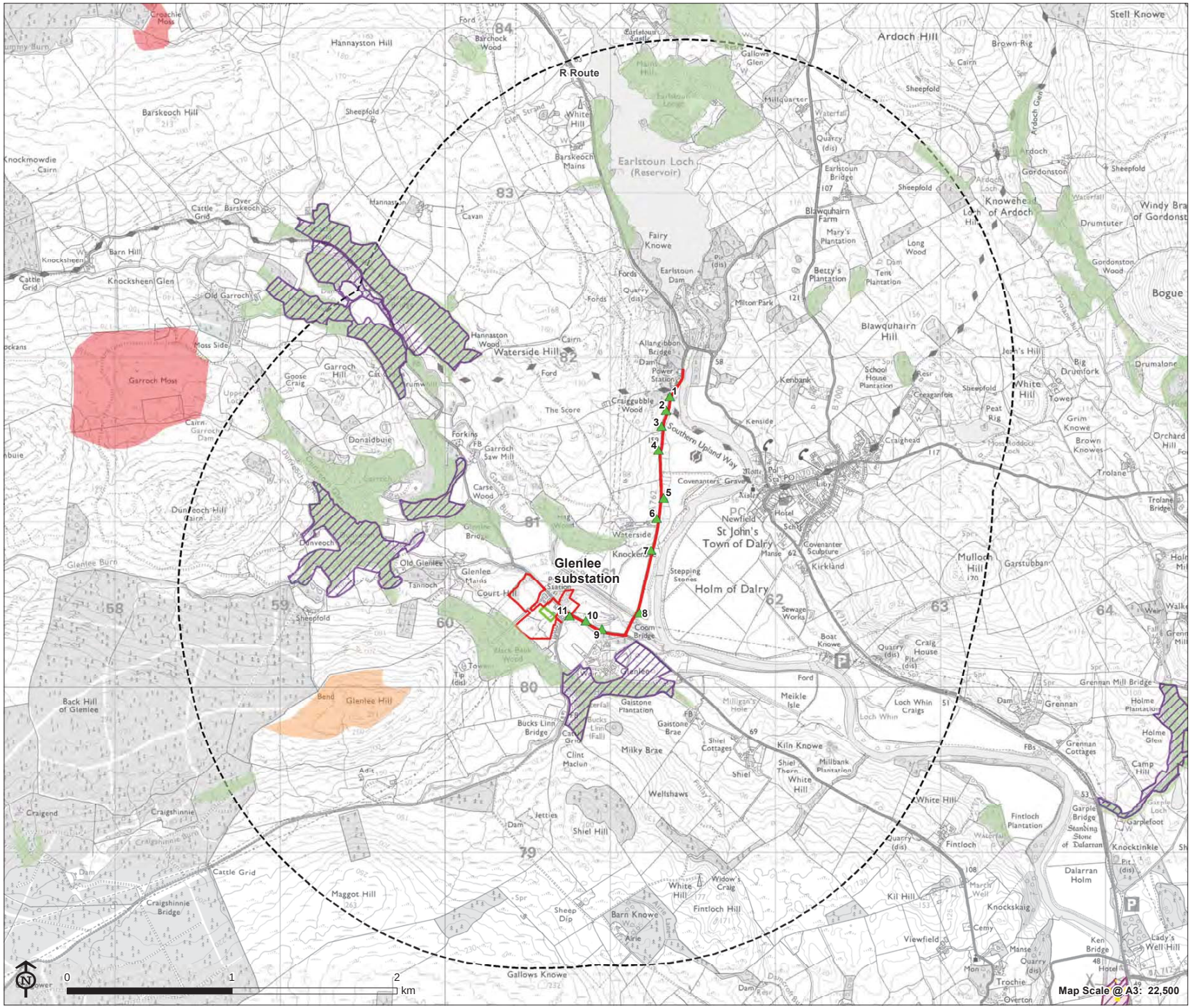

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Figure 1: Desk Study Results – Statutory and Non-Statutory Designated Sites

- Planning application boundary
- Substation extension
- Ecology study area
- Passing place

Designation

- Ramsar Site (R)
- Site of Special Scientific Interest (SSSI)
- Special Protection Area (SPA)
- Ancient Woodland Inventory (AWI)

Priority Peatland Habitats

- Class 1
- Class 2

LUC

SP ENERGY NETWORKS

CB:JN EB:robertson_s LUCGLA FIG01-00_6118-002_Glenlee_Ecology_Desk Study Results 29/08/2019

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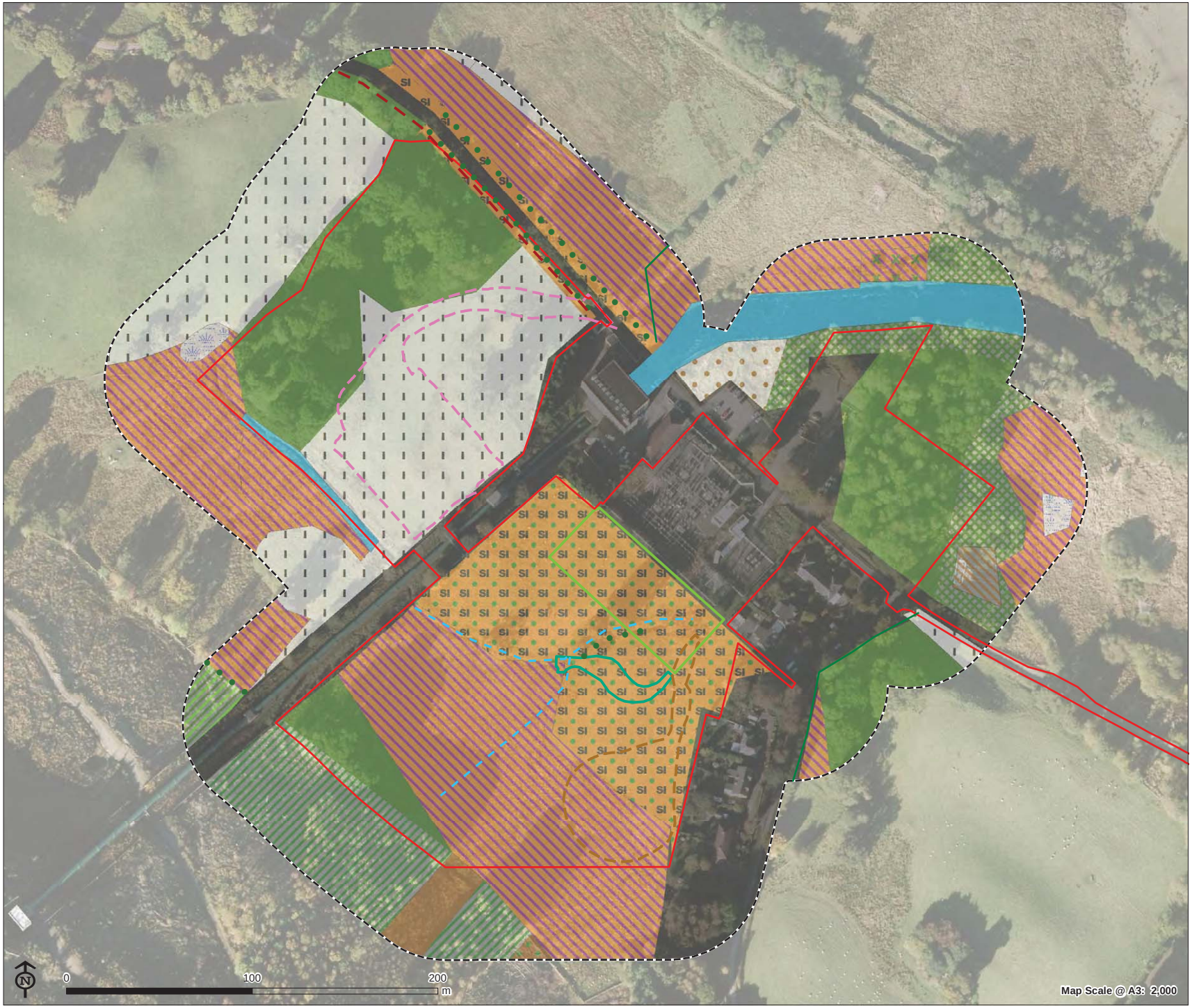
Figure 2: Phase 1 Habitat Survey



- Planning application boundary
- Substation extension
- Temporary compound and access for main works
- Temporary construction vehicle holding area
- Drainage ditch diversion
- Glenlee Site Boundary 50m buffer (excluding access)

Phase 1 habitat (linear features)

- J2.1.2 Intact hedge (species-poor)
- J2.5 Wall
- J2.6 Dry ditch
- TL Tree line

Phase 1 habitat

- A1.1.1 Broadleaved woodland (semi-natural)
- A1.1.2 Broadleaved woodland (plantation)
- A1.3.2 Mixed woodland (plantation)
- A2.1 Scrub (dense/continuous)
- B2.2 Neutral grassland (semi-improved)
- B2.2 Neutral grassland (semi-improved) / A3.1 Broadleaved scattered trees
- B4 Improved grassland
- B5 Marshy grassland
- B5 Marshy grassland / A2.2 Scrub (scattered)
- C1.1 Bracken (continuous)
- C1.1 Bracken (continuous) / A3.1 Broadleaved scattered trees
- C3.1 Other tall herb and fern (ruderal)
- C3.2 Other tall herb and fern (non ruderal)
- F1 Swamp
- G2 Running water
- Survey not required

LUC

SP ENERGY NETWORKS

CB:JN EB:robertson_s LUCGLA FIG02-00_6118-001_Glenlee_Habitats 26/08/2019

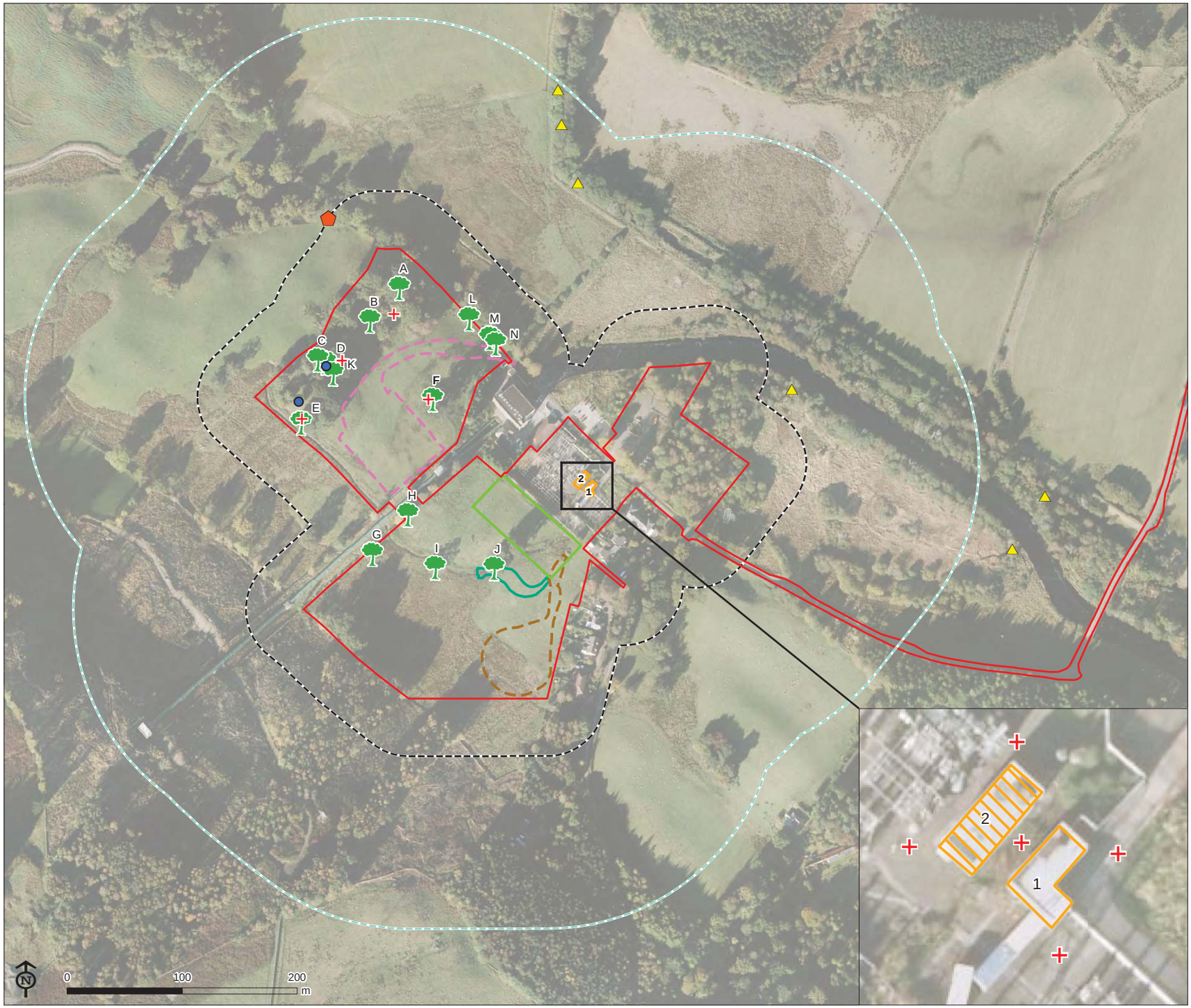


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Figure 3: Protected Species Survey

- Planning application boundary
- Substation extension
- Temporary compound and access for main works
- Temporary construction vehicle holding area
- Drainage ditch diversion

Protected species features

- Glenlee 50m protected species study area
- Bat surveyor positions
- Anabat location
- Potential bat roost structure
- Confirmed bat roost structure
- Bat Roost Potential (BRP) - tree
- Red squirrel sighting
- Glenlee 200m otter study area
- Otter spraint

LUC

SP ENERGY NETWORKS

CB:JN EB:robertson_s LUCGLA FIG03-00_6118-001_Glenlee_ProtectedSpecies 27/08/2019

Appendix 2
Site Photography

Photograph 1: A view from the north east corner of the Site, showing grassland and the adjacent hydro power station

Photograph 2: A view towards the south west of the Site, showing improved grassland and broadleaved woodland

Photograph 3: A view over improved and marshy grassland, showing the hydro power station's intake pipe in the background

Photograph 4: A view of trees in the south west of the Site, with Bat Roost Potential

References

[i] Available via SNH SiteLink – www.sitelink.nature.scot/home

[ii] E.g. Local Nature Conservation sites, available via the Dumfries and Galloway Local Development Plan - https://www.dumgal.gov.uk/ldp

[iii] Ancient, long-established and semi-natural woodlands - https://gateway.snh.gov.uk/natural-spaces/dataset.jsp?dsid=AWI

[iv] Carbon and peatland soils - http://map.environment.gov.scot/Soil_maps/?layer=10

[v] Via available online recording platforms, eg. NBN Atlas, and ongoing consultation with Forest Enterprise Scotland regarding red squirrel and pine marten records.

[vi] JNCC (2010). Handbook for Phase 1 Habitat Survey – a technique for environmental audit. JNCC, Peterborough

[vii] SEPA (2017). Land Use Planning System SEPA Guidance Note 31. Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems.

[viii] Rodwell, J.S. 1991-2000. British plant communities. 5 Volumes. Cambridge University Press.

[ix] Available at http://www.ieem.net/sources-of-survey-methods-sosm-

Appendix 8.2
Bat Survey Report

Appendix 8.2: Bat Survey Report

Introduction

1.1 This Appendix relates to bat surveys undertaken at the Glenlee Substation extension site. It includes an account of the methods adopted, baseline findings and an interpretation of results. The Appendix should read in relation to **Chapter 8: Ecology** of the EIA Report.

Scope of Surveys

1.2 Bat surveys were undertaken to identify bat activity and roost sites within the Glenlee Substation Extension site.

1.3 A range of survey methods were deployed to gain an understanding of bat species assemblages and their use of the site. Where potential roosting features were identified (during the Primary survey), they were recorded and then, where appropriate, further surveyed (Secondary survey).

Survey Method

Desk Study

1.4 In order that field surveys were fully informed, a desk study was undertaken to identify existing records of bat species within 2km of the Site boundary. A review was undertaken of publicly available species data, available via the NBN Atlas[1].

Field Survey

Primary survey: Bat Roost Potential (BRP) Survey

1.5 A BRP survey is the initial ground level assessment conducted to determine whether a building, structure, or tree has potential to support roosting bats.

1.6 The survey was completed at the Site in the summer months of 2017 and followed standard methods[2]. The survey took into account the range of roosting conditions required by bats throughout the year. The criteria used to categorise BRP are summarised in **Table 1** below.

Table 1: Bat Roost Potential (BRP) Categories

BRP Category	Roosting Habitat Features	Commuting and Foraging Habitat Features	Survey Requirement
Negligible	Negligible habitat features likely to support roosting, commuting or foraging bats.		No surveys required.
Low	Structures in this category offer one or more potential roost sites for individual, opportunistically roosting bats. These sites do not offer the space, shelter, or appropriate conditions to support large numbers of bats or maternity roosts. Trees in this category include those of sufficient size and age to support suitable roosting features, but none are visible from the ground.	Habitat on and around the Site could be used by a small number of commuting bats. This category includes densely urbanised landscapes or linear vegetation features poorly connected to the wider landscape (e.g. defunct hedges in an agricultural context).	One dusk or dawn survey required for structures. No surveys required for trees.
Moderate	Structures and trees in this category offer one or more roost site that, due to their space, shelter or conditions, offer roosting potential for a range of species. Roosts may be more permanent, rather than opportunistic. Small maternity roosts of common species may form in one of these roost sites.	Habitat on and around the Site is well-connected to wider continuous habitat and offers commuting and foraging habitat to a larger number of bats across a number of species (e.g. tree lines or linked gardens in the urban context, or continuous hedge/ tree lines and watercourses in an agricultural setting).	survey required for both structures and trees. Tree-climbing may be an appropriate alternative to dusk and dawn surveys.
High	Structures and trees in this category have one or more potential roost sites that are suitable for large number of bats. Roosts are likely to be permanent and include maternity roosts. Potential roost sites exist for a wide range of species or species of particular conservation interest.	Habitat on and around the Site is diverse, continuous and linked to extensive suitable habitat. This category includes well-vegetated rivers, streams, hedgerows and woodland edge. Habitat is sufficiently diverse to offer opportunities to a wide range of species or those of particular conservation interest.	One dawn and one dusk survey, plus one further dusk or dawn survey.

Secondary survey: Bat Activity Survey- Buildings

1.7 The BRP survey suggested the buildings within the Site were of limited potential to support a small number of bats. The 2018 bat activity surveys therefore aimed to determine whether bats were roosting in the Substation buildings and, if so, provide details on the species, numbers and roost types.

1.8 Following standard methods[2], an initial dusk (emergence) survey was completed on 02/08/18. A further dawn (re-entry) survey of the structures was completed on 21/08/18 with the same configuration of surveyor positions.

1.9 The dusk survey commenced 30 minutes prior to sunset and continued for 90 minutes after sunset. The Dawn survey started 90 minutes prior to sunrise and ended at sunrise. Both surveys were undertaken in appropriate weather conditions within the accepted survey season (April – September).

1.10 Five surveyors were positioned around the buildings, ensuring all aspects of each building could be observed simultaneously; surveyor locations can be seen in **Figure 1** in **Appendix 1**.

1.11 Heterodyne detectors were used to listen for bat echolocations and the survey was recorded with the use of static detectors (Anabat Express). If a bat emerged or entered the building the surveyor noted it on prepared pro-formas.

Secondary survey: Bat tree aerial inspection

1.12 Due to visibility constraints, dense areas of trees can be difficult to survey using standard emergence and re-entry survey methods. Where trees are identified as having potential roosting features, a range of additional survey methods is available.

1.13 The Primary survey identified a number of trees with BRP. These are shown in **Figure 1, Appendix 1**. Several trees within the Site were subject to aerial inspection by qualified tree climbers. Under the supervision of a licenced bat worker, the trees were climbed and potential roost features were examined with the use of a small endoscope on 20/08/18.

1.14 On visiting the Site to inspect the trees, it was noted that a large percentage of previously firm trees had been damaged by recent stormy weather. The damage to trees within the woodland block was extensive and resulted in an increased number of potential roost features not previously recorded in the Extended Phase 1 Habitat survey. At the time of the tree climbing survey, the plans were not likely to affect the area of damaged trees; as such, it was deemed unnecessary to further inspect each of these trees.

1.15 As development plans progressed, the Site boundary was revised meaning works were now likely to affect the area including the damaged trees. It was then decided an additional activity surveys should be conducted. This survey, completed in 2019, is further described below.

Secondary survey: Passive Bat Surveys

1.16 To gain an understanding of the composition and volume of bat fauna present in the damaged tree area, two static bat detectors (Anabat Express) were deployed. These detectors were left running for a period

[1] Available at https://nbnatlas.org/

[2] Collins, J. (ed.)(2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines(3rd edn). The Bat Conservation Trust, London.

of eight days from the 21st to the 29th August 2018 at locations: NX 60443 80586, NX 60419 80555, which are shown in **Figure 1**, **Appendix 1**.

Secondary survey: Bat Activity Survey- Trees

1.17 Following good practice guidelines[2] a dawn (re-entry) survey was completed on 03/07/19, with four surveyors covering an area of damaged trees in the west of the Study Area (see surveyor locations in **Figure 1**, **Appendix 1**). The surveyors were spread out within the wooded area and recorded species present and general activity of any bats seen, including where possible, behaviours and direction. Radios were used to communicate direction of bats and the surveyor farthest east had a clear view of bats returning to the woods on the west.

Constraints and Limitations

1.18 The time frame in which a survey is undertaken provides a snapshot of activity on the Site and will not necessarily detect all evidence of use by a species. Ecological surveys are limited by a variety of factors which affect the presence of flora and fauna such as season, migration patterns, and species behaviour. Evidence of species is not always discovered during the survey. This does not mean that a species is absent and as such, the surveys record and assess the suitability of habitats to support protected species. Habitats and species assemblages are dynamic and change over time in response to a range of variables. Data presented in this report should not be considered a long-term interpretation of ecological data and should not be relied upon as such.

1.19 With regards to bats and analysis, output from sound analysis of bat echolocations via Anabats represents single bat passes. It therefore cannot be determined if it is one bat foraging in the vicinity of the detector or whether it is multiple bats. The data from the outputs are of benefit for species level identification and offer insight into general activity levels.

1.20 It is not always possible to distinguish some bat calls to species level. Bats may change how they echolocate depending upon a number of factors including the habitat type in which they are flying. This may mean that they alter the frequency of their calls or repetition rates of pulses, which can result in recorded calls being difficult to distinguish between similar species; this is a widely accepted limitation of bat surveys.

1.21 Only two surveys (one dusk and one dawn) were undertaken at the substation's buildings. While two surveys are considered sufficient for the purposes of the EIAR, species licencing requirements dictate that three surveys should be completed within one survey season, within 18 months of construction. It is likely that further survey effort will be required before works commence, however the current data collection methods are considered appropriate at this stage.

1.22 Recording equipment failure is another constraint to the survey results. The two Static detectors deployed to provide a better understanding of bats using the area failed to record during deployment. To ensure no loss of relevant data, the additional bat activity tree survey was conducted at peak season when, due to the species ecology, activity would be most obvious.

Desk Study Results

1.23 There were no existing species records within the Site boundary; however one record of a pipistrelle bat had been recorded in 2004 within 2km of the Site.

Field Survey Results

1.24 When considering to the following data, reference should be made to photographs provided in **Appendix 2**.

Primary survey: Bat Roost Potential (BRP) Survey

1.25 The initial BRP surveys (refer to **Figure 1**) revealed that buildings and several trees had the potential to support a small number of bats. **Tables 2** and **3**, below, shows the results of the survey.

Table 2: Bat Roost Potential - Buildings

Building ID	Feature and comments	Secondary survey required (Yes/No)
1	Two possible access points recorded. Bat droppings were noted on the door below a cavity behind the external light fixture on the far east of the north face. A similar cavity was noted above the door further west of the north face.	Yes, these features would require ladders and the use of an endoscope to fully inspect. Alternatively activity surveys would be required.
2	Two possible access points recorded. Two openings on the western face of the building with pipes leading in. These openings are approximately 20 cm and could not be viewed from the ground level due to access restrictions.	Yes, these features would require ladders and the use of an endoscope to fully inspect. Alternatively activity surveys would be required.

Table 3: Bat Roost Potential - Trees

Tree ID	Tree Species	Feature and comments (Primary survey)	Secondary survey required (Yes/No)
A	Oak	Broken limb – Low BRP	No
B	Oak	Broken limb – Low BRP	No
C	Oak	Split limb with deep crevice – Moderate BRP	Yes, this tree could be climbed
D	Oak	Knot hole, split branch – Low BRP	No
E	Oak	Three broken branches – Moderate BRP	Yes, this tree could be climbed
F	Oak	New growth from limb wounds – Low BRP	No
G	Alder	Loose bark, decay - Moderate BRP	Yes (unsuitable for climbing), activity survey required
H	Lime	Feature within the fenced off area –Low BRP	No
I	Alder	Crevices, cracks, splits in limbs – Moderate potential	Yes, this tree could be climbed
J	Oak	Decay, broken limb, cracks and crevices – Moderate potential	Yes, this tree could be climbed
K	Oak	Small crevice in main trunk 1 m from base – low potential	No
L	Ash	Limited damage in the form of broken limbs – low potential	No
M	Ash	Limited damage in the form of broken limbs – low potential	No
N	Ash	Limited damage in the form of broken limbs – low potential	No

Secondary survey: Bat Activity Survey- Buildings

1.26 The BRP survey identified two buildings within the Site with the potential to support a small number of bats. Two activity surveys were completed on the substation buildings labelled 1 and 2, shown in **Figure 1.**

1.27 From the activity surveys, building 2 was identified as having a bat roost. One Soprano pipistrelle, *Pipistrellus pygmaeus*, was recorded using a vent on the east-facing aspect of the building as an access point to an interal roost. The location of the roost is shown in **Figure 1**, **Appendix 1**.

1.28 Pipistrelle species were recorded most frequently on both surveys, with other species record in the area being: *Nyctalus* spp. and *Myotis* spp.

Secondary Survey: Bat tree aerial inspection

1.29 The five trees initially identified by the BRP survey were inspected and, based on the climbing inspection, three of these were reclassified as having low potential for bats.

1.30 Two trees, labelled 'E' and 'J' (refer to **Figure 1** and **Table 3**) had features favourable for roosting bats. Tree 'E' had potential to support a small number of bats for breeding or possible hibernation purposes. Tree 'J' similarly had high potential to support a maternity roost.

1.31 At the time of inspection, no bats were found using the trees surveyed; there was no evidence to suggest recent use by bats. Full details on the inspected trees are found in **Table 5**, **Appendix 3.**

Secondary survey: Passive Bat Surveys

1.32 Whilst static detectors were deployed for the recommend period of time, due to technical malfunctions only one night of data was recorded from one device. **Table 4** below shows the results from 21/08/2018. The most common bat recorded was from Pipistrelle species. There were very few passes recorded from other species. Five passes recorded from *Myotis* bat species, one pass of a Brown long-eared bat, and one pass of a *Nyctalus* spp.(likely Leisler).

Table 4: Results from Static bat detector

Species	Bat passes
Common Pipistrelle -*Pipistrellus pipistrellus*	39
Soprano Pipistrelle -*Pipistrellus pygmaeus*	247
Pipistelle spp.	100
Myotis spp.	5
Brown long-eared *Plecotus auritus*	1
Nyctalus spp.	1
Total Bat Passes	393

Secondary survey: Bat Activity Survey- Trees

1.33 Four surveyors surveyed the wooded area to the west of the Site on the dawn of 02/07/19. The survey primarily aimed to record activity in and around those trees damaged by storms in winter 2017/18 and which had not previously been subject to bat survey effort.

1.34 Bats, primarily Pipistrelle species, were recorded foraging and commuting within and through the woods, but no roosts were identified.

1.35 Bats were commonly seen foraging around the tree canopy and then flying away. Activity levels peaked around on hour before sunset but generally, activity was low with only a few bats recorded at any one time; more commonly seen was a single bat commuting/foraging.

Interpretation

Value of the Site to bats

1.36 The Site is of some value to a limited number of common and widespread species.

1.37 The Soprano pipistrelle roost recorded in building labelled '2' in **Figure 1** does not pose as a significant constraint for the proposed development. With the common pipistrelle being the most common and widely distributed species of bat found in Britain[3]. Given the low number of bats recorded in the roost, it is thought to be of low conservation value to the species.

1.38 It should be noted that for licence purposes, SNH will likely require three surveys representative of the season falling immediately prior to disturbance/destruction of said roost. SNH will require data to be no older than 18 months. As such, it is likely that if the proposed development is approved, SNH will require further survey work to make a confident decision on appropriate levels of mitigation and compensation for the loss of the roost.

1.39 With regards to trees on Site, no roosts were confirmed. The current plans propose the removal of trees 'M', 'N', and 'J' only. Assuming removal of the trees with bat roost potential falls within the active season (April–September); pre-works checks should be undertaken in the form of activity surveys or a detailed tree inspection immediately prior to the removal of the feature. Should trees be removed outwith the active season, a climb and inspect survey on the tree (labelled J- see **Figure 1**) should be completed, recognising the potential for hibernating bats.

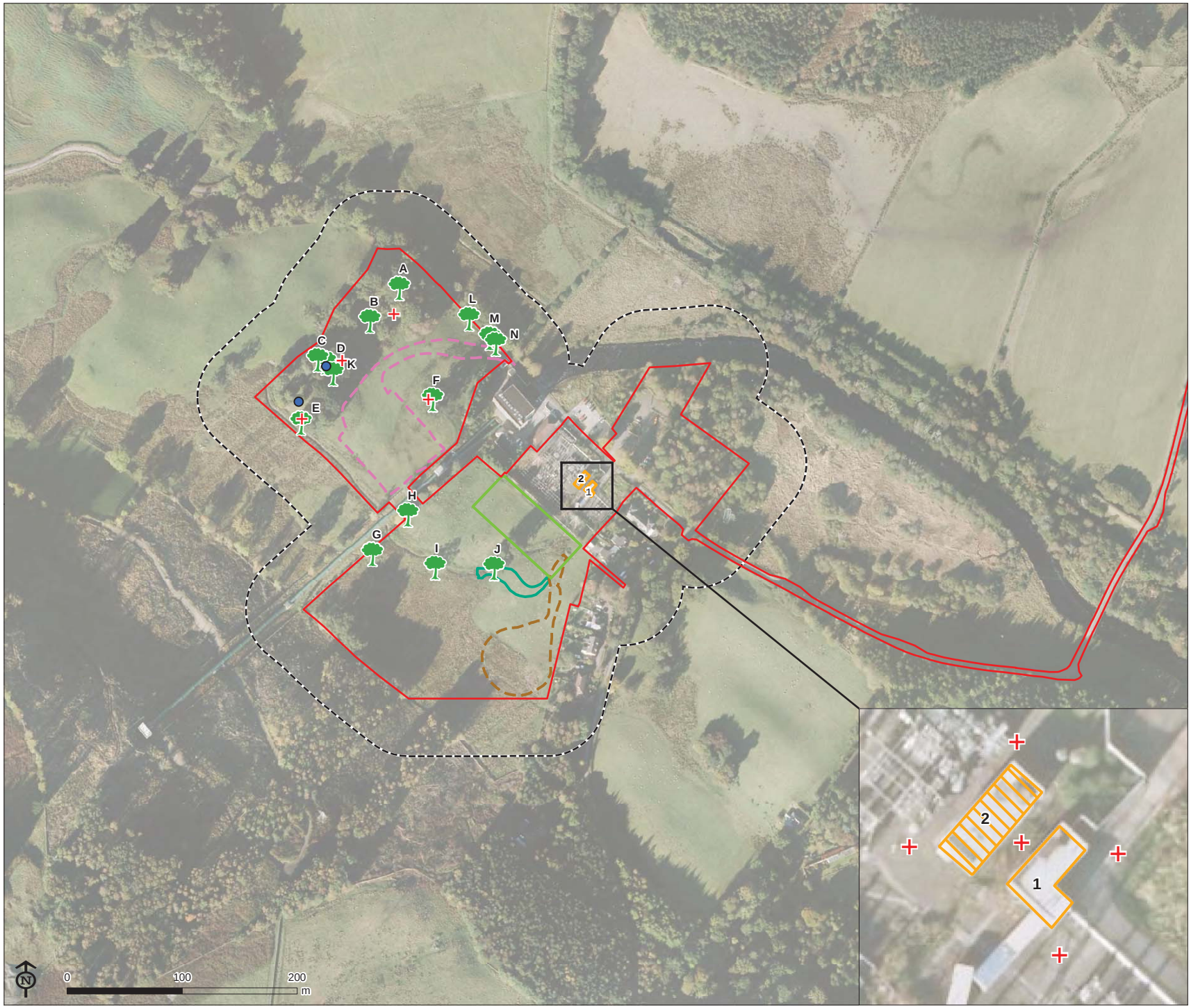
1.40 While the Static detectors failed to record the recommended[2] five nights worth of data, as stated above, the proposed development will not directly affect the woodland block to the west of the development. As it stands, it is likely that the trees within the woodland block to the west of the Site will remain. At the time of the surveys no bats were found roosting in the trees surveyed and the majority of the trees were deemed of low value to support roosting bats.

1.41 The construction of the extension and associated access track /compounds will result in the loss of potential roosting sites within the tree 'J'. There may be temporary disturbance to a limited number of tree roosting bats during construction of the temporary compound and access for main works.

1.42 With appropriate pre-works checks and mitigation, it is expected there will be no adverse effects on protected bat species.

[3] Mayer, F. & O. von Helversen (2001): Sympatric distribution of two cryptic bat species across Europe. *Biol. J. Linn. Soc. 74:365-374.*

Appendix 1
Figures



Glenlee Substation Extension EIA Report Technical Appendix 8.2

Figure 1: Bat Survey Results

- Planning application boundary
- Substation extension
- Temporary compound and access for main works
- Temporary construction vehicle holding area
- Drainage ditch diversion

Bat survey results

- Glenlee 50m protected species study area
- Bat surveyor positions
- Anabat location
- Potential bat roost structure
- Confirmed bat roost structure

LUC

SP ENERGY NETWORKS

CB:JN EB:robertson_s LUCGLA FIG01-00_6118-001_Glenlee_BatSurveyResults 27/08/2019

Appendix 2
Site Photography

Photograph 1: 'Building 2' with Bat Roost Potential below metal and wooden barge structures

Photograph 2: A tree with bat roost potential in the south west of the Site

Photograph 3: A further damaged tree, in the centre of the Site, with Bat Roost Potential

Photograph 4: A view of the west of the Site, showing groups of trees with BRP

Appendix 3
Inspection Survey Results

Tree ID	Tree Species	Feature and comments (Primary survey)	Secondary survey required (Yes/No)	Notes on inspection (Secondary Survey)	Roost present at time of inspection (Yes/No)	Roost potential status (as defined by Error! Reference source not found.)
A	Oak	Broken limb – Low BRP	No	N/A	N/A	N/A
B	Oak	Broken limb – Low BRP	No	N/A	N/A	N/A
C	Oak	Split limb with deep crevice – Moderate BRP	Yes, this tree could be climbed	Checked with ladder, endoscope, and downgrade potential to negligible.	No	Negligible
D	Oak	Knot hole, split branch – Low BRP	No	N/A	N/A	N/A
E	Oak	Three broken branches – Moderate BRP	Yes, this tree could be climbed	3 features: i)Top Branch has negligible potential, ii) Middle branch: very good potential for breeding & possible hibernation. Deep crevice leading to cavity that extends to heartwood, not all visible with scope. Cavity dry, open, secure with worn sides indicating use by something. Feathers also noted near the base of the cavity. iii) Lower/bottom branch: Good potential for summer roost, probably not suitable for breeding due to size. Dry and flat crevice, not a cavity.	No	3 features: i)Negligible ii)High iii)Low
F	Oak	New growth from limb wounds – Low BRP	No	N/A	N/A	N/A
G	Alder	Loose bark, decay - Moderate BRP	Yes (unsuitable for climbing), activity survey required	Tree is in poor health, a worse condition than previously noted. Tree not suitable to climb. Lots of decay and rot noted. Loose bark and wet throughout.	No	Negligible
H	Lime	Feature within the fenced off area –Low BRP	No	N/A	N/A	N/A
I	Alder	Crevices, cracks, splits in limbs – Moderate potential	Yes, this tree could be climbed	Tree inspected, features downgraded to negligible on closer examination.	No	Negligible
J	Oak	Decay, broken limb, cracks and crevices – Moderate potential	Yes, this tree could be climbed	4 features: i) Upper limb wound, broken limb has negligible potential for bats. ii) Middle branch: low potential, could support a small number of opportunistic bats. iii) West facing limb has two internal cavities on the NW limb. Upper cavity is extensive and could be used for maternity. iv) The lower of the cavities could support a small number of bats as opportunistic roosts.	No	4 features: i)Negligible ii)Low iii)High iv)Low
K	Oak	Small crevice in main trunk 1m from base – low potential	No	N/A	N/A	N/A
L	Ash	Limited damage in the form of broken limbs – low potential	No	N/A	N/A	N/A
M	Ash	Limited damage in the form of broken limbs – low potential	No	N/A	N/A	N/A
N	Ash	Limited damage in the form of broken limbs – low potential	No	N/A	N/A	N/A

Appendix 8.3
Fisheries Survey Report

A Scottish Registered Charity
No. SC 020751

Commissioned Report No. – JRAD020

KTR Glenlee Substation Fisheries Survey

For Land Use Consultants Limited

For further information on this report please contact:

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This report should be quoted as:

Galloway Fisheries Trust. March 2018. KTR Glenlee Substation Fisheries Survey.
Galloway Fisheries Trust Report No. – JRAD020

Summary

KTR Glenlee Substation Fisheries Survey

Commissioned Report No.: JRAD020
Contractor: Land Use Consultants Limited
Year of publication: March 2018

Keywords

Electrofishing; Glenlee, North American signal crayfish, electrofishing.

Background

In January 2018 LUC (on behalf of Scottish Power Energy Networks (SPEN)) asked the GFT to review proposals for the diversion of a watercourse associated with an extension to the existing Glenlee substation in terms of potential implications for fish.

An electrofishing survey was subsequently undertaken to establish if any fish species were present in the watercourse. There was also a concern that North American signal crayfish could be present. This invasive non-native species is found in much of the lower Dee catchment and their presence requires various bio-security measures to be put in place to ensure they do not spread to any other watercourses.

Main findings

- The watercourse to be diverted does support suitable instream conditions to support either fish or North American signal crayfish.
- An electrofishing survey found no fish to be present.
- A crayfish survey found no crayfish to be present.
- No specific recommendations are made for the diversion works as no sensitive species were found.

For further information on this project contact:
Name of Project Manager – J Ribbens
Telephone No. of Project Manager – 01671 403011

Table of Contents **Page**

1 INTRODUCTION

In January 2018 LUC (on behalf of Scottish Power Energy Networks (SPEN)) asked the GFT to review proposals for the diversion of a watercourse associated with an extension to the existing Glenlee substation in terms of potential implications for fish.

Following a discussion, it was agreed that an electrofishing survey would be undertaken to see if any fish species were present in the watercourse (Figure 1). If fish were found then advice would be provided regarding the legal implications and required mitigation to protect the fish prior to diverting the watercourse.

There was also a concern that North American signal crayfish could be present. This invasive non-native species is found in much of the lower Dee catchment and if present in the watercourse to be diverted then various bio-security measures would be required when undertaking any work within the watercourse to ensure they were not spread to any other watercourses. Signal crayfish are known to have become established in watercourses close to the Glenlee substation. It would be expected that if signal crayfish were found then SEPA would require specific actions in the method statement for the diversion works which would have cost implications for the project.

There is a variety of legislation, regulations and guidance in place relating to fish species that may be present in watercourses within the Kirkcudbrightshire Dee catchment. Atlantic salmon is an internationally important fish species which is listed under Annex II and V of the European Habitats Directive (1992) (only in freshwater), Appendix III of the Bern Convention (1979) (only in freshwater), and is a local priority species in the Dumfries and Galloway Local Biodiversity Action Plan. Atlantic salmon is also a species of conservation concern on a UK level. Brown trout / Sea trout is also a UK Biodiversity Action Plan species. Salmon and migratory Sea trout within the Dee Catchment are managed by the River Dee (Kirkcudbright) District Salmon Fishery Board.

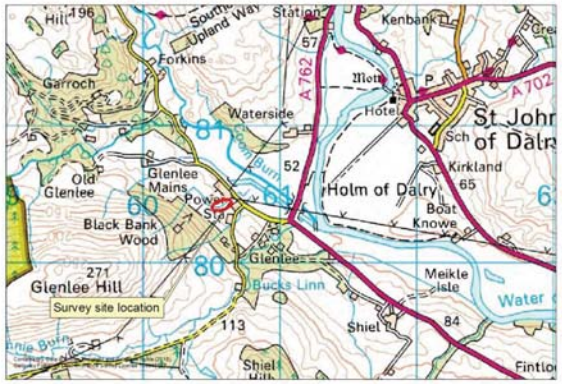

Figure 1: location of surveys

2 AIMS

The aims of this work were as follows:

1. To undertake an electrofishing survey to identify whether a fish population was present in the watercourse to be diverted.
2. Undertake a detailed bankside and habitat survey at each electrofishing site.
3. Undertake a survey to check for the presence of North American signal crayfish.
4. If required, provide advice in relation to potential mitigation measures to protect fish populations during the diversion works and to avoid the spread of North American signal crayfish.

3 METHODOLOGY

3.1 Data recording

The GFT is a partner in the Scottish Fisheries Co-ordination Centre[1] (SFCC), an initiative involving Scottish Fishery Trusts and others, including the Marine Scotland Science (Scottish Government), The Tweed Foundation, the Tay Foundation and the Cromarty Firth Fisheries Trust.

This group has, in partnership, developed a set of agreed survey and data collection methodologies for electrofishing surveys and an associated database in which to record information gathered from such surveys.

The electrofishing survey undertaken by GFT for this study have been completed to the high standards that are required by the SFCC.

3.2 Electrofishing surveys

To assess the fish population present within a watercourse various techniques have been developed in the recent decades. The main method of determining the status of a fish population is through employing the use of electrofishing equipment.

This technique of electrofishing involves the 'stunning' of fish using an electric current which enables the operator to remove the fish from the water. Once captured, the fish recover in a holding container. They are then anaesthetised using a specific fish anaesthetic, identified to species, measured and recorded, and once fully recovered, returned unharmed to the area from which they were captured.

The method of fishing involves the anode operator drawing stunned fish downstream to a banner net held against the current by an assistant. Captured fish are then transferred to a water-filled recovery container. The fishing team works its way across the survey section and upstream, thereby fishing thoroughly all the water in the chosen survey area.

For this study, electrofishing was undertaken by two SFCC accredited GFT staff.

It is the policy of GFT to disinfect all relevant equipment both prior to and following work in each river catchment to ensure that there is no transfer of disease organisms.

3.2.1 Electrofishing equipment

The apparatus which was employed during the electrofishing survey was a mobile, battery powered E-Fish backpack electrofishing kit. Smooth direct current was used.

3.3 Crayfish surveys

The GFT has undertaken various signal crayfish surveys previously for SNH.

[1] http://www.sfcc.co.uk/

The standard signal crayfish assessment methodology requires the use of a range of field techniques including:

- Hand searches under large substrates;
- Electrofishing in suitable habitats using the same methodology as for fish surveys;
- Kick sampling for three minutes in shallow riffle areas to target young juvenile crayfish

If watercourses have adequate water depth then baited crayfish traps can also be set and monitored to check for larger crayfish.

4 RESULTS

Prior to undertaking either of the surveys it was noted that the watercourse entered a screened narrow sloping culvert pipe prior to entering the existing sub-station at Grid reference NX60657 80437 (Figure 2). This pipe and screen would be expected to stop the natural upstream migration of signal crayfish or fish. Any fish or crayfish present upstream would have to have originated from introductions or individuals present prior to the construction of the sub-station.

The location of the sampling surveys are detailed in **Figure 1**.

Figure 2: Pipe and screening present where watercourse enters the sub-station

4.1 Electrofishing survey

The electrofishing survey was undertaken on the 6th March 2018. The survey started immediately upstream of the screening (Figure 2) at Grid reference NX60657 80437.

Instream habitats in this site were considered to be of good standard. Wet width within the site ranged from 30 to 100 cm. A length of 65 m was surveyed. Instream substrates were dominated by cobbles and a pebble and gravel mix. Flows were characterised by predominantly run with reasonable areas of riffle. Combined the instream characteristics present offered good quality fish habitats. It was noted that a varied and rich aquatic invertebrate population was present which would provide an adequate food supply if fish were present. The majority of water was under 10 cm deep. Even though the surrounding ground was grazed by sheep, good levels of bankside cover was available for fish. There was no tree canopy cover shading the site.

Although suitable habitats were present, no fish were caught from the site.

Figure 3: Electrofishing site

4.2 Crayfish survey

The electrofishing site offered suitable habitat to support signal crayfish.

The electrofishing survey for fish used a banner net held in the water during the electrofishing which would have caught crayfish if stunned by the electrofishing survey. No crayfish were caught.

A detailed hand search was undertaken of the electrofishing site prior to the electrofishing survey taking place. No crayfish were seen or caught.

Kick sampling was undertaken at five suitable locations within the electrofishing site and further upstream. These samples were checked for the presence of crayfish. No crayfish were caught.

Following these surveys the GFT is confident that no crayfish are present within the watercourse upstream of the sub-station.

5 CONCLUSIONS OF SURVEY

The surveys undertaken found no fish or signal crayfish to be present in the watercourse upstream of the sub-station. Thus no specific recommendations or mitigation is required for protecting fish or avoiding the movement of crayfish in the section of watercourse proposed to be diverted.

Fish are known to be present further downstream of the sub-station therefore it is important that these are considered during the planning of the instream works. The proposed work could raise levels of suspended silt within the water column further downstream.

The effect of this increased silt on fisheries can be extremely damaging. Direct effects on fish include, in the worst cases, respiration problems due to clogged gill rakers / gill filaments. The settlement of fine sediments on spawning gravels can reduce water flow and thus oxygen transfer to egg and alevin life stages of salmonids whilst they are buried in 'redds' (typically September – March). Spawning beds can be damaged by siltation at any time of year as gravels may become 'cemented' by the settling fine particles, causing problems when fish try to spawn the following autumn.

The most sensitive time of year for salmonids is between September and May. Spawning of trout may start as early as late September, with salmon starting roughly a month later but they may go on until early January. The eggs will develop in constructed 'redds' until they hatch as alevins. The alevins will remain hidden in the gravel, gaining nourishment from their yolk sac, until they swim up into the overhead water column between February and May, depending on water temperatures.

Adequate silt control measures will be required when works take place to protect sensitive fish populations further downstream. Management of dirty water leaving access routes and work site must be considered carefully to ensure it cannot impact on sensitive areas further downstream.

Appendix 12.1

Schedule of Proposed Mitigation and Monitoring Measures