Appendix 8.1 – Terrestrial (non-avian) Ecology



Cruachan 2

Technical Appendix 8.1: Non-Avian Ecology

Produced for Drax Generation Enterprise Ltd By Applied Ecology Ltd

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1 Introduction

Background

- 1.1 The Cruachan Power Station is a pumped storage hydro-electric facility located to the west of the settlement of Dalmally on the northern shore of Loch Awe, in Argyll and Bute. Feasibility studies for an extension to the generating capacity of the power station began in 2016, when the Site was in ScottishPower ownership, and as part of those feasibility studies, a number of specialist investigations were commissioned, including a range of ecological and ornithological surveys.
- 1.2 In 2019, ownership of the power station transferred to Drax, and the potential for increasing the generation capacity of Cruachan was revisited. In February 2021, Applied Ecology Ltd (AEL) was commissioned to review the pre-existing ecological and ornithological information for the proposals to determine its spatial and temporal coverage in the context more detailed feasibility work for a second generating facility ("the Proposed Development") at the Site (see Figure 1.1)¹. With regards to non-avian ecology, the review of the 2016-2018 surveys undertaken by Arcus Ltd found that all pre-existing data for the Site was likely to be robust and accurate, although their coverage was not potentially wholly aligned with the Site being promoted for the Proposed Development in 2022.
- 1.3 Following that data review, AEL was therefore commissioned to provide full ecological and ornithological support for a S36 planning application and accompanying Environmental Impact Assessment Report (EIAR) for the Proposed Development, to be known as Cruachan 2. AEL consulted NatureScot² regarding the survey suite required in 2021-2022, in order to ensure that robust and in-date data were available to inform a full Ecological Impact Assessment (EcIA) within the Ecology chapter of the EIAR. Full details of this consultation can be found in Chapter 8 (Ecology) of the EIAR, but in summary the following approach was adopted:
 - conversion of existing habitat survey data to Scottish EUNIS for use in EcIA;
 - completion of habitat survey gaps for the final Site boundary plus a 250 m buffer, to Scottish EUNIS (level 3) and NVC;
 - scoping out of species for which pre-existing surveys determined were likely to be absent and for which no further work would be needed in the context of the Proposed Development, namely wildcat, freshwater pearl mussel, and specially protected amphibians such as great crested newt;
 - identification of species for which pre-existing surveys or appraisals determined that they should be considered in the EcIA, but which were likely to be present at a density below that for which survey would be useful, namely reptiles;

² Scottish Natural Heritage (SNH) became known as NatureScot in August 2020. Where correspondence or guidance was provided prior to their name change, the organisation is referred to as SNH. All correspondence and guidance produced post-August 2020 is referenced as being from NatureScot.



¹ AEL (2021). Desk Study and Evaluation of Pre-Existing data. Unpublished contract report for Stantec. March 2021.

- completion of update surveys for species knownn to be present and active within the study area, namely otter, pine marten, badger and red squirrel;
- surveys for freshwater macroinvertebrates, macrophytes and fisheries.
- 1.4 It was expected that these new, additional ecological data, when combined with the preexisting data, would be sufficient to determine the likely non-avian ecological constraints associated with the Proposed Development.

Purpose of this report

- 1.5 This report provides details of non-avian ecology surveys undertaken on the Site between August and September 2022, including the methods used to collect primary and secondary data relating to ecological features on or near to the Site, a description of the survey results and an evaluation of the implications of these findings for the Development. It does not, however, cover non-confidential aspects of ornithological features relevant to the Proposed Development or freshwater ecological features, and these can be found in Technical Appendices 8.2³ and 8.3⁴ respectively. Confidential ornithological and badger information can be found in Confidential Technical Appendix 8.4⁵.
- 1.6 Collectively, these data will be used in the EcIA presented in Chapter 8 (Ecology) of the Environmental Impact Assessment Report (EIAR) for the proposed Development.

Report qualification

- 1.7 The surveys described here were undertaken in accordance with the best practice methodologies current at the time of commissioning. Site circumstances, scientific knowledge or methodological requirements can change during the course of a project, and these external factors may impact on the scope of subsequent work requirements.
- 1.8 All survey work and reporting was undertaken by experienced and qualified ecologists in accordance with the Code of Professional Conduct of the Chartered Institute of Ecology and Environmental Management (CIEEM) and BS 42020:2013 (Biodiversity). The work was undertaken during the Covid-19 pandemic, following all Scottish Government rules regarding social distancing and other protection measures to be taken by businesses operating at that time.
- 1.9 All ecological surveys have an expected validity period, owing to the tendency of the natural environment to change over time. This validity period varies from feature to feature, and is also dependent on the degree of change in a site's management and overall landscape ecology. Where the potential for change is considered to be relevant to the Site, this is highlighted in the appropriate section.

⁵ **AEL (2022a)** Cruachan 2 – Confidential Technical Appendix 8.4. Confidential unpublished contract report produced for Drax Generation Enterprise Ltd, April 2022.



³ **AEL (2022a)** *Cruachan 2 – Technical Appendix 8.2: Ornithology*. Unpublished contract report produced for Drax Generation Enterprise Ltd, April 2022.

⁴ Gavia Environmental Ltd (2022) Cruachan 2 – Technical Appendix 8.3: Freshwater Ecology. Unpublished contract report produced for Drax Generation Enterprise Ltd, April 2022.

1.10 This report does not purport to provide detailed, specialist legal advice. Where legislation is referenced, the reader should consult the original legal text, and/or the advice of a qualified environmental lawyer.







Status: Final

2 Designated Sites

Methodology

- 2.1 Details of nearby statutory sites designated for nature conservation were obtained from the NatureScot Natural Spaces website⁶ and plotted in a Geographical Information System (GIS). Sites listed on the NatureScot Ancient Woodland Inventory (AWI) were also obtained from this source and plotted in GIS.
- 2.2 The location and extent of Argyll and Bute Council's (A&BC) non-statutory sites for nature conservation, known as Local Nature Conservation Sites (LNCSs), were searched for in the A&BC Local Development Plan (LDP)⁷, and were subsequently plotted in GIS if they fell within 2 km of the Site.

Results

2.3 A map showing the location of statutory and non-statutory sites in the vicinity of the Site is provided in **Figure 2.1**.

Statutory designations

- 2.4 Two internationally designated sites fall within the Site boundary. These are the **Glen Etive** and **Glen Fyne Special Protection Area (SPA)** and part of the **Loch Etive Woods Special Area of Conservation (SAC)**. Details relating to the SPA are included within Technical Appendix 8.2. The SAC has been designated for three main woodland habitat types, namely alder woodland on floodplains, western acidic oak woodland and mixed woodland on base-rich soils associated with rocky slopes, as well as the presence of otter. The notifiable feature within the Site is predominantly the acidic oak woodland.
- 2.5 With respect to nationally designated sites, the **Coille Leitire Site of Special Scientific** Interest (SSSI) is concurrent with the Loch Etive Woods SAC (see above), designated for upland oak woodland. Pearl-bordered fritillary butterfly is also mentioned in the citation, although this is not considered to be one of the notified features.

Non-statutory designations

- 2.6 No LNCSs fall within the Site boundary, but there is one such site within 2 km of the Site. This covers Eilean Beith and Fraoch Eilean, both being islands within Loch Awe, 800 m south from the Site boundary at their closest point.
- 2.7 Ancient woodland, predominantly of semi-natural origin, flanks much of the shore of Loch Awe and the lower slopes of the surrounding hills, including those within the Site. Much of this comprises the Coille Leitire SSSI and the Loch Etive Woods SAC.

⁷ <u>https://www.argyll-bute.gov.uk/online-local-development-plan</u> accessed March 2021.



⁶ <u>https://sitelink.nature.scot/home</u>. Accessed November 2021.

Discussion

Statutory designations

- 2.8 The Loch Etive Woods SAC is considered to be an Important Ecological Feature (IEF) of **International** importance, and the Coille Leitire SSSI is considered to be an IEF of **National** importance.
- 2.9 Given the close proximity of these designated sites, it is possible that the Proposed Development will affect their notified interest features. These will therefore be considered in full in Chapter 8 (Ecology) of the EIAR, including the information needed for a Habitat Regulations Assessment (HRA) for the SAC.

Non-statutory designations

- 2.10 The woodland within the Site listed on the AWI is ancient woodland of mostly semi-natural origin. These areas will have been wooded since at least 1750, and likely longer than this. This does not necessarily mean that trees within these areas are ancient or veteran specimens *per se*, but that there has been a continuity of woodland cover since the date thresholds set for the inventory. As a result of this longevity, ancient woodland sites are associated with unique and complex communities of plants, fungi, soil biota, and insects and other animal species, and are hence priorities for conservation. Generally, AWI sites are usually considered to be IEFs of at least Council level importance.
- 2.11 Ancient Woodland is covered in the emerging A&BC Local Development Plan 2 (LDP2) under Policy 77 Forestry, Woodland and Trees. This policy states that:

"Development likely to have an impact on ancient semi-natural woodland, native or longestablished woods, hedgerows and individual trees with high nature conservation or landscape value either on or adjoining a development site will only be permitted where it can be adequately demonstrated that either:

- *i)* The proposed development will not compromise the conservation objectives nor adversely impact on the integrity of the woodland, trees or hedgerows; or
- *ii)* There is a proven public interest and benefit where social, economic, environmental or safety considerations of regional importance outweigh the ecological interest of the site and the need for the development cannot be met in other less ecologically damaging locations or by reasonable alternative means."
- 2.12 Ancient Woodland will therefore be included in the EcIA as an IEF of **Council** level importance.







Cruachan 2

Designated Sites



Other (on Roy map)

SSSI, SAC, SPA and AWI data Copyright NatureScot. Contains Ordnance Survey data © Crown copyright and database right (2022).

Ancient Woodland data may exclude some woodlands present on 1st Edition OS maps.

Figure 2.1

Map Scale @ A3: 1:35,000





3 Habitats and Flora

Methodology

Pre-existing data

- 3.1 The following habitat and flora survey reports were available for review, based on various study area boundaries:
 - ScottishPower Generation Ltd (2016) Cruachan Power Station / Extended Phase 1 Habitat and National Vegetation Classification (NVC) Survey Report / Arcus consultancy Services Ltd. Unpublished contract report, dated 11 November 2016.
 - ScottishPower Generation Ltd (2017) Cruachan Power Station Bryophyte Survey Report. Unpublished contract report, dated November 2017.
 - Arcus (2021) Cruachan Power Station Extended Phase One Habitat Survey Report 2020. Unpublished contract report produced for Drax Generation Enterprise Ltd, dated February 2021.
- 3.2 These habitat surveys, undertaken prior to AEL's commission, were considered to be robust in terms of the methodologies applied, and their seasonal timings. There have been no notable changes to the management practices covering the land within the relevant study areas since they were undertaken, and it was therefore considered unlikely that there would have been significant changes in the coverage and composition of the habitats in the intervening time period(s). However, there were spatial gaps in terms of the coverage of these pre-existing surveys and the Site boundary. In addition, it is now generally accepted that the Phase 1 Habitat Survey technique is no longer fit for purpose for EcIA (see below), and to that end it was recommended that habitats within the required habitat study area buffers were reclassified using Scottish EUNIS.
- 3.3 NatureScot was consulted and it was subsequently agreed that the following would be required:
 - conversion of existing habitat survey data to Scottish EUNIS for use in EcIA;
 - completion of habitat survey gaps for the final Site boundary plus 250 m buffer, to Scottish EUNIS (level 3) and NVC.

Scottish EUNIS habitat survey

3.4 NatureScot has now adopted EUNIS, the European Nature Information System, as the standard habitat classification scheme for terrestrial habitat data and mapping in Scotland[®]. As a result, the old JNCC Phase 1 Habitat Survey (JNCC, 2010[®]) is being phased out, to be replaced by the new Scottish EUNIS system. Pre-existing survey data were converted to Scottish EUNIS, and in August 2021, additional habitat surveys were undertaken using Scottish EUNIS, during which the pre-existing data were checked in the field and all gaps

⁹ **JNCC (2010)** Handbook for Phase 1 Habitat Survey – A technique for Environmental Audit. JNCC, Peterborough.



^{*} Strachan, I.M. (2017) Manual of terrestrial EUNIS habitats in Scotland. Version 2. Scottish Natural Heritage Commissioned Report No. 766.

were classified and mapped according to the standard EUNIS categories. Target notes were used to describe areas of both typical and unique botanical character. Habitat patches were mapped as polygon features, and if sufficient space on the map linear features (such as walls and fences) as lines where this provided added value. Plant species abundance was noted using the DAFOR¹⁰ system, and given the size of the study area and nature of the topography the minimum mappable unit (MMU) was 50 x 50 m except where features marked on the base map allowed mapping to be more precise.

- 3.5 The habitat map was subsequently digitised using GIS.
- 3.6 The standard habitat survey approach was "extended" to include a search for invasive nonnative species (INNS).

National Vegetation Classification

- 3.7 Pre-existing NVC data were available for the majority of the Site. However, gaps in the coverage of this were filled during survey in August 2021. The pre-existing data were checked in the field, any gaps were classified and mapped. The methodology adopted followed that outlined in Rodwell 2006¹¹, by which all habitats present within the Site were classified and mapped according to standard categories. NVC communities were allocated to stands based either on professional experience and judgement, or following consultation of the standard British Plant Communities texts (volumes 1¹², 2¹³, 3¹⁴ and 4¹⁵).
- 3.8 The NVC map was subsequently digitised using GIS.

Nomenclature

- 3.9 Higher plant vernacular and scientific names are given on the first usage of the species name, with the scientific name given in italics based on those given in Stace (2010)¹⁶. Moss nomenclature follows that given by Smith (2004)¹⁷, and for liverworts that given by Paton (1999)¹⁸, using only the scientific names as common names for mosses and liverworts are not yet well-established. Nomenclature for lichens follows that given by Smith *et al.* (2009)¹⁹.
- 3.10 The exception to this nomenclature is the usage of the NVC, where the community names given by Rodwell based on Flora Europaea (Tutin *et al.*, 1964)²⁰ have been adopted.

²⁰ **Tutin, T.G., Heywood, V.H., Burges, N.A., Valentine, D.H., Walters, S.M. & Webb, D.A. (1964)** *Volume 1. Lycopodiaceae to Platanaceae. Flora Europaea*. Cambridge University Press, Cambridge.



¹⁰ DAFOR: whereby species occurrence may be classified as being **d**ominant, **a**bundant, **f**requent, **o**ccasional or **r**are. Rare in the context of a DAFOR score should not be confused with species rarity in the more widely accepted meaning of general scarcity.

¹¹ Rodwell, J.S. (2006) National Vegetation Classification: User's handbook. JNCC, Peterborough.

¹² Rodwell, J.S. (ed.) (1991) British Plant Communities, Vol. 1: Woodland and Scrub. Cambridge University Press, Cambridge.

¹³ Rodwell, J.S. (ed.) (1991) British Plant Communities, Vol. 2: Mires and heaths. Cambridge University Press, Cambridge.

¹⁴ Rodwell, J.S. (ed.) (1992) British Plant Communities, Vol. 3: Grasslands and montane communities. Cambridge University Press, Cambridge.

¹⁵ Rodwell, J.S. (ed.) (1995) British Plant Communities, Vol. 4: Aquatic Communities, Swamps and Tall-herb Fens. Cambridge University Press, Cambridge.

¹⁶ Stace, C.A. (2010) New Flora of the British Isles. 3rd edition. Cambridge University Press, Cambridge.

¹⁷ Smith, A.J.E. (2004) The Moss Flora of Britain and Ireland. 2nd edition. Cambridge University Press, Cambridge.

¹⁸ Paton, J.A. (1999) The Liverwort Flora of the British Isles. Harley Books, Colchester.

¹⁹ Smith, C.W., Aptroot, A., Coppins, B.J., Fletcher, A., Gilbert, O.L., James, P.W. & Wolseley, P.A. (eds) (2009) *The Lichens of Great Britain and Ireland. British Lichen Society*, London.

Survey limitations

- 3.11 A number of habitat survey limitations were encountered, associated with access, scale of survey required and terrain/vegetation heights during the survey.
- 3.12 The steep rocky terrain and bracken height within woodland slopes along the Loch Etive SAC meant that safe access was not possible within extensive areas of this part of the Site. Similarly, steep slopes south of the upper sections of the existing access track were covered in dense bracken and enclosed by deer fence, with no access granted to this area of the Site on health and safety grounds. Nevertheless, all inaccessible areas within the Site boundary could be observed at least from a distance, and in sufficient proximity for a likely NVC community to be allocated.
- 3.13 The scale of the area needing detailed habitat survey also meant that remote mapping was undertaken in open ground via suitable vantage points at some locations. This was mainly relating to bracken cover or grazed grasslands on steep slopes that were identifiable from a distance. All areas of potential groundwater dependent terrestrial ecosystems (GWDTEs) were however checked in the field where accessible at the time of the survey.
- 3.14 The survey was conducted towards the end of the core botanical flowering period. This meant that some flowering species, in particular vernal woodland ground flora species, would not have been conspicuous. Nevertheless, all key species needed for diagnosis of NVC community were present, and were sufficient for an experienced botanists to map and classify the vegetation communities.
- 3.15 It should however be recognised that the NVC is a classification scheme and not a survey technique *per se*. The allocation of predefined community types to stands of vegetation types can be subjective, as the enormous variation present in the UK vegetation cannot be reliably described by the limited number of samples used to derive the NVC system. Due to this variation, its value as a tool for establishing spatial habitat change over time is also limited. However, it can be used as an indication of the type and extent of vegetation communities within a site, as a springboard for discussions regarding a site's relative conservation value, and for the identification of habitats of conservation interest where such schemes have been based on the NVC, for example GWDTEs.

Results

Pre-existing data

- 3.16 The pre-existing habitat survey data covered approximately 60.4 % of the Upper and Lower Works parts of the Site boundary, and the access track, but none of the location of the proposed Lower Site Compound.
- 3.17 The habitat mosaic recorded within the Upper Works Area of the Site primarily comprised a mosaic of semi-improved acid grassland amongst wet and dry dwarf shrub heaths, modified bog and areas of marshy grassland, with a large proportion of the Site being the oligotrophic standing water of Cruachan Reservoir. Continuous bracken also occurred throughout the study area. Small areas of a number of other habitat types were recorded, such as the intertidal zone of exposed rock created by the diurnal fluctuations in the levels of Cruachan Reservoir, scrub and broad-leaved woodland, spoil, buildings, cultivated ground and amenity grasslands.



Scottish EUNIS habitat survey and NVC survey

- 3.18 The Scottish EUNIS habitat map is shown in **Figure 3.1** for the Upper and Lower Works Area and the access track, and **Figure 3.2** for the Lower Site Compound. Summary maps of the distribution of GWDTEs with their relevant NVC community can be found in **Figures 3.3** and **3.4**, and the equivalent maps for Annex 1 habitat types in **Figures 3.5** and **3.6**. A summary of the habitats recorded within the Site is provided in **Table 3.1** below, and target notes can be found in **Appendix B.** A selection of habitat survey photographs can be found in **Figure 3.7**.
- 3.19 The habitat descriptions provided below are for all habitats occurring within the Site. However, **Figures 3.1-3.6** also show habitats recorded within 250 m of the main works area and construction village, and 100 m of the existing access track, as required for the assessment of GWDTEs. In May 2022, changes were made to the red line planning boundary to incorporate fully all at-depth construction elements. These changes meant that at the surface, habitat survey information was not available for all ground within 100 m of the revised planning boundary and therefore **Figures 3.1-3.6** appear to show survey area gaps. However, the data did cover the required GWDTE buffers for all at- or near-surface construction elements, and therefore for the purposes of assessment in the EIAR the data set was complete.

Upper and Lower Works Areas and Access Track

Aquatic habitats

3.20 The main aquatic habitat within the main Site was **standing water**, as applied to Cruachan Reservoir at the top of the hill, and Loch Awe at the bottom of the hill, collectively comprising just over 17 % of the Site. The shores of both waterbodies were virtually devoid of aquatic macrophytes; at Cruachan Reservoir because of the constant draw-down and reflood (resulting in 2.1 % of the Site being classified as **periodically inundated shores**) and at Loch Awe because of the artificial nature of the loch edge in front of the existing power station, shelving steeply into deep water. Mappable extents of watercourse were classified as **running water**, such as the Allt Cruachan flowing between the two main waterbodies.

Bogs and flushes

- 3.21 Less than 0.5 % of the main Site was classifiable as a type of blanket bog. This did however include a small extent of **low altitude blanket bog**, primarily above the Allt Cruachan, south of Cruachan Reservoir, and referenceable to M17a *Scirpus cespitosus Eriophorum vaginatum* blanket mire, the *Drosera rotundifolia Sphagnum* spp. sub-community. Although these areas did support carpets of *Sphagnum* mosses, including *S. palustre, S. capillifolium, S. papillosum, S. denticulatum, S. fallax, S. subnitens* and *S. pulchrum*, hare's-tail cottongrass *Eriophorum vaginatum* was conspicuously absent, presumably having been grazed out by sheep. The dominant graminoids were instead deergrass *Trichophorum cespitosum* and purple moor-grass *Molinia caerulea*.
- 3.22 Within these blanket bog areas, there were occasional **bog pools**, predominantly referenceable to the M1 *S. auriculatum* bog pool community. These M1 bog pools were also found in some areas of wet heath (see below), particularly to the north of Cruachan Reservoir. In these pools, *S. cuspidatum* and *S. fallax* were also found, along with frequent



bog asphodel *Narthecium ossifragum*. The margins of the pools also frequently supported common sedge *Carex nigra* and round-leaved sundew *Drosera rotundifolia*.

- 3.23 A number of types of upland **flush** were recorded throughout the Upper Works part of the Site, in particular down the slopes leading into Cruachan Reservoir, and down to the existing access track. These were often narrow (< 0.5 m wide) and on stony substrates within areas of wet heath (see below), and often too small to be mapped. The majority of these were referenceable to the M10 *Carex dioica Pinguicula vulgaris* mire community, although small areas of M11 *Carex demissa Saxifraga aizoides* mire were also identified, and on more shallow gradients, the M6 *Carex echinata Sphagnum recurvum/auriculatum* mire.
- 3.24 The M10 communities were conspicuous due to the present of common butterwort *Pinguicula vulgaris*, along with a variety of brown mosses, devil's-bit scabious *Succisa pratensis* and round-leaved sundew. M11 was also a stony flush habitat typified by carpets of yellow saxifrage *Saxifraga aizoides*, accompanied by mosses such as *Racomitrium lanuginosum*, *Breutelia chrysocoma* and also *R. loreus* in drier locations, and alpine lady'smantle *Achemilla alpina*.
- 3.25 The M6 flushes occurred within mosaics with the M17 blanket bog (see above) wet heaths and marshy grasslands (also see below). They were typically groundwater-fed soligenous mires where star sedge *Carex echinata* tended to be frequent (but never abundant) amongst other sedges such as carnation sedge *C. panicea* and common sedge. *Sphagnum papillosum* and *S. denticulatum* were also frequent, and herb species included tormentil *Potentilla erecta*, common sorrel, bog asphodel and round-leaved sundew.

Grasslands

- 3.26 Grasslands, including types of marshy grassland, comprised just over 13 % of the Upper Works part of the Site. The majority of these were **semi-improved acid grasslands** represented by the U4 *Festuca ovina – Agrostis capillaris – Galium saxatile* grasslands in the NVC, either on its own or as a mosaic with other bracken *Pteridium aquilinum* and/or matgrass *Nardus stricta* habitats (see below). The U4 grasslands within the main works part of the Site were co-dominated by either sheep's fescue *Festuca ovina* or common bent *Agrostis capillaris*, although other grass species were also frequent such as sweet vernalgrass *Anthoxanthum odoratum*, velvet bent *Agrostis canina* and purple moor-grass. Typical herbs found in these locations were heath bedstraw *Galium saxatile*, common sorrel, selfheal *Prunella vulgaris* and tormentil.
- 3.27 At higher elevations the U4 grasslands tended to give way to Nardus stricta acid grasslands, referenceable to U5 Nardus stricta Galium saxatile grasslands in the NVC. Here, mat-grass and purple moor-grass tended to be dominant, with occasional deergrass and very few herbs, although tormentil was occasional.
- 3.28 The EUNIS **grass heath** category was used for small areas of a mosaic habitat that had affinities with both CG10 *Festuca ovina Agrostis capillaris Thymus praecox* grassland and CG11 the *Festuca ovina Agrostis capillaris Alchemilla alpina* grass-heath which occurred as small patches along the existing access track. These were relatively species-rich areas dominated by sheep's fescue and common bent, but a number of other grass species were recorded, including red fescue, viviparous fescue *F. vivipara* and sweet vernal-grass, as well as herbs such as tormentil, the leaves of common dog violet *Viola riviniana*, wild thyme



Thymus polytrichus, ribwort plantain *Plantago lanceolata* and alpine lady's-mantle, and the moss *Hylocomium splendens*.

- 3.29 Improved grasslands were generally very limited within the Upper Works part of the Site, restricted to a small improved pasture adjacent to a steading along the existing access track. These were referenceable to MG6 *Lolium perenne Cynosurus cristatus* grassland, being reseeded swards co-dominated by perennial rye-grass *Lolium perenne* and crested dog's-tail *Cynosurus cristatus*.
- 3.30 Marshy grassland types comprised 2 % of the Upper Works area, either generically classified as **humid meadows**, or more specifically as *Juncus acutiflorus* rush pastures where sharp-flowered rush was recorded as the dominant species. The humid meadow category was used for areas referenceable to either MG9 *Holcus lanatus Deschampsia cespitosa* or M23b *Juncus effusus/acutiflorus Galium palustre* rush-pasture, *Juncus effusus sub-community*. The M9 areas were characterised by the tussocky structure caused by the dominance or co-dominance of tufted hair-grass *Deschampsia cespitosa*, and were generally relatively species-poor. Yorkshire fog *Holcus lanatus* was frequent; other species present included rough meadow-grass *Poa trivialis*, creeping buttercup *Ranunculus repens*, white clover *Trifolium repens*, soft rush *Juncus effusus* and creeping thistle *Cirsium arvensis*. In contrast, the M23b swards were overwhelmingly dominated by soft rush, with occasional purple moor-grass, and rarely marsh bedstraw *Galium palustre*, marsh thistle *Cirsium palustre* and common sorrel.
- 3.31 The Juncus acutiflorus rush pastures were dominated by sharp-flowered rush, and referenceable to the M23a Juncus effusus/acutiflorus Galium palustre rush-pasture, Juncus acutiflorus sub-community in the NVC. These were more species-rich swards than the areas of M23b, with a range of grasses such as purple moor-grass, sweet vernal-grass and Yorkshire fog, and forbs including creeping buttercup, selfheal, meadow buttercup Ranunculus acris, white clover, common cat's-ear Hypochaeris radicata, common sorrel and rarely common bird's-foot trefoil Lotus corniculatus and devil's-bit scabious.
- 3.32 **Sub-Atlantic bracken fields** were ubiquitous throughout the Upper Works part of the Site, along the route of the existing access track, and the steep hillside slopes flanking the Allt Cruachan and leading down to Loch Awe. At the time of survey, bracken was overwhelmingly dominant in these areas, but it was thought possible that in early spring a range of other woodland herb species might be present here.

Heathlands

- 3.33 Four main heathland types were identified within the Upper Works part of the Site and the access track. The majority of this, comprising just over 11 % of the Upper works, were **northern wet heaths**, referenceable to M15 *Scirpus cespitosus Erica tetralix* wet heath in the NVC. These habitats tended to be on shallow peat less than 0.5 m in depth, but depths were variable, reflecting the undulating bedrock. This habitat type was abundant along the slopes around Cruachan Reservoir, and often occurred in a mosaic with other associated plant communities such as bog pools, blanket bog on deeper peat areas, flushes and acid grassland types.
- 3.34 M15 is typically a highly variable community, which can be dominated by any of purple moor-grass, deergrass, cross-leaved heath or heather, and within this part of the Site, deergrass or purple moor-grass did tend to be the dominant species. Heather was rarely



found in the sward, and cross-leaved heath was occasional, at best. *Sphagnum* mosses did occur throughout, albeit patchily, indicating that there was a closer affinity with soligenous mire versions of M15 than true "heath". Bryophytes recorded included *S. capillifolium, S. papillosum* and *S. denticulatum, Racomitrium lanuginosum, Campylopus atrovirens, Hylocomium splendens* and the liverwort *Pleurozia purpurea*. Bog myrtle *Myrica gale* was also occasionally recorded, but this was not at the same cover values as seen in the Lower Site Compound part of the Site.

- 3.35 Where purple moor-grass achieved dominance on shallow peat areas, the habitat was classified as **purple moor-grass wet heath**. In these areas, the purple moor-grass formed conspicuous tussocks, in between which forb species were noted, including heather, cross-leaved heath, tormentil, bog-asphodel and devil's-bit scabious. This habitat often formed mosaics with the northern wet heaths, but occurred in its own right along the existing access track. In terms of the NVC, it was referenceable to M25a *Molinia caerulea Potentilla erecta* mire, *Erica tetralix* sub-community.
- 3.36 Both the northern and purple moor-grass wet heaths supported very small flush areas referenceable to M10 (see above).
- 3.37 Very small areas of **sub-montane** and **sub-Atlantic** *Calluna* **heaths** were mapped, predominantly on the southern, downslope side of the existing access track. Both habitat types were dominated by heather, but the sub-montane heaths were where wavy hair-grass *Deschampsia flexuosa* also formed a notable part of the sward, and in the sub-Atlantic *Calluna* heaths, blaeberry *Vaccinium myrtillus* was present. These areas were referenceable to H9 *Calluna vulgaris Deschampsia flexuosa* heath and H12 *Calluna vulgaris Vaccinium myrtillus* heath respectively.

Woodlands

- 3.38 Woodland habitats were generally confined to areas below the 200 m contour, and associated with the Loch Etive Woods SAC and SSSI. A strip of **ash woodland** flanked the A85 at the bottom of the hill, comprising sessile oak *Quercus petraea*, and ash *Fraxinus excelsior* as high canopy trees, with downy birch *Betula pubescens*, rowan *Sorbus aucuparia* and coppiced hazel *Corylus avellana*, referenceable to W9 *Fraxinus excelsior Sorbus aucuparia Mercurialis perennis* woodland in the NVC. The survey was not undertaken at an optimal time of year for the inspection of the ground flora, but the leaves of wood sorrel *Oxalis acetosella* and hard fern *Blechnum spicant* were noted.
- 3.39 Above this initial strip of ash woodland the woodland graded into a community more definable as **oak/birch woodland**. Sessile oak and downy birch, and occasionally silver birch *Betula pendula*, were the most frequent tree species here, accompanied by rowan and willows *Salix* spp., on often steeply sloping ground. Bracken and bramble *Rubus fruticosus* agg. were recorded in the shrub layer, along with saplings of rowan. These woodlands were classified as being the NVC woodland type W11 *Quercus petraea Betula pubescens Oxalis acetosella* woodland, although occasionally the W17 community, *Quercus petraea Betula pubescens Dicranium majus* woodland, was allocated to areas where the ground layer was much more open and heathy in character, with abundant bryophytes and lichens.



3.40 Very small areas of **plantation woodland** occurred around the residential properties along the existing access track, including both coniferous plantation, and deciduous or mixed stands.

Other habitats

- 3.41 **Rockfaces, boulder fields and other bare ground** occurred throughout the main works Site. These were not always totally devoid of vegetation. For example, the rock faces created during the construction of the existing Cruachan Reservoir dam supported a U15 community (*Saxifraga aizoides – Alchemilla glabra* banks), where alpine lady's-mantle and yellow saxifrage *Saxifraga aizoides* were abundant, along with common butterwort, fairy flax *Linum catharticum*, wild thyme and various yellow sedges. Within the boulder fields, small plants of heather and cross-leaved heath were recorded, as well as saplings and small trees of rowan, cushions of the moss *Racomitrium lanuginosum*, devil's-bit scabious and ferns.
- 3.42 Low density buildings within the Site included the Cruachan Reservoir dam, utilities buildings, residential properties and the offices and visitor centre associated with the Cruachan power station. Roads, tracks and other areas of hard standing included the railway line along the valley floor, and maintained areas of grassland and gardens were classified as cultivated/amenity grassland. These areas had no associated NVC community.

Lower Site Compound

Bogs and flushes

3.43 Just under 3 ha of the Lower Site Compound part of the Site comprised habitat complexes which were broadly described as **valley mire**. These occurred in hollows close to the boundary formed by the road running along the south-eastern edge of this section of the Site. Bog myrtle was conspicuously abundant in these areas, as was the cover of *Sphagnum* mosses, including S. *papillosum, S. capillifolium, S. subnitens* and *S. denticulatum*.

Grasslands

- 3.44 Just over 6 ha of the Lower Site Compound part of the Site comprised grassland habitats, the majority of which were *Juncus acutiflorus* rush pastures. These were primarily located within the area previously used as a construction compound for Cruachan 1, either side of the access track that passed through this part of the Site. In these areas, both sharp-flowered rush and soft rush were present, but the former was at a higher abundance, along with purple moor-grass. Tormentil and Yorkshire fog were both frequent, and more occasional species included devil's-bit scabious, common sorrel, sweet vernal-grass and various Sphagnum mosses. Spikes of a *Dactylorhiza* orchid species were occasional, most likely *D. fuchsii*, although some plants were possibly past their best *D. incarnata*. Similar habitats which were dominated by soft rush were classified as **humid meadows**.
- 3.45 **Semi-improved acid grasslands** within this part of the Site were generally limited to small areas on raised moraine hummocks. These habitats had been closely sheep-grazed, and were dominated by sheep's fescue, with abundant purple moor-grass and frequent common bent. The moss *Rhytidiadelphus squarrosus* was also abundant, along with tormentil, bracken and creeping buttercup. More occasional species included common dog



violet, eyebrights *Euphrasia* spp., mouse-ear-hawkweed *Pilosella officinarum*, viviparous fescue, heath rush and soft rush. Ribwort plantain and heath wood-rush *Luzula multiflora* were both rare.

- 3.46 A very small area of **mesotrophic pasture** was recorded where the access track left the public road, with Yorkshire fog, cock's-foot *Dactylis glomerata* and false oat-grass *Arrhenatherum elatius*, representing the NVC community MG1 *Arrhenatherum elatius* grassland.
- 3.47 **Sub-Atlantic bracken fields** occurred throughout the southern section of this part of the Site, in a mosaic with the northern wet heaths and semi-improved acid grasslands. Bracken was overwhelmingly dominant here, and these areas were referenceable to the NVC community U20.

Heathlands

3.48 The majority of this part of the Site was composed of **northern wet heaths**, as represented by the M15 NVC community, either in isolation of in a mosaic with M6, M17, M25, U4 or U5 communities. Deergrass or, more frequently, purple moor-grass were the two most common dominant species, although east of the access track, bog myrtle was also unusually abundant. Heather, bog asphodel and cross-leaved heath were all frequent, and common cottongrass and white beak-sedge were occasional, indicating that these were likely to be functioning as soligenous mires rather than true wet heaths. However, there were also conspicuously drier hummocks of habitat where *Cladonia* lichens were abundant, as well as the moss *Racomitrium lanuginosum*, and then trampled flushes which were often dominated by white beak-sedge and common sedge.

Woodlands

3.49 No large extents of woodland occurred within this part of the Site, but the Study Area did clip small sections of **riparian alder woodland/scrub** along the north-eastern boundary which was almost exclusively dominated by alder *Alnus glutinosa* trees, and oak/birch woodland along the south-eastern boundary. The alder woodland was referenceable to W7 *Alnus glutinosa – Fraxinus excelsior – Lysimachia nemorum* woodland in the NVC, and had a relatively species-poor understorey due to the presence of grazing sheep throughout, dominated by tufted hair-grass and common bent. The oak/birch woodlands were generally examples of W11, although adjacent to the public road these were little more than lines of trees, and sycamore *Acer pseudoplatanus* was frequent.

Other habitats

3.50 **Roads, tracks and other areas of hard standing** included the access track passing through this part of the Site, and the public road along the south-eastern boundary. The **rockfaces and bare ground** category was used for an area of cleared vegetation adjacent to the access track.



Table 3.1:	Summary	of habitat types	recorded on	the Site
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Habitat type	Lower Site Com	pound	Upper and Lowe Access Track	Total (ha)	
	Area within Site (ha)	% of Site	Area within Site (ha)	% of Site	
C1: Standing water	-	-	49.43	17.3	49.43
C2: Running water	-	-	0.41	0.1	0.41
C3.5: Periodically inundated shores	-	-	6.01	2.1	6.01
D1.21: Low-altitude blanket bog	-	-	0.98	0.3	0.98
D1.22: Bog pools in blanket bog	-	-	0.01	< 0.1	0.01
D1.24: Bare peat	-	-	0.48	0.2	0.48
D2: Valley mire	2.78	1.0	-	-	2.78
D4.19: British Carex demissa flushes	-	-	0.09	< 0.1	0.09
E1.71: Nardus stricta acid grasslands	-	-	11.13	3.9	11.13
E1.72#: Grass-heath	-	-	0.26	0.1	0.26
E1.72x: Semi-improved acid grassland	0.58	0.2	21.57	7.6	22.15
E2.1: Mesotrophic pasture	0.03	< 0.1	-	-	0.03
E2.6: Improved grassland	0.03	< 0.1	0.35	0.1	0.38
E3.41: Humid meadows	0.43	0.2	5.37	1.9	5.80
E3.42: Juncus acutiflorus rush pasture	4.61	1.6	0.31	0.1	4.92
E5.1: Tall ruderal herbs	0.00	< 0.1	0.03	< 0.1	0.03
E5.31: Sub-Atlantic bracken fields	1.93	0.7	48.59	17.0	50.52
F4.11: Northern wet heaths	35.84	12.6	32.07	11.2	67.91
F4.13: Purple moor-grass wet heaths	-	-	7.79	2.7	7.79
F4.21: Sub-montane heath	-	-	0.58	0.2	0.58
F4.22: Sub-Atlantic Calluna heaths	-	-	0.43	0.2	0.43
G1.1: Riparian birch/willow woodland/scrub	-	-	0.05	< 0.1	0.05
G1.2: Riparian alder woodland/scrub	0.01	< 0.1	-	-	0.01
G1.91: Oak/birch woodland	0.37	0.1	29.50	10.3	29.87
G1.A: Oak woodland	-	-	4.19	1.5	4.20
G1.A2: Ash woodland on slopes and screes	-	-	7.70	2.7	7.70
G3.F: Conifer plantation	-	-	0.10	< 0.1	0.10
G4: Mixed deciduous and coniferous woodland	-	-	0.12	< 0.1	0.12
H5.3: Rockfaces and other bare ground	0.05	< 0.01	0.26	0.1	0.31
H5.37: Boulder fields	-	-	0.42	0.1	0.42
I: Cultivated/disturbed land/amenity grass	-	-	0.45	0.2	0.45
J2: Low density buildings	-	-	0.88	0.3	0.88
J4: Roads, tracks and hard standing	0.99	0.3	6.90	2.4	7.89
J6: Waste deposits	-	-	0.61	0.2	0.61
Not surveyed	-	-	0.71	0.2	0.34
Totals	47.67	16.7	237.80	83.3	285.48



GWDTEs

3.51 Just under 35 % of the Site and its habitats Study Area buffer comprised habitats classifiable as groundwater dependent terrestrial ecosystem, under the current SEPA guidance. The vast majority of these (68 ha) were northern wet heaths (M15 in the NVC), a habitat which is moderately groundwater dependent in certain situations, and these mostly occurred within the location of the Lower Site Compound. At the location of the Upper Works, the highly groundwater dependent GWDTEs primarily comprised species- and *Sphagnum*-rich versions of M23a (sharp-flowered rush meadows) in the col below the dam. Throughout these habitats, and within areas of unimproved acid grassland, there were also many small-scale (< 1 m wide) flushes attributable to the NVC community M10, which is of nature conservation interest and also highly groundwater dependent.

Annex 1 habitat types

3.52 Many of the habitats within the Site contained elements considered to be Annex 1 priority habitat types, or were partially classifiable as such. This included woodland types for which the Loch Etive Woodlands SAC was designated, as well as more widespread peatland habitats containing some types of Annex 1 habitat.

Invasive non-native species (INNS)

3.53 The only INNS recorded within the Site boundary were areas of rhododendron *Rhododendron ponticum* along the A85 and within woodland at the junction of the A85 and St Conan's Road. However, extensive areas of INNS was noted within the wider Study Area along the railway line and shoreline of Loch Awe adjacent to the village of Loch Awe. This comprised long stretches of dense Japanese knotweed *Fallopia japonica* along with Himalayan balsam *Impatiens glandulifera* and rhododendron.

Discussion

Valuing habitat and flora

- 3.54 A summary of the value of the habitats recorded within the Site is provided in **Table 3.2** (see Chapter 8 of the EIAR for criteria for the determination of IEFs).
- 3.55 **Table 3.2** shows that nearly two-thirds of the whole Site comprised features of Local or Council importance, as a result of the prevalence of important peat- or wooded habitats within the Study Area, or habitats likely to be at least moderately groundwater dependent. These features should all be included in the EcIA as IEFs needing to be assessed.
- 3.56 The remaining one-third of the Site did include widespread and/or commonplace habitats, considered to have importance at the Site level, at best, and not needing to be included in the EcIA as IEFs. However, the exceptions to this would be the marshy grasslands categorised under the **Humid meadow** and *Juncus acutiflorus* meadow types. Although classified as being of Site value due to being common and widespread, these habitats are highly groundwater dependent, and as such should be considered as IEFs in the EcIA.



Habitat type	Lower Site Compound (ha)	Upper and Lower Works, and Access Track (ha)	Level of importance	Rationale
C1: Standing water	-	49.43	Council	Oligotrophic and dystrophic freshwaters are listed on the A&BC LBAP. These waterbodies are important for their size, potential ecological value and position in the ecological mosaic.
C2: Running water	-	0.41	Council	Rivers and streams are listed on the A&BC LBAP. Within the Site, they are important for their role as a connective feature, their position in the ecological mosaic and their potential value.
C3.5: Periodically inundated shores	-	6.01	< Site	The drawdown zone on Cruachan Reservoir is in itself of low ecological importance due to the diurnal changes in its water regime.
D1.21: Low- altitude blanket bog/ D1.22: Bog pools in blanket bog	-	0.99	Council	These habitats include NVC types which would represent Annex 1 habitat types. They are important for their size and rarity at a European level, and are listed as a biodiversity asset in the A&BC LBAP.
D1.24: Bare peat	-	0.48	Site	Although a disturbed habitat, bare peat on the Site has potential value (via restoration).
D2: Valley mire	2.78	-	Council	These habitats include NVC types which would represent Annex 1 habitat types. They are important for their size and rarity at a European level, and are listed as a biodiversity asset in the A&BC LBAP.
D4.19: British Carex demissa flushes	-	0.09	Council	These habitats include NVC types which would represent Annex 1 habitat types and GWDTEs. Although only small areas are present within the Site, they are important for their rarity at a European level, and are listed as a biodiversity asset in the A&BC LBAP.
E1.71: Nardus stricta acid grasslands	-	11.13	Local	Widespread and commonplace habitats typical of this assemblage of upland habitats, with a diversity that has been impacted by grazing and in some localities, drainage. However, at the Site they form mosaics with narrow species-rich flushes of conservation importance that are also GWDTEs.
E1.72#: Grass-heath	-	0.26	Local	These habitats include NVC types which would represent Annex 1 habitat types and GWDTEs. Although only small areas are present within the Site, they are important for their rarity at a European level, and are listed as a biodiversity asset in the A&BC LBAP.
E1.72x: Semi- improved acid grassland	0.58	21.57	Site	Widespread and commonplace habitats typical of this assemblage of upland habitats, with a diversity that has been impacted by grazing and in some localities, drainage.
E2.1: Mesotrophic pasture	0.03	-	< Site	Very small area of a widespread and commonplace habitat.

Table 3.2:	Summary of	value	of habitats	within t	he Site.
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Habitat type	Lower Site Compound (ha)	Upper and Lower Works, and Access Track (ha)	Level of importance	Rationale
E2.6: Improved grassland	0.03	0.35	< Site	Small area of a widespread and commonplace habitat.
E3.41: Humid meadows	0.43	5.37	Site	Widespread and commonplace marshy grassland habitats typical of this assemblage of upland habitats. Impacted by grazing and drainage, but contains some NVC types which are considered to be at least moderately groundwater dependent, which raises their value within an EcIA context.
E3.42: Juncus acutiflorus rush pasture	4.61	0.31	Site	Widespread and commonplace marshy grassland habitats typical of this assemblage of upland habitats. Impacted by grazing and drainage, but contains some NVC types which are considered to be at least moderately groundwater dependent, which raises their value within an EcIA context.
E5.1: Tall ruderal herbs	0.00	0.03	< Site	Small area of a widespread and commonplace habitat.
E5.31: Sub- Atlantic bracken fields	1.93	48.59	< Site	Widespread and commonplace habitat with limited intrinsic ecological value.
F4.11: Northern wet heaths	35.84	32.07	Council	These heathlands include NVC types which would represent some overlap with habitats considered to be Annex 1, as well as being GWDTEs. As soligenous types of wet heath, these would be considered to be a biodiversity asset within the A&BC LBAP. Important for its size, species- richness and position in the ecological mosaic.
F4.13: Purple moor-grass wet heaths	-	7.79	Local	These heathlands include NVC types which would represent some overlap with habitats considered to be GWDTEs. Important for its size, position in the ecological mosaic and potential ecological value.
F4.21: Sub- montane heath/ F4.22: Sub- Atlantic <i>Calluna</i> heaths	-	1.01	Council	These heathlands include NVC types which would represent some overlap with habitats considered to be Annex 1. They would be considered to be a biodiversity asset within the A&BC LBAP. Important for their position in the ecological mosaic.
G1.1: Riparian birch/willow woodland/s crub	-	0.05	Local	Small area of a woodland type considered likely to be a GWDTE, and considered to be a biodiversity asset in the A&BC LBAP.
G1.2: Riparian alder woodland/s crub	0.01	-	Local	Very small area of a woodland type considered likely to be a GWDTE, and considered to be a biodiversity asset in the A&BC LBAP.
G1.91: Oak/birch woodland	0.37	29.50	Council	Extensive area of habitat likely to include Annex 1 types. Important for its size, continuity, species



Habitat type	Lower Site Compound (ha)	Upper and Lower Works, and Access Track (ha)	Level of importance	Rationale
				diversity and position in the ecological mosaic. Also a biodiversity asset in the A&BC LBAP.
G1.A: Oak woodland	-	4.19	Local	Extensive area of habitat listed as a biodiversity asset in the A&BC LBAP. Important for its size, continuity, species diversity and position in the ecological mosaic.
G1.A2: Ash woodland on slopes and screes	-	7.70	Council	Extensive area of habitat likely to include Annex 1 types. Important for its size, continuity, species diversity and position in the ecological mosaic. Also a biodiversity asset in the A&BC LBAP.
G3.F: Conifer plantation	-	0.10	< Site	Widespread and commonplace habitat with limited intrinsic ecological value.
G4: Mixed deciduous and coniferous woodland	-	0.12	Site	Widespread and commonplace habitat.
H5.3: Rockfaces and other bare ground	0.05	0.26	< Site	Widespread and commonplace habitat with limited intrinsic ecological value.
H5.37: Boulder fields	-	0.42	Site	Widespread and commonplace habitat.
l: Cultivated/d isturbed land/amenit y grass	-	0.45	< Site	Widespread and commonplace habitat with limited intrinsic ecological value.
J2: Low density buildings	-	0.88	< Site	Widespread and commonplace habitat with limited intrinsic ecological value.
J4: Roads, tracks and hard standing	0.99	6.90	< Site	Widespread and commonplace habitat with limited intrinsic ecological value.
J6: Waste deposits	-	0.61	< Site	Widespread and commonplace habitat with limited intrinsic ecological value.
Not surveyed	-	0.71	n/a	n/a
Totals	47.67	237.80	-	

Invasive non-native species (INNS)

Relevant legislation

3.57 Non-native species are covered in Scotland by clauses within the Wildlife and Natural Environment (Scotland) Act (2011) ("WANE Act"), which superseded non-native legislation previously contained within the Wildlife and Countryside Act (1981, as amended). This



legislation states that it is an offence to plant any named invasive species in the wild in locations that are outwith its native range. Current legal interpretation is that this applies whether planting/propagation has occurred intentionally or unintentionally.

INNS at the Site

- 3.58 If areas of rhododendron are to be impacted as part of the Development, it is recommended that:
 - a qualified specialist contractor is commissioned to devise and execute an INNS eradication programme;
 - treatment measures must be suitable for use in proximity to watercourses, and if herbicides are proposed this may require an authorisation under the Water Environment (Controlled Activities) (Scotland) Regulations 2011 ("CAR"). SEPA has recently produced new guidance in this respect²¹;
- 3.59 The Code of Practice on Non-Native Species (Scottish Government, 2012)²² should be adhered to throughout any INNS removal, and in addition to any legislative requirements, any soil that may contain non-native plant material should also be moved in line with this good practice guidance.
- 3.60 A detailed method statement pertaining to the removal of INNS and site biosecurity should be produced by the contractor. This will inform all relevant parties of their responsibilities and provide a framework for safely working on a site with INNS present. In addition, the eradication programme should include monitoring for subsequent years following the treatment to assess the effectiveness of measures employed and to retreat any areas where additional measures are needed.

²² Scottish Government (2012) Code of Practice on Non-Native Species. Made by the Scottish Ministers under Section 14c of the Wildlife and Countryside Act, 1981.



²¹ <u>https://www.sepa.org.uk/media/532108/wat-sg-18.pdf</u> Accessed November 2021.



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Cruachan 2

Scottish EUNIS Habitat Map - West

	Site boundary	
[]	Proposed Development footprint	
Habitat	S:	
	C1: Standing water	
XX	C2: Running water	
	C3.5: Periodically inundated shores	
	D1.21: Low-altitude blanket bog	
	D1.22: Bog pools in blanket bog	
	D1.24: Bare peat	
	D4.19: British Carex demissa flushes	
	E1.71: Nardus stricta acid grasslands	
	E1.72#: Grass-heath	
	E1.72x: Semi-improved acid grassland	
	E2.6: Improved grassland	
• •	E3.41: Humid meadows	
• •	E3.42: Juncus acutiflorus rush pasture	
	E5.1: Tall ruderal herbs	
	E5.31: Sub-Atlantic bracken fields	
	F4.11: Northern wet heaths	
	F4.13: Purple moor-grass wet heaths	
	F4.21: Sub-montane heath	
	F4.22: Sub-Atlantic Calluna heaths	
	G1.1: Riparian birch/willow woodland/scrub	
	G1.2: Riparian alder woodland/scrub	
	G1.91: Oak/birch woodland	
	G1.A2: Ash woodland on slopes and screes	
	G1.A: Oak woodland	
$\backslash \backslash$	G3.4: Pinus woodland	
	G3.F: Conifer plantation	
	G4: Mixed deciduous and coniferous woodland	
•	H5.37: Boulder fields	
•	H5.3: Rockfaces and other bare ground	
	I: Cultivated/disturbed land/amenity grass	
	J2: Low density buildings	
	J4: Roads, tracks and hard standing	
	J6: Waste deposits	
	Not surveyed	
0	Target notes	
Figure 3.1		

Map Scale @ A3: 1:15,000

Surveyed by: AEL	
Survey date: July/August 2021	
Drawn by: GC/RAH	V V V
Checked by: DS	Applied Ecology Ltd
Status: Final	



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AELSC0491 034-01 ETAfig3-2habitatsE

Cruachan 2

Scottish EUNIS Habitat Map - East

Site boundary Proposed Development footprint Habitats: C1: Standing water \sim C2: Running water C3.26: Phalaris swamp D2: Valley mire \sum E1.7/E5.31/F4.13 E1.71: Nardus stricta acid grasslands E1.72#: Grass-heath \sim E1.72x: Semi-improved acid grassland \sim E2.1: Mesotrophic pasture E2.6: Improved grassland E3.41: Humid meadows E3.42: Juncus acutiflorus rush pasture E5.1: Tall ruderal herbs E5.31: Sub-Atlantic bracken fields E5.42: Tall herb humid meadow F4.11: Northern wet heaths F4.13: Purple moor-grass wet heaths G1.1: Riparian birch/willow woodland/scrub G1.21: Mixed riparian woodland G1.2: Riparian alder woodland/scrub G1.51: Birch bog woodland G1.91: Oak/birch woodland G1.A: Oak woodland G3.F: Conifer plantation G5.1: Line of trees H5.3: Rockfaces and other bare ground I: Cultivated/disturbed land/amenity grass J2: Low density buildings J4: Roads, tracks and hard standing Not surveyed Ο Target notes

Figure 3.2

Map Scale @ A3: 1:15,000

Surveyed by: AEL	L.
Survey date: July/August 2021	
Drawn by: GC/RAH	
Checked by: DS	
Status: Final	





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Cruachan 2

GWDTEs - West



Site boundary

Proposed Development footprint

GWDTEs:



Highly Partially highly Moderately

Figure 3.3

Map Scale @ A3: 1:15,000





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Cruachan 2

GWDTEs - East



Site boundary

Proposed Development footprint

GWDTEs:



Highly Partially highly Moderately

Figure 3.4

Map Scale @ A3: 1:15,000





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AELSC0491 037-01 ETAfig3-5Annex1W 20220503 A3 03/05/2022

Cruachan 2

Annex 1 Habitats - West



Site boundary Proposed Development footprint

Annex 1 habitat type definitions:



Overlaps with Partially overlaps with Is contained within Is partially contained in

Figure 3.5

Map Scale @ A3: 1:15,000





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191 038-01 ETAfig3-6Annex1sE

Cruachan 2

GWDTEs - East



Site boundary Proposed Development footprint



Annex 1 habitat type definitions: Overlaps with Partially overlaps with Is contained within

Figure 3.6

Map Scale @ A3: 1:15,000





Figure 3.7: Selection of habitat survey photographs.

(a) Wet heath in Lower Site Compound, with bog myrtle, bog asphodel and purple moor-grass.

(b) Flushes in Lower Site Compound area with white beak-sedge.

(c) Rockface community at Cruachan Reservoir.




(d) Flushes with butterworts within wet heath habitats.

(e) Sphagnum-rich bog pools near Cruachan dam.

(f) Mosaic of bracken and acid grasslands along main access route.





(g) Drawn-down zone at Cruachan Reservoir, devoid of vegetation.

(h) Mosaic of acid grassland and wet heath below Cruachan dam.

(i) Small basic flushes in grasslands above Cruachan Reservoir.





(j) Denuded bare peat area at Cruachan dam, following use of area for filming in summer 2021.

(k) Ancient woodland on slopes above Loch Awe.

(I) Shoreline of Loch Awe.

4 Otter

Methodology

Pre-existing data

- 4.1 The following protected species survey reports were available for review:
 - ScottishPower Generation Ltd (2017) Cruachan Power Station Protected Species Survey Report. Unpublished contract report, dated November 2017.
 - Arcus (2021) Cruachan Power Station Protected Species Survey Report 2020. Unpublished contract report produced for Drax Generation Enterprise Ltd, dated February 2021.
- 4.2 Pre-existing information regarding the presence of protected or notable species in the near vicinity of the Site was extracted from a range of data sources within the National Biodiversity Network (NBN) Atlas²³, where there were no copyright issues associated with their use in a commercial context.

2021 field survey

- 4.3 In August 2021, a formal otter survey was conducted for the Site and a 200 m buffer of this, where access allowed. The survey followed the guidance provided by NatureScot²⁴, comprising searches for field signs, including spraints, confirmed shelters²⁵, feeding remains, slides, prints and tracks.
- 4.4 All signs of otter activity were noted, both from within the watercourses and along their banks, and their locations recorded using a hand-held GPS. Survey findings were subsequently digitised in GIS.

Camera monitoring

- 4.5 Upon completion of the 2021 otter habitat survey, three features were selected for camera monitoring to determine their current usage levels by otter (camera locations 1, 3 and 4, as shown in **Figure 4.1**). Location 1 was positioned on a suspected well-used otter couch along the banks of Loch Awe, in close proximity to the A85. Location 3 was focused on a boulder pile with worn entrance that was adjacent to a watercourse. Location 4 was within a boulder pile at the northern end of Cruachan Reservoir that had evidence of otter spraint inside. Otter were not the target feature of the other cameras deployed.
- 4.6 The camera at Location 1 was deployed on the 06 August 2021, and Locations 3 and 4 were deployed on 18 August 2021. All cameras were collected on 29 September 2021. Cameras were set to video recording rather than static photo, and all recording was undertaken under licence from NatureScot.

²⁵ Otter home ranges can be extensive and will include various cavities below ground known as holts and above ground shelters. The latter includes couches in vegetation and hovers in cavities under overhanging banks or between boulders (Green *et al.*, 1994).



²³ <u>https://nbnatlas.org/</u> accessed March 2021.

²⁴ <u>https://www.nature.scot/doc/standing-advice-planning-consultations-otters.</u> Accessed August 2021.

Survey limitations

- 4.7 Otters do not hibernate, and their survey can be undertaken at any time of the year. However, it is best attempted after 4-5 rain free days, when water levels are lower and there is less likelihood that signs of the species' presence will have been washed away.
- 4.8 The survey reported here was undertaken during a period of dry weather, and water levels were generally low, particularly in the upper sections of Allt Cruachan and associated tributaries. The water levels were potentially low enough in this part of the Site to limit otter movement and consequently this introduced a minor limitation to the results.
- 4.9 Due to the topography within the woodland areas north of the A85, the majority of watercourses within this part of the Study Area could not be accessed fully, for health and safety reasons. This included steep, rocky and craggy terrain along watercourse which supported waterfalls and gorge type features. The main areas not accessible were within the Loch Etive Woods SAC which has otter as one of its qualifying interests. Therefore, lack of access within this area of the Site did introduce a limitation to the completeness of the survey, although the majority of these areas were well outwith the likely footprint of the Proposed Development. Steep hillsides both upstream and downstream of the existing access track were also not accessible in certain locations, as well as some stretches along Loch Awe where steep embankments extended down to deep water. Many of the hillside watercourses were steep enough to prevent otter from commuting, and therefore a general assessment of the suitability of all inaccessible areas for otter was made from suitable vantage points. It is therefore not considered that lack of access to all watercourses significantly affected the survey conclusions.

Results

Pre-existing data records

- 4.10 The NBN contained five records of otter dating from 2010 or more recently, and not constrained by copyright rules.
- 4.11 Surveys in 2016 and 2020 identified a single otter spraint within two sections of the Study Area, but the 2017 survey recorded higher levels of otter activity, including hovers and occasional spraints around Cruachan Reservoir. Spraints and two hovers were also identified downstream of the Reservoir, along the Allt Cruachan. During that survey, a spraint was also found on the shore of Loch Awe adjacent to the existing power station.
- 4.12 Other survey work in 2018 recorded an otter holt along the northern edge of Cruachan Reservoir. However, as described below, during the 2021 survey this feature was thoroughly inspected and was found to lack any suitable features for a holt, and was instead classified as a hover.

2021 field survey

4.13 Habitat target notes recorded during the 2021 otter survey are provided in **Appendix C** and displayed in **Figures 4.1-4.2**. A selection of survey photographs is provided in **Figure 4.3**.



Loch Awe

- 4.14 Otter were found to be active across the full Site, with the highest activity recorded along the shores of Loch Awe, and a particular concentration of signs directly east of the existing power station. A series of hover features occurred within the overhanging stone and rubble forming the reclaimed shoreline, and a well-used couch feature was identified on shoreline below the A85 embankment, with multiple fresh spraints and worn areas at the base of a tree. Otter were recorded regularly by the camera here, with activity occurring on 24 out of 29 days. On multiple occasions, up to five otters were recorded at the couch at once, which included regular socialising and playing, as well as periods of rest. An individual dog otter was also regularly recorded at this location, using the couch at different times to the family group. The shores of Loch Awe and the overlapping boulder piles here offered optimal habitat for potential resting sites and holts. Otter mainly used the couch in the hours around dusk and dawn, but were frequently at the couch in broad daylight and using the area for resting earlier in the evening, likely to be shortly after emerging/returning to a nearby holt.
- 4.15 No confirmed holts were located within the Study Area along Loch Awe, but based on activity recorded in 2021 and historic sightings it was considered highly likely that a natal holt was present beyond the south-western boundary of the Study Area on the southern shore of Loch Awe, in areas less prone to continual disturbance by the A85. In addition to this, during vantage point bird surveys, a holt used by a single otter was confirmed 1.5 km to the west of the Study Area.

Wooded slopes and the access track

4.16 As described above, access was restricted to watercourses extending north from Loch Awe and through the steep woodland areas. No signs of otter were found along watercourses upstream or downstream of the access track to the east, including at features where sprainting activity would normally be expected, such as culverts or bridges. South of the access track, a boulder pile with a worn entrance was recorded as a potential holt, as an otter was seen inspecting the hole during camera monitoring on 17 August 2021 - three otters travelled downstream from the east and two of the three inspected the hole but did not appear to enter. On 26 September 2021, two clips of a single otter were recorded here between 08:09 and 08:22, showing the otter inspecting the hole but no confirmed signs of entry/exit. Due to the behaviour displayed, and the suitability of the boulder pile, this feature was categorised as a potential holt on the basis that otter could use it at some point in the future.

Cruachan Reservoir

4.17 Activity along the upper sections of Allt Cruachan and around Cruachan Reservoir were slightly lower than that recorded in 2017, likely due to the low water levels offering less desirable foraging resources at the time of the survey. Nevertheless, there were signs of otter activity here, with three confirmed hovers, generally within overlapping boulders. One of these hovers had been recorded as a holt in 2018. Upon inspection, the overlapping boulders had created a deep sheltered space with spraints visible on rock surfaces. However, the internal area did not extend back in any direction and was not judged to be sheltered enough for a holt. Old and fresh otter spraints were noted within this hover



feature at the start of the recording period, but the camera at this location (Location 4) did not record any otter activity, indicating that the feature was not regularly used.

Lower Site Compound

4.18 The eastern section of the Study Area had lower otter activity, with no confirmed signs along the Allt Mhoille. This watercourse had some inaccessible sections due to waterfalls and steep rocky sides, but displayed suitability for otter resting sites and commuting/foraging habitat. There was a series of meanders in the river which had resulted in island sections and overhanging tree roots, but no recent signs of otter were found. The River Strae to the south-east was included in the Study Area in 2021, and otter spraints and a single hover were recorded here, confirming the presence of otter in the general area.

Discussion

Relevant legislation

- 4.19 The otter is a European Protected Species (EPS), protected by the Conservation (Natural Habitats, etc.) Regulations 1994, as translated into domestic legislation post-Brexit and via the Wildlife and Countryside Act 1981 (as amended). This legislation collectively makes it an offence to capture, harass, injure or kill an otter; obstruct access to, damage or destroy a breeding site or resting place of an otter; disturb an otter in such a way as is likely to affect their distribution or abundance, disturb otter in such a way as is likely to impair their ability to survive or breed, or disturb an otter while it is occupying a structure or place which it uses for shelter or protection. Each of these actions is considered to be an offence whether the action is deliberate or reckless, except in the case of damaging or destroying a breeding site or resting place, which is a strict liability offence i.e., there is no defence for destroying a breeding site or resting place.
- 4.20 A licence is required for all developments that will affect otter. Disturbance is defined by NatureScot as any new effect occurring within a minimum of 30 m of an otter shelter. This distance is likely to increase for activities with a higher potential for disturbance, such as blasting or track-laying, or in remote locations or where the shelter in question is regarded as being high-status. If breeding is suspected, NatureScot may request a non-intervention zone of 100-200 m, or that work be suspended pending further investigation²⁶. Otters are inquisitive animals and are known to habituate to a range of disturbances. They are, however, often particularly intolerant of dogs.

Otter at the Site

4.21 The majority of the Site had high suitability for otter, either confirmed through active signs, or suitability based on known historic presence and the general structure of the watercourses. Loch Awe was well-used by a number of otters, assumed to be a family group of a mother and the previous year's cubs, and separately so by an associated adult male. The location of the Lower Site Compound contained smaller networks of ditches and

²⁶ <u>https://www.nature.scot/sites/default/files/2020-06/Species%20Planning%20Advice%20-%20otter.pdf</u> accessed March 2021.



this was less suitable for otter. However, the Allt Mhoille along the eastern boundary of the Site at this location was noted as having suitability for commuting and foraging otter.

- 4.22 No holts were found within 200 m of the Proposed Development, but the stretch of shore in front of the existing power station is currently an important territory for otter, for commuting and foraging, socialising and resting. Given this level of otter activity, it was considered likely that a holt was present within the general area, although most likely to be outwith the Site Boundary.
- 4.23 Argyll and Bute Council LBAP is currently being re-drafted, but the current version includes otter as a priority species²⁷. Given the level of activity recorded on Loch Awe, otter should be considered to be a **Council** level IEF in the EcIA.

²⁷ <u>https://www.argyll-bute.gov.uk/sites/default/files/planning-and-environment/AandB%20BAP%20Draft.pdf</u>. Accessed March 2022.







Cruachan 2

Otter Habitat Survey Results



Site boundary 200 m from Site boundary Proposed Development footprint Otter habitat target notes Camera location

Watercourses surveyed in 2021:



Not safely accessible

Figure 4.1

Map Scale @ A3: 1:25,000

Surveyed by: AEL	
Survey date: August 2021	
Drawn by: DS	
Checked by: RAH	
Status: Final	





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Cruachan 2

2021 Otter Survey Results



Spraint

Figure 4.2

Map Scale @ A3: 1:25,000

Surveyed by: AEL Survey date: August 2021 Drawn by: DS Checked by: RAH Status: Final





Figure 4.3: Selection of photographs from the otter survey.

(a) Shoreline along Loch Awe with highest level of otter activity within the Site. Numerous areas of overlapping boulders offering good opportunities for otter shelters.



(b) Worn area on the embankment along the shore of Loch Awe with multiple fresh spraints. Later confirmed to be a well-used couch during camera monitoring.

(c) Hover recorded along the shoreline of Loch Awe.





(d) Fresh spraints within hover in area of high otter activity along Loch Awe shoreline within the Site.

(e) Hover, in the left of the picture, recorded along Allt Cruachan downstream of the dam. Old dried spraint found within the feature.

(f) Shoreline around Cruachan Reservoir with suitability for resting sites under larger overlapping boulders.





(g) Hover recorded at the northern end of Cruachan Reservoir. Camera monitoring recorded no activity during the deployment period.

(h) Internal area of hover recorded at the northern end of Cruachan Reservoir.Fresh and older spraints visible on rock.

(i) Steep sided rocky watercourse downstream of existing access track, typical of the structure of watercourses in this part of the Site.





(j) Potential holt feature within the Study Area, 200 m south of the existing access track. Later confirmed to have been inspected by otter during camera monitoring but assumed also to be used by badger.

(k) Habitat along Allt Mhoille adjacent to the boundary in the eastern section of the Site. Suitability for resting sites and foraging/commuting otter but no active signs found.



(I) Single otter resting at couch along Loch Awe shoreline during daylight hours.



(m) Five otters at couch along Loch Awe shoreline before dusk.

(n) Four otters huddled together resting at couch along Loch Awe shoreline before dusk.





5 Water Vole

Methodology

Pre-existing data

- 5.1 The following protected species survey reports were available for review:
 - ScottishPower Generation Ltd (2017) Cruachan Power Station Protected Species Survey Report. Unpublished contract report, dated November 2017.
 - Arcus (2021) Cruachan Power Station Protected Species Survey Report 2020. Unpublished contract report produced for Drax Generation Enterprise Ltd, dated February 2021.
- 5.2 Pre-existing information regarding the presence of protected or notable species in the near vicinity of the Site was extracted from a range of data sources within the National Biodiversity Network (NBN) Atlas²⁸, where there were no copyright issues associated with their use in a commercial context.

2021 field survey

- 5.3 The surveys undertaken in 2016-2020 identified low habitat suitability for water vole across the majority of the Site. Therefore, during consultation with NatureScot it was agreed that full survey in 2021 would not be needed, and instead suitability would be recorded to confirm the findings from the previous surveys, as well as formal water vole survey in the limited number of areas not surveyed in 2016-2020. These formal surveys focused on the Lower Site Compound in the east of the Site.
- 5.4 The formal water vole survey was undertaken in August 2021 for suitable habitat within the Site that was not surveyed in 2016-2020, and a 50 m buffer of this ("the Study Area"). The survey followed national survey guidance^{29,30} and comprised searches of the ditch system for water vole signs, including feeding stations, latrines, footprints, burrows and runs, as well as sightings of voles.
- 5.5 Any signs or potential signs of water vole were noted, and their location recorded using a hand-held GPS. Survey findings were subsequently digitised in GIS.

Survey limitations

5.6 The survey was undertaken at the appropriate time of year, when water levels were low, suitable for identifying recent signs of water vole. All sections of watercourses within areas identified as having habitat suitability were accessible. This included ditch systems around Cruachan Reservoir, and the Lower Site Compound part of the Site. Watercourses through steep woodland areas and along the access track were not all accessible, but this was not

³⁰ Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016). *The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series)*. Eds Fiona Mathews and Paul Chanin. The Mammal Society, London.



²⁸ <u>https://nbnatlas.org/</u> accessed March 2021.

²⁹ <u>https://www.nature.scot/standing-advice-planning-consultations-water-voles</u> accessed March 2021.

judged to be a significant limitation as these areas were not the focus of the survey, and were confirmed to be unsuitable for water vole based on the flow rate, bank profile and rocky substrate.

Results

Pre-existing data

- 5.7 No signs of water vole were identified in any previous surveyed areas at the Site in 2016-2020. There were also no historic records of water vole found in any data searches.
- 5.8 The majority of the watercourses were considered unsuitable for water vole due to high flow rate, rocky bankside composition and lack of foraging opportunities. Mink were also noted as being in the area, which often predate water vole, and this was likely to be one of the limiting factors for the establishment of water voles within the Site.

2021 field survey

- 5.9 The locations of target notes taken during the water vole survey are displayed in **Figure 5.1** and summarised **Appendix E**. A selection of survey photographs is provided in **Figure 5.2**.
- 5.10 The majority of watercourses within the Site were confirmed to be unsuitable for water vole, due to the fast flowing, steep and rocky nature of the tributaries through woodland areas and on steep hillsides. Similarly, many of the watercourses around Cruachan Reservoir were rocky and on steep slopes.
- 5.11 The exception to this was an area with shallow banks on level ground south of Cruachan Dam, as described in target note F (see **Appendix E**). Additionally, there were some ditches surrounding Cruachan Reservoir that had peaty banks and were on a gentler gradient, as described (target note G). The Lower Site Compound part of the Site contained networks of ditches lined by rush and with suitability for water vole, but no signs of the species were found.

Discussion

Relevant legislation

5.12 The water vole is protected by the Wildlife and Countryside Act (1981, as amended) and the Nature Conservation (Scotland) Act (2004). It is an offence intentionally or recklessly to disturb a water vole in its place of shelter, or to intentionally or recklessly damage, destroy or obstruct access to a shelter. Both these Acts have been amended by the Wildlife and Natural Environment (Scotland) Act (2011), known as the WANE Act. Sections 18(2)(a) and (b) of the WANE Act insert a licensable purpose into section 16 of the Wildlife and Countryside Act. NatureScot can therefore licence the disturbance of water vole (including destruction of burrows) for reasons of social, economic and environmental significance, provided there is no satisfactory alternative.

Water vole at the Site

5.13 Water vole were judged to be absent from the Site and there was limited habitat suitability to enable the Site to be colonised in the future. Nevertheless, small areas of suitable



habitat were identified and this included the location of the Lower Site Compound. The areas of limited suitability around Cruachan Reservoir were generally isolated within the surrounding landscape and judged unlikely to become colonised.

5.14 For the purposes of the EcIA, water vole is not considered to be an IEF needing to be included in the assessment. However, pre-construction update surveys for other protected species should include a search for water vole signs within the location of the Lower Site Compound. Additionally, a watching brief for the occurrence of water vole field signs should be kept by the ECoW, who will advise regarding appropriate action should the species be found or suspected to be present during the works.





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Cruachan 2

Water Vole Habitat Survey Results



Site boundary 50 m from Site boundary Proposed Development footprint Water vole habitat target note

Figure 5.1

Map Scale @ A3: 1:25,000

Surveyed by: AEL Survey date: August 2021 Drawn by: DS Checked by: RAH Status: Final





Figure 5.2: Selection of photographs from the water vole survey.

(a) Ditch network and rush dominated habitat north of the B8077, with suitability for water vole, described in TN E.

(b) Suitable water vole habitat north of the B8077, described in TN E.



(c) Limited habitat suitability within area south of the dam, as described in TN F.



(d) Watercourse typical of that found around Cruachan Reservoir, with rocky substrate. Certain sections displayed water vole suitability where the substrate was more peaty, as described in TN G.



6 Badger

Methodology

Pre-existing data

- 6.1 The following protected species survey reports were available for review:
 - ScottishPower Generation Ltd (2017) Cruachan Power Station Protected Species Survey Report. Unpublished contract report, dated November 2017.
 - **Drax (2020)** Cruachan 2 Hydro Ecology Camera Trap Monitoring Report. Unpublished contract report, dated March 2020.
 - Arcus (2021) Cruachan Power Station Protected Species Survey Report 2020. Unpublished contract report produced for Drax Generation Enterprise Ltd, dated February 2021.
- 6.2 Pre-existing information regarding the presence of protected or notable species in the near vicinity of the Site was extracted from a range of data sources within the National Biodiversity Network (NBN) Atlas^a, where there were no copyright issues associated with their use in a commercial context.

2021 field survey

- 6.3 Badger surveys undertaken between 2016-2020 identified only low habitat suitability for badger across the majority of the open, wet parts of the Site. Therefore, during consultation with NatureScot it was agreed that full survey in 2021 would not be needed, and instead suitability would be recorded to confirm the findings from the previous surveys, as well as formal badger survey in the limited number of areas not surveyed in 2016-2020. These formal surveys focused on the Lower Site Compound in the east of the Site.
- 6.4 In August 2021, searches for badger field signs were therefore undertaken in suitable habitats within the Site and a 100 m buffer of this where access allowed ("the Study Area"), as per the survey guidelines provided by Scottish Badgers³². Features such as setts, latrines and dung pits, badger hair, footprints, trails and evidence of foraging were all searched for³³.
- 6.5 The survey concentrated on areas potentially suitable for sett excavation, including woodland habitats, their margins and embankments. All badger signs, confirmed or potential, were noted and their locations recorded using a hand-held GPS. Any relevant survey findings were subsequently digitised in GIS.

 ³² Scottish Badgers (2018) Surveying for Badgers: Good Practice Guidelines. Online publication at www.scottishbadgers.org.uk
³³ Harris, S., Cresswell, P. & Jefferies, D. (1989) Surveying for Badgers. Occasional Publication of the Mammal Society No. 9.
Mammal Society, Bristol.



³¹ <u>https://nbnatlas.org/</u> accessed March 2021.

Categorisation of badger setts

- 6.6 Whilst badger setts are usually categorised according to their present use and appearance, this can be dynamic, particularly with regard to the prevalence of supplementary setts and the fact that their status is able to change over relatively short periods of time. The conventions shown in **Table 6.1** were used to describe setts.
- 6.7 In addition to sett classification, the level of badger activity is conventionally recorded for each sett by classifying each sett entrance hole according to one of three categories, as follows:
 - well-used: an entrance free of leaf-litter and showing recent signs of excavation;
 - partly-used: an entrance with some debris and leaf-litter but also showing some signs of recent digging;
 - disused: an entrance with debris and leaf-litter partially obscuring the hole, with no recent signs of digging, or a hole that exhibits the characteristics of a badger sett entrance hole (large and D-shaped entrance and old spoil piles at the entrance), but with no other signs of badger activity.

Table 6.1: Conventions used to classify badger setts.

Sett type	Characteristics
Main	The continuously used breeding and over-wintering sett for a social group of badgers. Only one main sett will exist in each social group's territory and will be relatively centrally located within the group's range. Several holes with large spoil heaps and obvious paths between sett entrances.
Annex	Linked by well-used paths to the main sett but not connected underground and not continuously used. Normally less than 150 m from the main sett, comprising several holes. May not be in use all the time, even if the main sett is very active.
Subsidiary	Distant from the main sett. Several entrances but with no well-used paths connecting to a main sett, and used only seasonally.
Outlier	Distant from main sett. Small, with one or two entrances only. Used for short periods sporadically, with no obvious well-used paths connecting to other setts. Little spoil outside holes.

Camera monitoring

6.8 Upon completion of the badger survey, two features were selected for camera monitoring to determine use by badger, at Locations 3 and 6. The camera at Location 3 was deployed on 18 August 2021, and Location 6 was deployed on 19 August 2021. All cameras were collected on 29 September 2021. Cameras were set to video recording and all recording was undertaken under appropriate licences from NatureScot.

Survey limitations

6.9 Badger surveys can be undertaken at any time of year, although the optimal times are March-June and September-November when badgers are particularly active but vegetation is lower. Badger latrines are reliably maintained by badgers in early spring, and at other times of year can be harder to locate. The survey was therefore undertaken outside the optimal summer window, and when vegetation heights were greater.



6.10 As with other protected species survey, the topography within woodland areas north of the A85 within the Site boundary meant that the majority of this area could not be accessed fully due to health and safety concerns; the steep terrain, combined with dense bracken in many areas, prohibited safe survey. Therefore, lack of access within this area of the Site did introduce a limitation to the survey results. However, as described below, camera trapping within the Loch Etive Woods SAC was undertaken in 2019 and confirmed the presence of badger within this area of the Site. Habitats within a 30 m disturbance zone to the north side of the A85 included a strip of unsuitable, steep and craggy rock, and suitable woodland to the north was separated by the railway line. Therefore, the access restrictions were not judged to be a significant limitation to the conclusions of the survey.

Results

Pre-existing data

- 6.11 The 2016 badger survey confirmed the presence of an active outlier sett in the eastern part of the Site (beyond the 100 m Study Area from the 2021 Site boundary).
- 6.12 No field evidence, setts or sightings of badgers were recorded during the 2017-2020 surveys. However, camera trap surveys undertaken within Loch Etive Woods SAC in 2019 did confirm the presence of badger in that location. The majority of camera traps recorded commuting behaviour and foraging activity, and potentially mating behaviour.

2021 field survey

- 6.13 Non-confidential results of the results of the badger survey are displayed in Figure 6.1 and summarised in Appendix F. A selection of survey photographs is provided in Figure 6.2. The location of badger setts is not shown on Figure 6.1 for animal protection reasons; these locations can be found in Confidential Technical Appendix 8.4 (Map 1).
- 6.14 Many of the habitats throughout the Study Area were confirmed to have low potential for badger. Wet habitats unsuitable for sett creation occurred throughout open areas. This included sections of the Site around Cruachan Reservoir, sloped open hillsides north and south of the existing access track, and wet open habitats within the Lower Site Compound area in the east of the Site.

Wooded slopes and the access track

- 6.15 The woodland slopes through the centre of Loch Etive Woods SAC, although not fully accessible during the 2021 survey, offered some areas of suitability for sett creation. The lower slopes of the woodland immediately north of the A85 were considerably steeper with frequent rocky crags that were generally less suitable for badger setts.
- 6.16 Woodland directly south of the lower sections of the existing access track had dry slopes suitable for sett creation but no signs of badger were found in this section of the Study Area. However, a suspected badger outlier sett was identified within the wider Study Area, 200 m south of the existing access track. A large latrine was also found directly outside a well-used hole extending into a boulder pile. Camera monitoring here appeared to show badger infrequently using the hole on five separate days (19, 23 and 31 August 2021, and 05 and 19 September 2021). These visits tended to occur around dusk or dawn, and often



badger were recorded traveling in from a western direction. No conclusive evidence of badger entering/exiting the hole was recorded, but some clips showed the badger actively investigating the hole before the clip cut off. It was therefore possible that this hole was an infrequently used outlier sett, and was certainly within a badger clan territory due to the presence of the maintained latrine.

Lower Site Compound

6.17 Plantation woodland south of the River Strae, and the area surrounding the substation north of the B8077 were included in the 2021 Study Area buffer prior to finalisation of the Site boundary. An outlier sett that was identified in this area in 2016 showed no signs of recent use in 2021, with dense bracken covering the hole. Badger hair was however found amongst the spoil at the entrance which did suggest that badgers were still active in the area. Further evidence of an active badger clan in this area were identified along the edge of the plantation woodland south of the River Strae. A well-used latrine was located along the fence line here, and a dug out bees nest was found on the bank of the River Strae. No confirmed setts were found within the plantation woodland, but suitable dry slopes occurred throughout. A single mammal hole was found here, but camera monitoring did not reveal any badger activity.

Discussion

Relevant legislation

- 6.18 The badger and its setts are protected in Scotland by the Protection of Badgers Act 1992 (as amended) and strengthened by the Wildlife and Natural Environment (Scotland) Act (2011). This makes it illegal to wilfully kill, injure or take a badger, or attempt to do so, cruelly ill-treat a badger, interfere with a sett by damaging it or any part of it, destroying it, obstructing access to it or disturbing a badger while it is occupying a sett.
- 6.19 NatureScot is responsible for issuing licences under the Badgers Act for the purpose of development. Generally, it is considered that development using heavy machinery within at least 30 m of a badger sett entrance could result in disturbance and would therefore be licensable.

Badger at the Site

- 6.20 Badger were confirmed to be active within the wider Study Area surrounding the Site in 2019, and in 2021. Based on the field signs and camera monitoring results, it was considered likely that a badger clan territory extended along the steep woodland slopes north of the A85, and that a second badger clan was present in habitat surrounding the River Strae to the east of the Site. The presence of setts within the main Site boundary in woodland north of the A85 could not be ruled out, due to much of this area being inaccessible. The majority of the ground within the Lower Site Compound was too wet to be occupied by badger and the species was considered to be absent from this part of the Site within a licensable distance.
- 6.21 At this time, there are no specific licensing issues associated with badger, and the Site is considered to be of **Site** level importance for the species. However, given the known



presence of badger within areas of the Site and potential for setts to be located within inaccessible areas, the species should still be included in the EcIA as an IEF.





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Cruachan 2

2021 Badger Survey Results



- Badger latrine
- Badger foraging

Details of sett locations can be found in Confidential Technical Appendix 8.4.

Figure 6.1

Map Scale @ A3: 1:25,000

Surveyed by: AEL Survey date: August 2021 Drawn by: DS Checked by: RAH Status: Final



(a) Steep woodland slopes with dense bracken within the Loch Etive Woods SAC. Not safely fully accessible during

the survey.

Figure 6.2: Selection of photographs from the badger survey.



(c) Woodland south of the lower end of the existing access track. Gentler slopes suitable for badger sett creation, but no signs found.







(d) Badger latrine, within the eastern section of Study Area boundary in 2021, south of the River Strae.

(e) Mammal hole found within plantation woodland south of the River Strae that was within the Study Area boundary in 2021. Camera monitoring confirmed the hole was disused.

(f) Dug out bee nest along the bank of the River Strae.



(g) Badger outside hole entrance of potential outlier sett.



7 Red Squirrel

Methodology

Pre-existing data

- 7.1 The following protected species survey reports were available for review:
 - ScottishPower Generation Ltd (2017) Cruachan Power Station Protected Species Survey Report. Unpublished contract report, dated November 2017.
 - Drax (2020) Cruachan 2 Hydro Ecology Camera Trap Monitoring Report. Unpublished contract report, dated March 2020.
 - Arcus (2021) Cruachan Power Station Protected Species Survey Report 2020. Unpublished contract report produced for Drax Generation Enterprise Ltd, dated February 2021.
- 7.2 Pre-existing information regarding the presence of protected or notable species in the near vicinity of the Site was extracted from a range of data sources within the National Biodiversity Network (NBN) Atlas³⁴, where there were no copyright issues associated with their use in a commercial context.

2021 field survey

7.3 In August 2021, a survey of suitable habitats within the Site and a 50 m buffer was undertaken, to search for signs of red squirrel. Trees were inspected from ground-level, using binoculars if necessary, for squirrel dreys. Feeding signs were also recorded, namely the remains of pine cones, acorns or hazelnuts with the characteristic marks of having been eaten by squirrels.

Survey limitations

- 7.4 Squirrel dreys are difficult to find in dense tree cover. The walkover in August 2021 was undertaken when trees were in full foliage, and the woodland areas surveyed contained many sizeable, high-canopy trees. The timing of the survey was thus not optimal.
- 7.5 In addition, as with other protected species surveys, the topography within woodland areas north of the A85 meant that the majority of the wooded slopes could not be accessed fully, due to health and safety concerns regarding the steep terrain and dense bracken. However, in 2019, camera trapping within the Loch Etive Woods SAC confirmed the presence of red squirrel within this area of the Site, and field signs of the species were also confirmed within this woodland in 2021. Therefore, the access restrictions were not judged to be a significant limitation to the derivation of a valid baseline for assessment.

³⁴ <u>https://nbnatlas.org/</u> accessed March 2021.



Results

Pre-existing data

- 7.6 The Site was located within the known range of red squirrel, and 17 pre-existing records of this species were found within the NBN search area for which there were no copyright issues associated with their use in a commercial setting.
- 7.7 Surveys undertaken in 2016-2020 also reported the woodlands within the Site as having high suitability for red squirrel, and in 2016 there were sightings of red squirrel within the Loch Etive Woods SAC. Camera trapping surveys undertaken in 2019 also recorded regular activity by red squirrels within this section of woodland.

2021 field survey

7.8 The results of the 2021 red squirrel survey are displayed in **Figure 7.1** and described in **Appendix G**. A selection of survey photographs is provided in **Figure 7.2**.

Wooded slopes and the access track

- 7.9 Much of the red squirrel Study Area was considered to have low suitability for the species, as the majority of the habitats had no tree cover. However, woodland cover along the slopes north of the A85 and south of the lower section of the existing access track provided extensive, high quality habitat for red squirrel, with continuous cover of sizeable, mature trees for dreys, and optimal foraging opportunities. Red squirrel was not a target species for the camera monitoring, but were recorded on a number of the camera traps, including at Locations 2 and 3, confirming the presence of this species within these wooded slopes. Despite access limitations within the wooded slopes, two dreys were found at the edge of the Study Area north of the A85, and squirrel feeding remains (piles of hazelnuts) were located adjacent to the hill path along the downstream section of Allt Cruachan. It was considered likely that a large number of dreys would be present throughout the woodland areas that were not accessible.
- 7.10 Red squirrel feeding remains were also found immediately north and south of the lower section of the existing access track, within oak-dominated woodland. The remaining field signs identified during the 2021 survey were located within the original wider Study Area, but were well beyond a 50 m buffer of the final Site boundary. This included two sightings of red squirrel in woodland areas north of Loch Awe village, as well as two dreys in the same general area.

Lower Site Compound

7.11 A drey was also found south of the River Strae within a block of plantation woodland that had high suitability for red squirrel. This was located within the original wider Study Area, but well beyond the 50 m buffer of the final Site boundary. The highest levels of red squirrel activity recorded by the camera traps were at Locations 5 and 6 within the plantation woodland to the south of the River Strae, including footage of adult and young red squirrels together, suggestive of the presence of breeding dreys in this particular woodland block.



Discussion

Relevant legislation

- 7.12 Red squirrel is protected by the Wildlife and Countryside Act 1981 (as amended) and the Nature Conservation (Scotland) Act 2004, against intentional or reckless killing, injury or taking (capturing), damaging, destroying or obstructing access to any structure or place which a red squirrel uses for shelter or protection, or disturbance while it is occupying a structure or place which it uses for that purpose. In 2011, both of these Acts were amended by the Wildlife and Natural Environment (Scotland) Act 2011 (known as the WANE Act). NatureScot can therefore license disturbance of red squirrel (including removal of dreys) for over-riding reasons of social, economic and environmental reasons provided there is no satisfactory alternative. The distance at which disturbance to a red squirrel drey may occur is variable, depending on the activity and whether or not breeding is suspected.
- 7.13 The red squirrel population is in decline in the UK and has been replaced over most of England, Wales and central and south-east Scotland by the non-native grey squirrel. Red squirrel is primarily a conifer specialist and population densities are highest in stands containing conifer tree species of a variety of ages and with reliable cone crops.

Red squirrel at the Site

- 7.14 When combining the various findings from the surveys undertaken in recent years, it was considered likely that red squirrel were present in relatively high numbers within the woodland areas north of the A85. Foliage cover at the time of the survey made the presence of dreys within wooded parts of the Site impossible to rule out, although the Lower Site Compound area did not contain any suitable habitat for red squirrel. Suitable woodland habitat did occur however within a 50 m buffer of the Site boundary in this location, to the west and to the east along the Allt Mhoille.
- 7.15 The Argyll and Bute Council LBAP is currently being re-drafted, but the current version includes red squirrel as a priority species. Given the high suitability of habitat within parts of the Site, and recorded sightings and field signs of the species, red squirrel should be considered to be a **Council** level IEF in the EcIA.





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Cruachan 2

2021 Red Squirrel Survey Results





Sighting

Drey

Feeding remains

Figure 7.1

Map Scale @ A3: 1:25,000

Surveyed by: AEL
Survey date: August 2021
Drawn by: DS
Checked by: RAH
Status: Final





Figure 7.2: Selection of photographs from the red squirrel survey.

(a) High qaulity continuous habitat for red squirrel, typical of the structure of ancient woodland north of the A85.

(b) Red squirrel drey found during the survey in 2021.

(c) Red squirrel feeding remains.





(d) Red squirrel recorded on camera at Location 2.

(e) Red squirrel recorded on camera at Location 3.

(f) Adult and younger red squirrel recorded on camera at Location 5.




(g) Red squirrel recorded on camera at Location 6.



8 Pine Marten

Methodology

Pre-existing data

- 8.1 The following protected species survey reports were available for review:
 - ScottishPower Generation Ltd (2017) Cruachan Power Station Protected Species Survey Report. Unpublished contract report, dated November 2017.
 - **Drax (2020)** Cruachan 2 Hydro Ecology Camera Trap Monitoring Report. Unpublished contract report, dated March 2020.
 - Arcus (2021) Cruachan Power Station Protected Species Survey Report 2020. Unpublished contract report produced for Drax Generation Enterprise Ltd, dated February 2021.
- 8.2 Pre-existing information regarding the presence of protected or notable species in the near vicinity of the Site was extracted from a range of data sources within the National Biodiversity Network (NBN) Atlas³⁵, where there were no copyright issues associated with their use in a commercial context.

2021 field survey

8.3 In August 2021, all accessible areas within 250 m of the Site were searched for pine marten signs, primarily scats as a simple means of detecting pine marten presence. Particular attention was paid to prominent rocks, tree stumps and other places where martens were typically leave scats. In addition, potential den sites such as elevated tree cavities, large raptor nests, owl nest boxes, elevated rocky outcrops and large upturned root plates of fallen trees were searched for and recorded. All identified pine marten signs, both confirmed or potential, were noted and their locations were recorded using a hand-held GPS. Survey findings were subsequently digitised in GIS.

Camera monitoring

- 8.4 Upon completion of the pine marten survey, four features were selected for camera monitoring to determine use by pine marten. Location 2 was positioned on a hole at the base of an upturned tree nearby to a scat, within woodland south of the existing access track, and Location 3 was selected as a possible pine marten den in a boulder pile. Locations 5 and 6 were outwith the 250 m buffer of the final Site boundary but were within the Study Area as given in 2021. They were respectively focused on a forestry ride within plantation woodland where multiple scats were identified, and a mammal hole within the same block of plantation woodland.
- 8.5 All cameras were deployed on either the 18 or 19 August 2021 and collected on the 29 September 2021. Cameras were set to video recording, and all recording was undertaken under appropriate NatureScot licences.

³⁵ <u>https://nbnatlas.org/</u> accessed March 2021.



Survey limitations

8.6 As with other protected species surveys, the topography within woodland areas north of the A85 meant that the majority of this area could not be accessed fully due to health and safety concerns; the steep terrain, combined with dense vegetation and bracken, prohibited safe survey. Lack of access within this part of the Site did introduce a limitation to the completeness of the survey results. However, in 2019 camera trapping within the Loch Etive Woods SAC had already confirmed the presence of pine marten within this part of the Site, and therefore the access restrictions were not considered to be a significant limitation to the derivation of a valid baseline for assessment.

Results

Pre-existing data

- 8.7 Within the NBN records that were not constrained for use in a commercial setting, there were six pine marten records dating from 2010 or later.
- 8.8 Surveys in 2016-2020 reported the woodland areas within the Site as having high suitability for pine marten, and during surveys in 2017 and 2020 a small number of pine marten scats were found within the Loch Etive Woods SAC, but no dens were confirmed. Camera trapping surveys undertaken in 2019 also recorded regular activity by pine marten within woodland to the west of the lower sections of Allt Cruachan, with seven out of the 11 cameras recording pine marten activity. This included regular sightings at the Cruachan Visitor Centre which has historically been an area pine marten have visited to feed at the bird tables.

2021 field survey

8.9 The results of the pine marten survey are shown in **Figures 8.1** and **8.2**, with habitat target notes provided in **Appendix H**. A selection of survey photographs is provided in **Figure 8.3**.

Wooded slopes and the access track

8.10 Much of the Study Area was considered to have low suitability for pine marten dens, as the majority of the habitats were open and on wet ground. However, woodland cover along the slopes north of the A85 and south of the lower section of the existing access track provided extensive high quality habitat for pine marten dens and foraging, with frequent boulder piles, fallen trees, mature trees with cavities and optimal foraging opportunities. Despite the access limitations, scats were found in woodland areas south of the existing access track, and at two culvert areas directly adjacent to the track. A boulder pile with a worn entrance, suitable for pine marten denning, was found 250 m south of the existing access track, although a badger latrine was also located outside the opening. Subsequent camera monitoring recorded no pine marten carrying what appeared to be a chicken egg, moving east to west through the woodland. *Ad hoc* conversations with residents of Loch Awe village revealed that pine marten were often seen at bird feeders in residential gardens.



Lower Site Compound

8.11 The field signs identified during the 2021 survey of the Lower Site compound part of the Site were located within the original Study Area, but were well beyond a 250 m buffer of the final Site boundary. This included scats throughout the plantation woodland to the south of the River Strae, and a single mammal hole suitable for pine marten. However, there was no evidence of pine marten on the footage recorded by the camera at Location 6, although pine marten clips occurred on six separate days, including scent marking behaviour..

Discussion

Relevant legislation

- 8.12 Pine marten and its dens are protected by the Wildlife and Countryside Act 1981 (as amended) and by the Nature Conservation Act 2004. It is an offence to intentionally or recklessly:
 - kill, injure or capture a pine marten;
 - disturb a pine marten in a den;
 - damage, destroy or obstruct access to a pine marten den³⁶.
- 8.13 NatureScot is responsible for issuing licences relating to pine marten for the purpose of development. For non-breeding dens, exclusion zones should be a minimum of 30 m; at least 100 m is necessary where dens are known or suspected of being used for breeding and works in the breeding season cannot be avoided (March-June inclusive). Where exclusion zones of the required size cannot be achieved, works will require a licence from NatureScot before they can proceed.

Pine marten at the Site

- 8.14 When combining the various findings from surveys undertaken, it can be concluded that pine marten are likely to be widespread within the woodland areas north of the A85. Although no specific dens were found in the Site, the foliage and access restrictions at the time of the survey made their presence impossible to rule out. Woodland areas within 250 m of the south of the access were more robustly searched as part of the surveys and no dens were identified. However, pine marten were confirmed to be present within areas adjacent to the existing access track through both field signs and camera monitoring.
- 8.15 There were no signs of pine marten presence within the Lower Site Compound part of the Site, but suitable woodland habitat did occur to the west within a 250 m buffer of the Site boundary. The high level of activity within the plantation block south of the River Strae confirmed that pine marten were likely to be denning within the wider area to the southeast of the Site.
- 8.16 The Site is considered to be of **Local** level importance for the pine marten population in the area. The species should therefore be a **Local** level IEF in the EcIA, and due to the likely

³⁶ The exception to this is when the den is in the roof space or other part of a house, where it is not an offence to discourage a pine marten from using the den, or to block access to the den, provided a pine marten is not in the den at the time the action is taken and does not have dependent young.



continued access restrictions for full survey, the presence of pine marten dens within 250 m of the Lower Site Works should be assessed within the EcIA on a precautionary basis.





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Cruachan 2

Pine Marten Habitat Survey Results

Site boundary



250 m from Site boundary Proposed Development footprint Camera location Suitable foraging and denning habitat Pine marten habitat target note

Figure 8.1

Map Scale @ A3: 1:25,000







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Cruachan 2

2021 Pine Marten Survey Results



Site boundary 250 m from Site boundary Proposed Development footprint

Field signs in 2021:

A Pine marten scat

Figure 8.2

Map Scale @ A3: 1:25,000







Figure 8.3: Selection of photographs from the pine marten survey.

(a) Suitable pine marten habitat within woodland areas north of the A85.

(b) Weathered pine marten scat adjacent to existing access track.



(c) Large cavity in mature tree with suitability for denning pine marten. Typical of features present throughout woodland areas.





(d) Pine marten scat within plantation woodland south of the River Strae.

(e) Pine marten scat within plantation woodland south of the River Strae.

(f) Pine marten carrying an egg.





(g) Pine marten on camera trap in east of the Study Area.

(g) Pine marten on camera, scent marking at the entrance to a disused mammal hole in the east of the Study Area.



9 Bats

Methodology

Pre-existing data

- 9.1 The following protected species survey reports were available for review:
 - ScottishPower Generation Ltd (2017) Cruachan Power Station Bat Survey Report. Unpublished contract report, dated November 2017.
- 9.2 Pre-existing information regarding the presence of protected or notable species in the near vicinity of the Site was extracted from a range of data sources within the National Biodiversity Network (NBN) Atlas³⁷, where there were no copyright issues associated with their use in a commercial context.

Habitat assessment

9.3 A general appraisal of the landscape ecology value of the Site for foraging and commuting bats was made, based on the criteria provided in Collins (2016)³⁸ and Wray *et al.* (2010)³⁹.

Preliminary Roost Assessment of structures

- 9.4 In August 2021, a licensed bat ecologist carried out a PRA for the built structures at the Site. In accordance with current best practice survey guidance produced by the BCT (Collins, 2016 - see **Table 9.1**), the structures were carefully inspected for features which might typically provide access into their structures for roosting and/or hibernating bats. Binoculars were used (together with a high-powered Clulite torch where light conditions were poor or close access difficult) to inspect likely bat entry points such as lifted tiles, illfitting fascia boards, cladding and wall crevices. Well-used roosting bat entry/exit points can show signs of bat use, such as staining and scratch marks, as well as droppings below or adhering to nearby walls. Evidence of this kind was also searched for during the inspection.
- 9.5 Internal inspections were not carried out.

Limitations of the structures PRA

9.6 The inspection of structures for evidence of bats can be conducted at any time of the year. However, the chances of finding evidence of bats (e.g. their droppings) on external areas that are unprotected from rainfall may be restricted if undertaken outside the main batactive season and/or after periods of wet weather, as any evidence of bat presence may have been washed away. It is important to note that visible signs are not always obvious at a roost site, even when bats are present. The survey described here was undertaken within

³⁹ Wray, S., Wells, D., Long, E. and Mitchell-Jones, A. (2010). Valuing bats in Ecological Impact Assessment. *In Practice*, December 2010.



³⁷ <u>https://nbnatlas.org/</u> accessed March 2021.

³⁸ **Collins, J. (2016)** Bat Surveys: Good Practice Guidelines, 3rd Edition. Bat Conservation Trust.

the main bat active period and after a prolonged period of dry weather. The conditions were therefore optimal for the physical identification of bat presence.

Table 9.1:	Categories	of habitat	suitability	for bats	(after	Collins,	2016).
------------	------------	------------	-------------	----------	--------	----------	--------

Suitability	Description of roosting habitats	Description of commuting and foraging habitats
Negligible	Negligible roosting features likely to be used by roosting bats.	Negligible habitat features likely to be used by commuting or foraging bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis by larger numbers of bats (i.e., unlikely to be suitable for maternity or hibernation). A tree of sufficient size and age to contain potential roost features, but with none seen from the ground, or the features seen have only very limited roosting potential.	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but is isolated i.e., not well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure or tree with one or more potential roost sites that could be used by bats, due to its size, shelter, protection, conditions and surrounding habitat, but unlikely to support a roost of high conservation status (with respect to roost type only – the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).	Continuous habitat connected to the wider landscape that could be used by bats for commuting, such as lines of trees and scrub, or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging, such as trees, scrub, grassland or water.
High	A structure or tree with one or more potential roost site(s) that is/are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to its/their size, shelter, protection, conditions and surrounding habitat.	Continuous, high-quality habitat that is well connected to the wider landscape which is likely to be used regularly by commuting bats, such as river valleys, streams, hedgerows, lines of trees and woodland edges. High-quality habitat that is well-connected to the wider landscape and which is likely to be used regularly by foraging bats, such as broad-leaved woodland, tree-lined watercourses and grazed parkland. Site is close to and connected to known roosts.

- 9.7 A PRA would also usually require a survey to be undertaken internally as well as externally. However, Cruachan Visitor Centre was closed at the time of the survey, the Cruachan Power Station administration building had a strict Covid-19 policy in place, and no access was available to the utilities building adjacent to the Cruachan Power Station. The rows of lock-ups off St Conan's Road could also not be inspected internally as these were owned by local residents. The aqueduct tunnels around Cruachan Reservoir were all recorded as having hibernation suitability, but this was only based on a view available from the opening of each tunnel.
- 9.8 As physical signs of bat occupancy can be absent even during the bat active period, if potentially suitable roost features were present, this would have formed the basis of the



evaluation regardless of the presence or absence of confirmatory physical evidence of bats. Therefore, the access restrictions were not considered to be a significant limitation to the study as recommendations regarding bat activity survey are not dependent on the need for conclusive physical evidence of bats, although both may result in caveats to the survey findings.

Preliminary roost assessment of trees

- 9.9 In August 2021, trees in specific areas within the original Site boundary and identified as being potentially impacted by the Development were assessed for their bat roost suitability (BRS), in accordance with the protocol for visual inspection of trees due to be affected by arboricultural work (Collins, 2016) (see **Table 9.1**). The Study Area used in 2021 included large sections of woodland with mature trees, and no detailed footprint for the Proposed Development was available at the time of the survey. It was not feasible to carry out specific assessment on each tree within the Study Area due to the sheer number of specimens involved, as well as health and safety concerns regarding the steepness of the ground. Therefore, survey effort was targeted to focus on trees potentially in or close to the footprint of the Proposed Development, which comprised tree lines along the River Strae and Allt Mhoille, as well as targeted assessment for trees within the Site boundary along the existing access track and along the shore of Loch Awe.
- 9.10 The trees were inspected from ground-level, using binoculars if necessary, for features considered to be suitable for bats, including cracked or flaking bark, split limbs or trunks, ivy cladding, knot holes, woodpecker holes and bird/bat boxes. A high-powered torch and an endoscope were also used to aid the survey where appropriate. Consideration was also made of the habitat context of a tree its connectivity with and/or proximity to suitable bat commuting or foraging habitat, and accessibility for a flying bat.

Limitations of the PRA of trees

- 9.11 The inspection of trees for their suitability for bats can be conducted at any time of year, according to the best practice survey guidance produced by the BCT. However, finding evidence of bats (e.g. their droppings) on surfaces that are unprotected from rainfall may be restricted if undertaken outside the main bat active season (May to September) and/or after periods of wet weather. During the latter, evidence of bat presence may have been washed away. This survey was undertaken within the main bat activity season but the dense foliage meant that many of the mature trees could not be assessed fully.
- 9.12 Evidence of roosting bats in trees, such as droppings and staining, is often entirely absent, even when roosting bats are present. This, combined with the transitional nature of use of tree roosts by many species of bat, means that while survey work may confirm roost presence, it is unlikely to confirm conclusively absence.
- 9.13 The area surveyed in the east of the Site in 2021 was larger than the final Site boundary. Despite this, the final Site boundary extended closer to the section of the Allt Mhoille north of the B8077 than was included in the original boundary. This resulted in a small section along the final Site boundary where no assessment of trees was carried out in 2021, as shown in **Figure 9.2**. However, this section was quite some distance away from the likely location of the Lower Site Compound.



9.14 Sections of trees adjacent to the existing access track were not fully accessible due to dense bracken in these areas. Where this was the case, a single grid reference was taken which often comprised multiple numbers of trees, as described in **Appendix I**. Therefore, each point on the map does not necessarily relate to a single tree and in some instances included multiple trees.

Results

Pre-existing data

9.15 No records were found for bats within the NBN, dated from 2010 or later that were not restricted for use in a commercial setting.

Static monitoring

9.16 A total of nine static detectors were deployed by Arcus in 2017, in June, July and September. Each session had detectors deployed for a minimum of five consecutive nights per session. The general locations of detectors are outlined in **Table 9.2**.

Static location	Habitat description
A	Cruachan dam. Eastern side on the reservoir bank.
В	Cruachan dam outlet (downstream side).
С	Western banks of Falls of Cruachan.
D	Broadleaved woodland on eastern banks of Falls of Cruachan.
E	Open hillside by existing access track.
F	Watercourse upstream from existing access track.
G	Watercourse and riparian woodland crossing existing access track.
н	Open bracken covered grassland along existing access track.
1	Mature broad-leaved woodland near lower section of existing access track.

Table 9.2: Static detector locations used in 2017 (by Arcus Ltd).

- 9.17 The static detectors recorded overall low levels of bat activity and low species diversity, primarily common and soprano pipistrelle, and *Myotis* sp..
- 9.18 The most abundant species recorded was common pipistrelle (51 % of calls), with *Myotis* sp. only comprising 0.4 % of the calls. Activity was highest in the first deployment in June 2017 (2410 passes), dropping significantly in the second deployment in mid-July 2017 (823 passes), and increased again in the third deployment in September 2017 (1531 passes).
- 9.19 The location with the highest activity was Location G, then Location I, and thirdly Location A. Collectively, these three locations comprised 85 % of all bat activity recorded across all survey sessions. All three were located within woodland or water-edge habitats.



Emergence surveys

9.20 In August 2017, a single emergence survey was completed on the utilities building adjacent to the existing Cruachan power station, along with two emergence surveys on a mature tree adjacent to the utilities building (referenced as TN91 in the 2021 surveys). No roosting bats were identified during these surveys.

Hibernation records

9.21 In late October 2019, during civils maintenance works, a single hibernating Daubenton's bat was found within a stone crevice in the eastern aqueduct tunnel into Cruachan Reservoir.
A further inspection was carried out of the work area by a licensed bat worker, and a licence was applied for to allow that work to be completed.

Habitat assessment

Roosting

- 9.22 Extensive ancient woodland and mature tree lines along the A85 corridor provided a network of habitats that offered numerous roosting opportunities for bats. Roosting suitability of trees was formally identified as part of a PRA assessment at the Site, and the results of this are described in more detail below.
- 9.23 The railway bridge over the Allt Cruachan, the Visitor Centre, and the administration building at Cruachan Power Station also displayed bat roost suitability and were the subject of dedicated PRA assessment. The aqueduct tunnels around Cruachan Reservoir were also found to have suitability for hibernation roosts.

Foraging

- 9.24 The mosaic of habitats within the Site created a mixture of attractive bat foraging and commuting areas that extended into the wider area. Abundant woodland tree cover occurred throughout the Site, with woodland edges offering particularly attractive bat foraging habitat, as well as clearings within the woodland canopy. Dark woodland corridors along riparian habitat and the edge of Loch Awe also offered opportunities for foraging below the canopy and over water. The woodland edges, existing tree lines and riparian corridors provided strong bat commuting routes.
- 9.25 In accordance with the criteria provided in Wray *et al.* (2010), the habitat mosaic of the Site was initially considered to have at least Local value for foraging and/or commuting bats. The habitats present within the Site were judged to offer High habitat suitability for bats, based on the criteria provided by Collins *et al.* (2016).

Preliminary roost assessment of buildings

9.26 Results of the PRA of structures can be found in **Figure 9.1**. A description of each structure and the roost suitability are shown in **Table 9.3**. Photographs of the structures can be found in **Figure 9.2**.



Building TN	Building description	BRS
22	Bridge over the Alt Mhoille at the B8077. Stone crevices on the underside, but outside Site boundary.	Moderate
47	Lock-ups with metal sheeted roof and concrete sides. Gaps allowing access internally for bats but limited roosting space available and in poor condition.	Negligible
52	Lock-ups with same construction as TN47 but longer row. Same access locations as TN47 and in general disrepair. Limited roosting space internally. Concrete fascia feature along rear side had gap against wall. However, this backed on to dense vegetation.	Negligible
68	Aqueduct tunnel from the hillside. Likely to have many stone crevices and maintain a humidity and temperature suitable for hibernating bats. Easy flight access via inlet opening. Daubenton's bat recorded here in late 2019 during stabilisation works.	Suitable hibernacula
69	Aqueduct tunnel from the hillside. Likely to have many stone crevices and maintain a humidity and temperature suitable for hibernating bats. Easy flight access via inlet opening.	Suitable hibernacula
70	Bridge over Allt Cruachan downstream of the dam. Concrete structure with no suitable roosting crevices.	Negligible
71	Substation building south of the dam with pebbledash render at lower walls at 2 m and then cladding in upper sections. No suitable roosting crevices.	Negligible
83	Bridge over existing access track. Steel underside with no crevices.	Negligible
87	Visitor centre building. Timber cladding with concrete tiles on the roof. Modern construction. Limited roosting features with most areas well sealed. Cavity behind front signage at the entrance.	Low
88	Admin building of the power station. Flat roofed and rendered panels on external walls. Rendered panels mostly sealed to external walls, but some minor crevices were visible as well as lifted flashing along window frames.	Low
89	Aqueduct tunnel from the hillside. Likely to have many stone crevices and maintain a humidity and temperature suitable for hibernating bats. Easy flight access via inlet opening.	Suitable hibernacula
90	Railway bridge over Alt Cruachan with multiple stone crevices.	Moderate
94	Utilities building with concrete rendered walls and timber soffit with a flat roof. Activity survey undertaken here by Arcus in 2017. All areas were sealed and no crevices were visible.	Negligible

Table 9.3: Description of bat roosting suitability recorded in the PRA of structures.

Preliminary roost assessment of trees

- 9.27 A summary of the assessment of trees within the Site is provided in **Appendix I** and **Figure 9.3**, with survey photographs in **Figure 9.4**.
- 9.28 The areas inspected were split into defined areas, comprising tree cover along the River Strae and Allt Mhoille, trees within the Site along the existing access track, and specific trees within the grounds of the existing power station. Many of the trees inspected within the original Site boundary were no longer relevant to the final Site boundary, particularly along the River Strae and Allt Mhoille, but these have been included in the results tables and maps for context.

Wooded slopes and the access track

9.29 As described above, large areas of the Site had continuous woodland cover with mature trees and these areas were recorded as 'continuous trees with BRS'. This included trees



adjacent to the A85 within the Lower Works Area and the temporary A85 diversion. Numerous large mature trees occurred along the northern side of the A85 adjacent to the existing train station layby, displaying a variety of PRFs. No trees with BRS were identified along the tree lined embankment of Loch Awe within the Site as these were relatively young, recently planted specimens.

9.30 Along the existing access track and junction of St Conan's Road, one tree was recorded as having high suitability, 28 trees (or groups of trees) with moderate BRS, and four trees with low BRS.

Lower Site Works

9.31 In the grounds surrounding the existing power station buildings, one tree had high BRS and three trees had moderate BRS.

Lower Site Compound

9.32 In total along the River Strae and Allt Mhoille, one area of trees with high BRS, 28 trees with moderate BRS and 14 with low BRS were recorded. Of these, only five (one with moderate BRS and four with low BRS) were located in proximity to the final Site boundary, and none of these were close to the footprint of the Proposed Development.

Discussion

Relevant legislation

- 9.33 All British bats are EPS, protected in Scotland by the Conservation (Natural Habitats &c.) Regulations (1994) as translated into domestic legislation post-Brexit, and the Wildlife and Countryside Act (1981, as amended). This legislation makes it an offence to capture, harass, injure or kill a bat; obstruct access to, damage or destroy a breeding or other resting place of a bat; disturb bats in such a way as is likely to affect their distribution or abundance, or disturb bats in such a way as is likely to impair their ability to survive or breed. Each of these actions is considered to be an offence whether the action is deliberate or reckless, except in the case of damaging or destroying a breeding site or resting place which is a strict liability offence. A licence is required for all developments which will affect areas known to contain bat roosts.
- 9.34 A bat roost is defined as any structure or place which is used for shelter or protection, irrespective of whether or not bats are resident. Buildings and trees may be used by bats for a number of different purposes throughout the year including resting, sleeping, breeding, raising young and hibernating. Use depends on the age, sex, condition and species of bat as well as the external factors of season and weather conditions. A roost used during one season is therefore protected throughout the year and any proposed works that may result in disturbance to bats, or loss, obstruction of or damage to a roost are licensable.



Bats at the Site

Bat roosts within structures

Summer roosting

- 9.35 The bridge over the Allt Mhoille at the B8077 and the railway bridge over Allt Cruachan both displayed moderate summer roosting suitability for bats but will not be directly affected by the Proposed Development. The Visitor Centre and administration building at the existing power station, both displayed low suitability, but also will be not be affected. All other structures within the Site were judged to have negligible suitability for summer roosting.
- 9.36 At this time, no further activity surveys needed on structures within the Site, and summer roosting bats within structures are not considered to be an IEF for the purposes of the EcIA.

Winter hibernation

- 9.37 Hibernation suitability was recorded within the aqueduct tunnels surrounding Cruachan Reservoir. These could not be inspected fully, but were judged to offer suitable conditions for hibernating bats within rock crevices throughout the tunnels. In late October 2019, hibernating Daubenton's bats were found the eastern tunnel at Cruachan Reservoir during stabilisation works, confirming that bats use these features for hibernation. Hibernating bats, most likely *Myotis sp.*, should therefore be assumed to be potentially present within the aqueduct tunnels surrounding Cruachan Reservoir between late October and early March.
- 9.38 Hibernating bats within tunnel features should therefore be included in the EcIA as an IEF of **Local** importance, and impacts assessed on a precautionary basis.

Roosting suitability of trees

9.39 The PRA of trees within the Site identified numerous trees that displayed bat roost suitability. With regards to proximity to the Proposed Development, indirect impacts on these features could occur during the Lower Works and therefore summer bat roosts in trees should be included as an IEF of **Local** importance in the IEF, and impacts assessed precautionarily.

Foraging and commuting

- 9.40 Areas of woodland within the Site, as well as edge habitats, and riparian corridors of trees would be expected to be well-used by a range of bat species, such as soprano and common pipistrelles, along with brown long-eared and *Myotis* sp., with the highest activity along tree cover at the existing access track. Static monitoring in 2017 confirmed that pipistrelle bats and *Myotis* sp. were present foraging around the eastern side of Cruachan Reservoir.
- 9.41 Foraging and commuting bats should therefore be included in the EcIA as an IEF of **Local** importance, and impacts assessed on a precautionary basis.





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Cruachan 2

2021 Bat Roost Suitability of Structures

 \triangle

Site boundary

Proposed Development footprint

Structure bat roost suitability in 2021:

- Confirmed hibernacula
- Potential hibernacula
- Moderate
 - Low
 - Negligible

Figure 9.1

Map Scale @ A3: 1:25,000

Surveyed by: AEL Survey date: August 2021 Drawn by: DS Checked by: RAH Status: Final



Figure 9.2: Photographs from building PRA survey.





(b) Lock-ups adajcent to St Conan's Road with negligible roost suitability, described in TN47 and TN52.

(a) Bridge over Allt Mhoille with moderate roost suitability, described in

TN22.



(c) Aqueduct tunnel from the hillside into Cruachan Reservoir with hibernation suitability, described in TN68. Similar tunnels located at TN69 and TN89.





(d) Bridge over Allt Cruachan south of the dam with negligible roost suitability, described in TN70.

(e) Substation south of the dam with negligible roost suitability, described in TN71.



(f) Visitor Centre with low roost suitability, described in TN87.





(g) Railway bridge over the Allt Cruachan with moderate roost suitability, described in TN90.

(h) Utilities building with negligible roost suitability, described in TN94.Activity surveys were completed on this building in 2017.





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Cruachan 2

2021 Bat Roost Suitability of Trees



Site boundary Proposed Development footprint Continuous trees with BRS Not surveyed in 2021 Tree bat roost suitability in 2021:



High Moderate

Low

Figure 9.3

Map Scale @ A3: 1:25,000

Surveyed by: AEL	
Survey date: August 2021	
Drawn by: DS	
Checked by: RAH	
Status: Final	





Figure 9.4: Photographs from tree PRA survey.

(a) Large mature oak tree adjacent to junction at St Conan's Road. Various deadwood visible. Typical of size and type of features found on mature trees that were classified as having moderate BRS.

(b) Knothole feature typical of what was considered to be a low BRS feature.

(c) Large mature oak adjacent to utilities building at existing power station. Tree was rated as having high BRS, and was the subject of activity surveys in 2017.



(d) Woodland areas marked as having 'continuous trees with BRS', north of the A85.



10 Ecological Features Scoped Out

10.1 Following the review of pre-existing data for the Proposed Development, and consultation with NatureScot, a number of potential IEFs were scoped out of the assessments for the Proposed Development.

Scottish wildcat

- 10.2 During surveys undertaken in 2016, suitable habitats for Scottish wildcat were recorded within the Site, including semi-natural woodland of mixed age, moorland, woodland marginal habitats and rough grazing. In addition, suitable denning locations were identified amongst large rocks, boulders and hillside rocky crags. However, high numbers of recreational users within the Site (including dog walkers and hill walkers), were considered likely to deter Scottish wildcat from using these habitats.
- 10.3 In 2018, further walkovers for wildcat were undertaken and no specific signs of this species were identified. Furthermore, in 2019 wildcat were not recorded on any camera traps as part of extensive monitoring, nor were they recorded in 2021.
- 10.4 It was therefore judged unlikely that wildcat were present within the Site, and this species was scoped out of the 2021 surveys and will not be considered in the EcIA.

Beaver

10.5 The Site is not within the known distribution of beaver in Scotland. Furthermore, the watercourses and tributaries within the Site did not include typical habitat that beavers utilise, mainly consisting of steep fast flowing watercourses down hillsides, and waterbodies with artificial margins. Therefore, beaver were scoped out of the 2021 surveys and will not be considered in the EcIA.

Freshwater pearl mussel

10.6 Surveys in 2017 included consideration of habitat suitability within the Site for fresh water pearl mussel, noting that this species relies on the presence of salmonid fish for dispersal at the start of their life cycle. Due to the steepness of the watercourses and the presence of significant barriers for the movement of salmonid fish species, it was considered unlikely that fresh water pearl mussel was present within the Site. Therefore, this species was scoped out of the 2021 surveys and will not be considered in the EcIA.

Reptiles

10.7 No formal or casual records for reptile species were reported in the surveys undertaken for the Site between 2016 and 2018, and no such animal species were seen in 2021. However, suitable habitats for all three of common lizard, slow-worm and adder was noted, including south-facing areas of undergrowth within heathland, dense bracken, tussocky grassland and rough pasture, particularly when located in close proximity to scree and exposed rocks



where reptiles may bask. Nevertheless, it was also likely that they would be present at a density below which survey would produce useful returns. It was therefore agreed during consultation that reptile survey was not practicable, but these species should be considered in the EcIA on a precautionary basis. Adder, common lizard and slow-worm are all listed on the Scottish Biodiversity List as principal species of concern, for which negative impacts should be avoided. They are not included in the A&BS LBAP and therefore will be considered in the EcIA as an IEF of **Local** importance.

Amphibians

10.8 Surveys between 2016 and 2018 recorded suitable habitat for common frog and common toad throughout the Site, with particular suitability for these species in wetland habitats including wet heath, bog and marshy grasslands. However, no waterbodies were present within the Site with suitability for specially protected amphibians such as great crested newt, and therefore these species will not be included as an IEF in the EcIA.



11 Conclusions

- 11.1 In 2021, a data review and range of habitat and protected species survey were undertaken for the Site at Cruachan 2. The results of these surveys have informed constraints mapping for the proposed Development and will be utilised in the Ecology chapter of the EIAR.
- 11.2 These results and conclusions will typically remain valid for a period of 12-18 months, after which time a review would be needed.



Appendix A List of Abbreviations Used in this Report



Abbreviation	Full terminology
A&BC	Argyll and Bute Council
AEL	Applied Ecology Ltd
AGL	Above Ground Level
AWI	Ancient Woodland Inventory
BRS	Bat Roost Suitability
CIEEM	Chartered Institute of Ecology and Environmental Management
DAFOR	Dominant, abundant, frequent, occasional or rare.
EcIA	Ecological Impact Assessment
ECoW	Ecological Clerk of Works
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EPS	European Protected Species
EUNIS	European Nature Information System
GIS	Geographical Information System
GPS	Global Positioning System
GWDTE	Groundwater Dependent Terrestrial Ecosystem
HRA	Habitats Regulations Assessment
INNS	Invasive Non-Native Species
JNCC	Joint Nature Conservation Committee
LBAP	Local Biodiversity Action Plan
LNCS	Local Nature Conservation Site
MMU	Minimum Mappable Unit
PRA	Preliminary Roost Assessment
PRF	Potential Roost Feature
SAC	Special Area of Conservation
SEPA	Scottish Environmental Protection Agency
SPA	Special Protection Area
SPP	Species Protection Plan
SSSI	Site of Special Scientific Interest
WANE Act	Wildlife and Natural Environment (Scotland) Act (2011)



Appendix B Scottish EUNIS/NVC Survey Target Notes



TN	Description
1	Valley mire complex in hollow, with abundant bog myrtle and cover of Sphagnum mosses including <i>Sphagnum papillosum</i> and S. <i>capillifolium</i> . Other frequent species included round-leaved sundew, bog asphodel, tormentil, cross-leaved heath, purple moor-grass, star sedge, white beak-sedge, and marsh willowherb, with occasional devil's-bit scabious and species of <i>Dactylorhiza</i> orchids.
2	Acid grassland mound with over-mature oak trees. Bracken and purple moor-grass occasionally locally abundant, but common bent, tormentil, sheep's fescue and sweet vernal-grass all abundant. Trees likely to contain Potential Roost Features for bats.
3	M23 community dominated by sharp-flowered rush, with frequent soft rush. Purple moor-grass was abundant, and tormentil and Yorkshire fog frequent. More occasional species included devil's-bit scabious, common sorrel, sweet vernal-grass and Sphagnum mosses. Dactylorhiza spikes were rare.
4	A form of M15 wet heath variously dominated by bog myrtle and purple moor-grass, with bog asphodel, cross- leaved heath, white-beaked sedge, and occasional heather and tormentil. Small, narrow flush areas in hollows were dominated by common cottongrass.
5	Small runnel with bare peat and bog pondweed. Other species present included common cottongrass, various Sphagnum species, bog asphodel, white beak-sedge, and purple moor-grass. Some of the runnels also supported bog bean.
6	Wet, sluggish ditch with bog pondweed, round-leaved sundew, common spearwort, <i>Sphagnum cuspidatum</i> , <i>S. denticulatum</i> , Yorkshire fog (on margins), sharp-flowered rush, white beak-sedge, occasional purple moor-grass and marsh willowherb.
7	Woodland dominated by silver birch, goat willow and rowan. Bramble frequent in understorey, and abundant common knapweed in more open areas. Other species recorded included common hogweed, sneezewort and viviparous fescue.
8	Flush dominated by white beak-sedge, with common butterwort, round-leaved sundew, purple moor-grass, glaucous sedge, bog asphodel and abundant trampled ground.
9	Complex mosaic of habitats across the hillside, including extensive areas dominated by white beak-sedge, and other areas where purple mor-grass had been grazed down with abundant deergrass into a fairly short-sward version of M15. Mat-grass dominated U5 formed a mosaic within this, along with sharp-flowered rush dominated M23. Sheep's fescue, red fescue, common bent and velvet bent, all constant but at a low abundance, along with tormentil, eyebrights, the moss <i>Racomitrium lanuginosium</i> , abundant <i>Sphagnum</i> mosses especially in areas with the white beak-sedge, devil's-bit scabious and small, individual plants of heather. Bog myrtle occasionally present.
10	Carpets of white beak-sedge.
11	Species-poor variant of M23, dominated by sharp-flowered rush, but with some areas with acid grassland patches on drier soils giving more of a MG10 feel. Frequent species included tormentil, sweet vernal-grass, white clover, and abundant red fescue. Heath rush, Yorkshire fog and selfheal all occasional, and eyebrights rare.
12	Mosaic of M25 and M15 where purple moor-grass was dominant on shallow peats. Deergrass, bog myrtle and sharp-flowered rush all abundant. Frequent species included bog asphodel and cross-leaved heath was occasional. The slope down to the road was more species-rich, with bell heather and heather, eyebrights and northern marsh orchid. There were occasional narrow flushes with brown mosses, round-leaved sundew, devil's-bit scabious and common butterwort, indicative of M10.
13	Flush dominated by white beak-sedge, within M15 habitat. Various Sphagnum species present, along with round- leaved sundew, the moss <i>Racomitrium lanuginosium</i> , and sharp-flowered rush.
14	Small patch of M15 with sharp-flowered rush, and surrounded by bracken.
15	Patch of acid grassland dominated by sheep's fescue and common bent, with scattered soft rush and sharp-flowered rush, frequent tormentil, white clover and creeping buttercup, and occasional common sorrel, Yorkshire fog, sweet vernal-grass and common mouse-ear. Bracken was rare.
16	Species of cudweed found on disturbed ground within the powerline wayleave.
17	Mixed woodland containing oak, birch, rowan and willow on slopes. Occasional larger oak standards present, with the other species collectively dominant. Bracken and bramble in the understorey, with saplings of rowan and hazel.
18	Asbestos roofed, rendered concrete garages with some bar roosting suitability. Large, mature oaks in woodland surrounding the structure, along with INNS such as rhododendron and Montbretia.
19	U4 acid grassland with fescues, bent grass and tormentil, and occasional heath rush.
20	M23 dominated by sharp-flowered rush, with marsh thistle, tormentil, devil's-bit scabious and willow saplings. Frequent hummocks of Sphagnum, including <i>S. fallax, S. capillifolium</i> and <i>S. palustre</i> .



TN	Description
21	Large area of bare peat, assumed to have been disturbed during recent filming activities.
22	M23 dominated by sharp-flowered rush in a mosaic with fescue-dominated grassland (viviparous fescue) and purple moor-grass, governed by the hummock and hollow topography and scattered boulders. Also some small M10 flushes with butterwort and hare's-tail cottongrass. <i>Sphagnum</i> mosses plentiful and varied, along with eyebrights, cross-leaved heath, and species of <i>Dactylorhiza</i> . Occasional nettle patches noted along the existing access track to the dam, in areas of frequent sheep dunging.
23	Small lochan, well-used by common blue damselflies. Successional sequence of vegetation from common spike- rush, common cottongrass, common spearwort through to carpets of <i>Sphagnum</i> , least bur-reed and bog pondweed. Areas of round-leaved sundew and butterworts on margins, and surrounded by purple moor-grass dominated grassland.
24	U5 grassland grading into M15 with bog myrtle, deergrass and frequent purple moor-grass. Boulder-strewn, with M10 type flushes in some locations.
25	Mosaic of U4 and M23a where common bent, crested dog's-tail, Yorkshire fog, sweet vernal-grass and sheep's fescue were all abundant or frequent. Sharp-flowered rush and soft rush were both at least frequent, and occasionally locally abundant. Herb species were limited to creeping buttercup, selfheal, meadow buttercup, white clover, common cat's-ear, common sorrel and rarely common bird's-foot trefoil and devil's-bit scabious.
26	M15 wet heath dominated variously by deergrass or purple moor-grass, with frequent heather and bog asphodel, and abundant cross-leaved heath. Common cottongrass and white beak-sedge were both occasional. Other occasional species included sharp-flowered rush, tormentil, and the drier hummocks have species of <i>Cladonia</i> lichen and the moss <i>Racomitrium lanuginosium</i> . Bog myrtle was also locally abundant, and there were occasional trampled flushes containing white beak-sedge and common sedge.
27	Habitat above the fenceline where purple moor-grass was conspicuously dominant and taller, resulting in lower diversity within the sward. Bog asphodel and bog myrtle were still abundant, with occasional tormentil, sharp-flowered rush and bracken. No heather or deergrass was found in these areas. Also occasional trampled flushes, with white beak-sedge, round-leaved sundew, common butterwort, common sedge, and <i>Sphagnum capillifolium</i> , <i>S. fallax</i> and <i>S. denticulatum</i> .
28	Grazed U4 grassland, dominated by sheep's fescue, abundant purple moor-grass and frequent common bent. The moss Rhytidiadelphus squarrosus was also abundant, along with tormentil. Bracken was frequent, along with creeping buttercup. More occasional species included violets, eyebrights, mouse-ear-hawkweed, viviparous fescue, heath rush and soft rush. Ribwort plantain and heath woodrush were both rare.
29	M25a on shallow peats, dominated by purple moor-grass, with Yorkshire fog, common bent and sheep's fescue. Tormentil was conspicuously abundant, but otherwise the sward was relatively species-poor, with soft rush, occasional bracken, marsh lousewort and heather.
30	Deep peat complex dominated by purple moor-grass and sharp-flowered rush. Bog asphodel, bog myrtle were also conspicuous in the sward and in some locations were co-dominant with the <i>Molinia</i> and <i>Juncus</i> . Common cottongrass and star sedge were occasional, and round-leaved sundew and cross-leaved heath were rare. Occasional <i>Sphagnum</i> mosses and bog pondweed.
31	Similar to TN30, with sharp-flowered rush and purple moor-grass on deep peat. Bulky <i>Sphagna</i> were abundant, along with cross-leaved heath, tormentil and bog asphodel.
32	M25 dominated by purple moor-grass with abundant devil's-bit scabious. Tormentil was frequent, and heath rush, heather and viviparous fescue were occasional.
33	An area of odd-looking habitat which appeared to be an area of M15 dominated by sharp-flowered rush. Peat depths were variable, presumably reflecting an undulating bedrock, but purple moor-grass and bog asphodel were both abundant, with Sphagnum mosses locally abundant. Tormentil was also abundant, along with bog myrtle. More occasional species included devil's-bit scabious. Common spearwort, white beak-sedge, common sedge and yellow sedges were all present in the flushes.
34	Railway bridge. Willow/birch woodland on the aside of Loch Awe. Bracken with birch, ash and some oak were present on the road side facing south-west. Facing north-east there was willow/birch woodland on both sides of the railway.
35	Area dominated by meadowsweet, with abundant tufted hair-grass, and occasional reed canary-grass. Also present were common hemp-nettle, marsh valerian, common sorrel, sharp-flowered rush, sneezewort and hedge woundwort, grading into an area dominated by tufted hair-grass and a small extent of reed canary-grass swamp.
36	Reed canary-grass swamp with water mint, marsh marigold and marsh ragwort. River levels were v. low, revealing a fed fescue colonised mud bank, and marsh marigold and broad-leaved pondweed in the water. Bottle sedge was recorded along the banks.



TN	Description
37	Species of aster found along shoreline.
38	Rockside community of hillside, with butterworts, alpine lady's-mantel, heather, viviparous fescue, fairy flax, yellow saxifrage, wild thyme, and yellow sedges.
39	Deergrass dominated M15. Very little cross-leaved heath or purple moor-grass, but frequent tormentil and velvet bent. Mosaic with areas of U5 grassland.
40	U5 becomes more prevalent within the mosaic with M15, but coverage of both habitat types highly variable throughout this general area.
41	Narrow M15-type flush dominated by purple moor-grass, with bog asphodel.
42	M2 bog pool with <i>Sphagnum cuspidatum</i> , round-leaved sundew, bog asphodel. Relatively shallow peat with bedrock no more than 30 cm below surface. Gradation into U5 grassland.
43	Molinia-dominated habitat, with bog asphodel, deergrass, devil's-bit scabious, tormentil. Likely to be classifiable as M15, but cross-leaved heath was rare. Heath rush was occasionally found.
44	Tight mosaic of U5, U4 and M15 along shoreline; grazed by sheep.
45	Habitat dominated by deergrass and bog asphodel, with abundant common cottongrass and occasional purple moor- grass. Bog pool present with <i>Sphagnum cuspidatum</i> ,. Hummocks of <i>S. papillosum</i> and <i>S. capillifolium</i> , with cross- leaved heath and tormentil.
46	M25 conspicuously dominated by purple moor-grass, with bog asphodel and rarely tormentil.
47	Willow scrub.
48	M15 wet heath. Dominated by deergrass with occasional purple moor-grass and hare's-tail cottongrass. Forbs included butterwort, bog asphodel, tormentil, eyebright and cross-leaved heath. Bryophytes included <i>Pleurozium schreberi</i> . Peat less than 1 m. Some scattered boulders in this habitat.
49	U5 acid grassland. Mat-grass dominated with heath grass, deergrass and brown bent. Rare purple moor-grass and sweet vernal-grass. Forbs and shrubs included tormentil, bog asphodel, ling heather and cross-leaved heath. Bryophytes included <i>Pleurozium schreberi, Rhytidiadelphus loreus,</i> and <i>Thuidium tamariscinum.</i> On steeper/sloping ground than surrounding wet heath.
50	M15 wet heath. Deergrass, purple moor-grass and viviparous fescue over bryophyte layer of <i>Racomitrium lanuginosum</i> and <i>Pleurozium schreberi</i> . Forbs and shrubs included ling heather, cross-leaved heath and tormentil. Some patches of M15 were flushed, appeared to be M15a areas of M15 on drier slopes appeared to be M15a or M15b.
51	U5 acid grassland. Mat-grass dominated with common bent, sheep's fescue and viviparous fescue. Forbs included tormentil and dog-violet in places. Bryophytes included <i>Hypnum jutlandicum, Pleurozium schreberi</i> and <i>Rhytidiadelphus loreus</i> . This grassland showed signs of heavy grazing. To the east of the existing access track leading down to the reservoir mat-grass became less dominant with U5 transitioning to U4.
52	M15 on steep slopes with exposed rocks in some locations. Shoulder of hillside supported M17c with heath rush present.
53	M25a wet heath. Purple moor-grass dominated wet heath with deer-grass also present. Dwarf shrubs include ling heather and cross-leaved heath. Forbs included tormentil and bog-asphodel. On soft sloping ground within M15 wet heath.
54	Boulder field. Exposed rock face with dwarf shrubs of ling heather and cross-leaved heath. Other scattered species included devil's-bit scabious, male fern and cushions of <i>Racomitrium lanuginosum</i> . Higher up a couple of small trees were visible, most likely rowan.
55	Transition from U5 and U4 to M15.
56	M15 wet heath. Dominated by deergrass with occasional purple moor-grass and hare's-tail cottongrass. Forbs included butterwort, bog asphodel, tormentil, eyebright and cross-leaved heath. Bryophytes included <i>Pleurozium schreberi</i> . Peat less than 1 m. Some scattered boulders in this habitat.
57	Area of stony ground adjacent to U5 grassland with pioneering willow species. Less than 1 m tall due to grazing. Likely eared willow.
58	U4 grassland with patches of bare ground close to reservoir edge.
59	Festuca-Holcus-Anthoxanthum (Rodwell 2000) grassland. E2.13 Abandoned pasture. Yorkshire fog dominated with red fescue, common bent, sweet vernal-grass and meadow buttercup. Scattered patches of bracken within tis grassland.



TN	Description
60	W11 woodland, G1.91 oak/birch woodland. Sessile oak, pedunculate oak, rowan and silver birch woodland with Yorkshire fog dominated grassland in the understory. Patches of bracken also present within this habitat.
61	W4 birch woodland. G1.5 swamp woodland. Birch woodland over wet ground with purple moor-grass dominated understory, soft rush and sharp-flowering rush also present.
62	M23a. E3.42: Juncus acutiflorus rush pasture. Sharp-flowered rush dominated with occasional meadowsweet and scattered willow scrub.
63	S27a swamp. D2.39: transition mire. Bottle sedge dominated with marsh cinquefoil, water horsetail, soft rush and marsh-bedstraw. The eastern edge of this habitat transitions into being tufted hair-grass dominated with tormentil, common sorrel and sharp-flowered rush.
64	Pond. Dried out at time of visit.
65	M23b. E3.41: Juncus effusus rush pasture. Dominated by soft rush with Yorkshire fog also present.
66	MG9. E3.41: Juncus effusus rush pasture. Tufted hair-grass dominated with Yorkshire fog and rough meadow-grass
67	W7c. G1.21: mixed riparian woodland. Alder and downy birch woodland, understory dominated by tufted hair- grass with sweet vernal-grass and common bent.
68	M23a/M23b. E3.41: Juncus effusus rush pasture. Mosaic of soft rush dominated rush pasture and sharp-flowered rush pasture.
69	M23a/M23b. E3.41: Juncus effusus rush pasture. Mosaic of soft rush dominated rush pasture and sharp-flowered rush pasture.
70	U4. E1.72x: Semi-improved acid grassland. Raised ground with grazed common bent and sweet vernal-grass with occasional sheep's fescue, crested dog's-tail and Yorkshire fog. There was also rare perennial rye-grass. White clover and yarrow were also present.
71	E2.6: improved grassland. Grazed field with similar species to U4 grassland with perennial rye-grass and Yorkshire fog becoming more dominant.
72	G1.A: oak woodland. Birch, hybrid oak, alder and hawthorn along watercourse edges.
73	U4. E1.72x: Semi-improved acid grassland. Common bent and sweet vernal-grass with occasional sheep's fescue, crested dog's-tail, cock's-foot and Yorkshire fog. There was also rare perennial rye-grass. White clover and yarrow were also present.
74	U4/M23b. E3.41: Juncus effusus rush pasture. Wetter section of grazed field where the semi-improved acid grassland becomes a mosaic with soft rush pasture.
75	G3.F: conifer plantation. Mature plantation dominated by Sitka spruce and some larch planted at the edges.
76	M17. D1.21: low altitude blanket bog. Ling heather, hare's-tail cottongrass and common cottongrass over deep peat. Bog asphodel, tormentil and sundew also present. Bryophytes included Sphagnum capillifolium, S. papillosum.
77	M17. G1.51: Birch bog woodland. Birch had colonised the bog habitat described above.
78	M15. F4.11: northern wet heaths. Dominated by ling heather, cross-leaved heath, purple moor-grass and deergrass. Wavy hair-grass and mat-grass also present. On sloped ground in plantation clearing.
79	G1.91: Oak/birch woodland. Downy birch with ling heather and blaeberry in the understory.
80	M15/M17: D1.21: low altitude blanket bog. Wet heath/blanket bog mosaic over undulating ground with deep peat present in the depressions. Dominated by ling heather, cross-leaved heath, purple moor-grass and deergrass. Patches of common cottongrass dominated stands on deeper peat. Sphagnum species and bog asphodel more common on deeper peat. Rare bog myrtle also recorded.
81	U4. E1.72x: Semi-improved acid grassland. Common bent and sweet vernal-grass with occasional sheep's fescue, crested dog's-tail and Yorkshire fog
82	M23a. E3.42: Juncus acutiflorus rush pasture. Sharp-flowered rush dominated with occasional meadowsweet in flushed depression.
83	G4.F: Mixed forestry plantation. Mix of planted tree species including lime, beech, fir, rowan and horse chestnut.
84	G1.91: Oak/birch woodland. Woodland on steep slopes. Oak, birch, rowan and hazel all present with oak becoming less common further up the slope. Majority of this woodland was W11 with small patches of W17. W17 understory had mats of blaeberry with occasional common cow-wheat and a dense bryophyte carpet including <i>Pleurozium schreberi</i> and <i>Thuidium tamariscinum</i> . A deep gorge was also recorded within this woodland, Falls of Cruachan. Hazel and elder were recorded in the lower sections of the gorge with oak being recorded higher up. Ferns and



TN	Description
	bryophytes were also abundant but unable to access safely. The edge of this woodland was bordered with dense bracken stands again on steep slopes.


Appendix C Otter Survey Target Notes



Appendix C1: Otter habitat survey target notes.

Watercourse reference	Description	Suitability for otter
1	Section of Loch Awe shoreline in east of the Study Area. Rocky shoreline with steep narrow section of woodland. Large section here was not accessible due to road overhanging shore and no accessible shoreline.	Suitable for commuting and foraging. Lacking in features for resting, unless present under A85 overhang.
2	Shoreline around the Cruachan visitor centre. Rock armour lined around the slope with scrub. Power plant shoreline had sections of concrete wall.	Suitable for commuting and foraging. Lacking in features for resting.
3	Watercourse down the falls of Cruachan that was an inaccessible steep sided gorge.	Otter likely to find certain sections difficult to navigate. However, SAC designated for otter so otter known to be present. The area is likely to have plentiful potential holt/resting site features.
4	Shoreline at power station. Rocky shore in front of steep slope of dense scrub and woodland. Sections were inaccessible due to dense scrub.	Potential for resting sites, as well as commuting/foraging.
5	Shoreline of Loch Awe east of power station. Steep slope of woodland onto rock shoreline with large boulders. Hard to fully access due to deep water.	Large stretch of shore with plentiful resting site features and potential holt features within boulder piles.
6	Same habitat as TN5	Same as TN5.
7	Stretch of Loch Awe not accessible due to concrete wall associated with road design.	Suitability limited by concrete wall construction. It could not be determined if any gaps extended in to the wall.
8	Stretch of Loch Awe shoreline along railway line. 3- 4 m wide small rocky shore with narrow strip of woodland.	Limited number of features for resting but suitable for commuting and foraging.
9	Slope from the railway became steeper with more piles of large boulders.	Higher suitability for resting sites than at TN8 due to pile of boulders.
10	Rocky beach shore within strip of woodland cover. Limited slope and no boulder piles. Tributaries extended north under culverts but had low flow at the time of the survey.	Limited potential for resting sites. Suitability for commuting, both along the shore and to the north via tributaries.
11	Larger patch of woodland along the shore with tributaries extending north. No flow at the time of the survey.	Tributaries had overhanging tree roots with suitability for resting sites.
12	Flat shore with strip of woodland.	Tree line had cover for commuting but no potential resting site features.
13	Alt Cruachan downstream from the dam. Very low flow at the time of the survey. Large boulders along the banks. Sheep grazing up to the banks.	Overlapping boulders provided suitable resting features. Good commuting and foraging habitat.
14	Harder to access section of the Alt Cruachan. Increasingly steep sides with waterfalls and pools.	Rock overhangs offering potential resting features. Many features were likely to be submerged in periods of high flow.
15	Steep tributary extending up the hillside to the east of Alt Cruachan. Typical of tributaries in the surrounding area.	Narrow channel with no sheltered features. Possible otter use the tributary for commuting but the access road was a barrier to movement up the hillside due to rock shelf on the east side.
16	Steep tributary up the hill to the west. Rocky banks with occasional waterfalls and pools.	Unlikely to provide extensive sheltered features. Commuting potential into the upper reaches of the tributary.
17	Two tributaries on the eastern hillside. Downstream of existing access track was narrow	No suitability for shelters. Commuting suitability only with foraging within the rush area. Upstream section



Watercourse reference	Description	Suitability for otter
	and rocky flowing into a flush. Upstream section had steep rock wall at the roadside.	unlikely to be accessible for otter due to rock wall at the roadside.
18	Western shore of the reservoir. Water levels were relatively low at the time of the survey. Rocky shore with occasional boulder piles.	Reservoir offered foraging opportunities, but the shoreline had limited potential for shelters, restricted to any boulder piles.
19	Typical tributary that extended into the reservoir. Narrow with low flow at the time of the survey.	Limited features for shelters, and upper sections restricted to commuting potential.
20	Tributaries with no flow at the time of the survey.	Commuting potential only.
21	Shoreline of the reservoir with lots of large boulder piles. Peat banks had collapsed in places creating sheltered pockets.	Boulder piles were extensive in places offering deep sheltered areas. Collapsed peat banks had resulted in shelter features.
22	Larger watercourse with higher flow. Large rock piles on the banks.	Good features for shelters and optimal foraging and commuting potential.
23	Large upper section of Alt Cruachan. Mainly grassy/peat banks.	Lacking in features for shelters. Good commuting and foraging potential.
24	Large watercourse extending up the hillside. Lots of boulders along banks. Hard to access fully due to terrain.	Possibility of shelter features in upper sections. Suitable for commuting.
25	Run of overhangs in grassy banks.	Previous shelters marked in 2017. No signs in 2021.
26	Inaccessible stretch of eastern side of the reservoir due to slippery steep rocks.	No obvious suitability for shelters but good commuting and foraging potential.
27	Stretch of Loch Awe shoreline in the east. Low water level at the time of the survey exposing sandy substrate. Normal water level was right up to woodland edge.	Woodland area did not appear to have any shelter features but provided good cover for commuting and foraging.
28	Shallow strip of Loch Awe shoreline with steep rock armour along railway and line of trees.	Limited shelter potential in isolated rock overhangs. Good commuting and foraging potential.
29	Watercourse along existing access track. Not accessible due to dense scrub and bracken. Likely to be steep sided with rocky gully and fast flow in high spate.	Potential for resting features in lower sections within woodland. No potential likely around existing access track. Commuting potential if otter wanted to reach upper sections of hillside.
30	Hard to access watercourse due to terrain and vegetation. Upstream of the track had dense bracken along steep rock sides. Downstream continued through woodland.	Upper sections with steep rock likely to be exposed to high flow events . Woodland section likely to have suitable resting features. No signs recorded around culvert.
31	Hard to access watercourse due to terrain . Upstream of track climbed steeply through a series of waterfalls. Downstream continued through steep sided gorge with rock faces on both sides. Downstream section surveyed.	No features found for resting/shelter but possible in lower sections of woodland outwith 250 m. High flow in rainfall is likely to surge through the gorge. Commuting potential for otter to reach upper hillsides from Loch Awe.
32	Watercourse that flows under existing access track. Upstream section has series of waterfalls and was harder to access. Downstream had calmer stretches as well as small waterfalls through woodland.	No features found for resting/shelter but possible in lower sections of woodland outwith 250 m. High flow in rainfall is likely to surge through the gorge. Commuting potential for otter to reach upper hillsides from Loch Awe. No signs under road bridge.
33	Three separate watercourses that join further downstream. All had steep rock sides in deep gorges. Various waterfalls and pools. Some of the waterfalls were large enough to prevent safe access.	Large waterfalls may prevent movement of otter. Otherwise commuting and foraging potential. Any shelter features visible in low flow were likely to be submerged and flood in high flow.
34	Steep watercourse through rocky gully. Partially accessible downstream and found to be the same as TN34.	Potential for commuting.

Watercourse reference	Description	Suitability for otter
35	Series of inaccessible steep watercourses. No safe access due to incline. All the watercourses tended to cut into the hillside with deep rock sides. It is likely that a substantial amount of water flows through these in rainfall events at a high speed due to incline.	Likely to be suitable resting features in lower stretches of watercourse within woodland. Upper areas were on steep incline and likely to frequently flood.
36	Watercourse that flows through a steep rocky gully. Partially accessible upstream. Some tree lined and vegetated shallower banks.	Potential for resting sites, as well as commuting/foraging.
37	Deep drainage ditch through a field. Rocky bed with soil banks and marshy grassland adjacent to it.	No potential features recorded for resting/shelter but some commuting potential.
38	Small burn similar to TN37. Steeper towards the upstream end as the watercourse follows the hill. Several burns in this area were as described in TN39.	No potential features recorded for resting/shelter. No possible commuting potential as the watercourse eventually leads to much steeper and rockier ground which would prove more difficult to navigate.
39	Small burn with a rocky bed and some boulders/rocky overhangs further upstream. Downstream gave way to a smally gully with vegetated banks with some boulder piles.	Some potential for resting places further upstream but the ground downstream in the middle section was very open and boggy. It is unlikely that otter use this for resting/commuting/foraging in these areas. A vegetated gully downstream to the road provided some foraging/commuting potential.
40	Generally inaccessible steep watercourses. Waterfalls and vertical rocky sides indicate a high flow and speed at times after heavy rain.	Likely to be suitable resting features in lower stretches of watercourse within woodland. Upper areas are on steep incline and likely to frequently flood.
41	Burn running from steeper ground at the foot of the surrounding hills down to a culvert at the road side. Generally a rocky bed with soil banks. One area of large sandy banks roughly halfway upstream.	Existing mammal holes in the sandy banks could provide resting places for otter although most were too small and were thought to be rabbit. Further upstream from a culvert on the middle section of the burn had a large overhang of soil and vegetation above running water. It was not possible to see into this but there could be potential resting places within this area. Potential for commuting/foraging.
42	Small burn running through pasture. The watercourse was heavily poached by cattle. Adjacent habitat was dominated by marshy grassland. The banks and surrounding soil were very wet at the time of survey.	No features suitable for resting/sheltering otters were recorded along this watercourse. Some potential for commuting from more suitable habitat downstream and upstream.
43	Lower section of the burn described in TN42. This section was rockier with a mixture of boulder and soil banks. Woodland fringed most of this watercourse with some more open areas of grassland and reedbeds towards the easternmost extent.	Several features were recorded as suitable potential resting/sheltering places for otter. Gaps in boulders and under trees provide potential resting places. Potential for commuting/foraging, particularly given connectivity to Loch Awe where field signs were recorded. Fish were recorded in a deeper pool adjacent to the railway line, proving some foraging opportunity.
44	Relatively dry ditch with some areas of slow flowing water. Runs through agricultural pasture.	No features were suitable for resting/sheltering. Trees lining the banks were relatively immature and offered no features. Some potential for commuting.
45	Burn running from steeper ground above. Many waterfalls in steep gullies, particularly further upstream. Further downstream was flatter and with slower flow of water.	Areas upstream carried a large volume of water at a fast pace with steep drop offs. Further downstream however there were areas potentially suitable for resting/sheltering within woodland habitats.
46	This watercourse was similar to TN45 with steep gullies further upstream. Areas of boulders were used to build culvert features on mid to upper stretches of the watercourse surveyed.	Areas upstream were too steep and rocky to offer otter potential. Boulder piles around culverts and areas of woodland with shallower banks provided some potential



Watercourse reference	Description	Suitability for otter
		for sheltering/resting. These stretches also had potential for commuting.
47	Similar to many watercourses running down the hillside. Steeper, rockier upper section which levels to a flatter mid section. The watercourse passed through a rocky gully towards the road.	Some areas inaccessible due to steepness of the slope and height of vegetation. However, likely to have suitable potential resting places for otter in the middle section. Steeper and more rocky section downstream may prevent otter from commuting upstream.
48	Similar to many watercourses running down the hillside. Very steep and rocky upper section which levels towards the downstream end. Downstream section ran through regenerating birch woodland habitat.	Upstream was not suitable for otter as it was too steep and likely carried too much water when in spate. Further downstream in woodland habitats there was potential for resting/foraging/commuting.
49	Similar to many watercourses running down the hillside. Very steep and rocky upper section which levels towards the downstream end. Inaccessible at the top section due to incline.	Further downstream in woodland habitats there was potential for resting/foraging/commuting.
50	Similar to many watercourses running down the hillside. Very steep and rocky upper section which levels towards the downstream end. Narrow gullies in the downstream section were blocked by tree debris.	Upstream was not suitable for otter as it was too steep and likely carried too much water when in spate. Further downstream in woodland habitats there was potential for resting/foraging/commuting. However, some steep gullies could prevent otter from commuting further upstream.
51	Similar to many watercourses running down the hillside. Very steep and rocky upper section which levels towards the downstream end. Inaccessible at the top section due to incline.	Upstream was not suitable for otter as it was too steep and likely carried too much water when in spate. Further downstream in woodland habitats there was potential for resting/foraging/commuting otter.
52	Steep-sided wooded slopes that were inaccessible, with very narrow shoreline.	Some trees along the shoreline may provide some shelter.
53	Wooded watercourse with the burn running over rocks that were steep in places. Further upstream, beyond the survey boundary, continued to have cover of overhanging trees.	The section surveyed had no obvious features that could provide shelter but spraints were found.
54	This section of shoreline was less steep than the section to the west (TN53) with a grass and bracken embankment leading down to the open shoreline. This section also had scattered mature trees. The trout farm operated from this stretch of shoreline.	The only opportunity for otter shelters were the mature trees some of which had suitable cavities at the root bases but none big enough for a holt. The loch shore itself provided ample opportunities for foraging and commuting.
55	A straightened burn that ran though an open field to the shore.	There were no potential shelters identified however it is likely the burn could be used by commuting otter.
56	Burn flowing through open field with some scattered trees along the bank. The burn itself is just outwith the survey boundary.	No suitable shelters were identified at the entrance to the burn but a spraint found nearby would suggest it is at least used by commuting otter.
57	Wider section of River Strae. Overhanging tree roots in places for potential resting along bank but limited in any suitable holt features.	Overhanging tree roots in places for potential resting along bank but no suitable holt features. Suitable for commuting/foraging.
58	Exposed sand and mud south of A85. Difficult to access due to soft ground.	Limited potential other than commuting and foraging.
59	River Strae with banks lined by alder trees. Very low flow at the time of the survey.	Potential for commuting and foraging. Lack of suitable features for holts or resting sites, but near to woodland cover on the eastern side.
60	Upstream end of Alt Mhoille. Pebble beach areas with woodland and scrub on the banks. Lots of overhanging tree roots on bank.	Suitable for commuting and foraging and resting sites. Lack of features for holts.
61	Pond area stocked with brown trout.	Good otter foraging but no features for resting or holts.



Appendix C2: Otter survey target notes.

Target note	х	Y	Sign	Comments
1	207108	727078	Spraint	Dried spraint on prominent rock along shore.
2	207152	727055	Spraint	Dried spraint on prominent rock along shore.
3	207959	726683	Spraint	Dried spraint on rock.
4	208010	726695	Hover	Chunk of concrete with entry space and large amount of spraint on rocks inside.
5	208045	726686	Couch	Hole within slope but only extended in 1.5 m before narrowing too much for otter. Worn area on ground in front of hole next to tree indicating frequent use by resting otter as a couch. Anal jelly and fresh spraint found outside hole and on adjacent rocks. Camera trap deployed and confirmed well-used couch by multiple otters.
6	208064	726676	Hover	Large rock pile with sheltered areas under overhang. Spraints of varying ages found.
7	208383	726462	Spraint	Old spraints on rock along shore.
8	208510	726411	Hover	Extensive resting area under concrete overhang. Old and new spraints inside.
9	211039	726218	Hover	Overhang under rock pile with old spraint inside.
10	211401	726671	Spraint	Old spraint on rock.
11	211616	726683	Spraint	Spraint on prominent rock.
12	211834	726900	Hover	Overhang under tree roots with fresh spraint inside.
13	211815	726914	Spraint	Fresh spraint on rock under railway bridge.
14	212308	727344	Spraint	Spraint on rock.
15	208001	727855	Hover	Overlapping boulders creating deep sheltered space. Historical resting site but only old spraint stains visible on rock. Not used for some time.
16	208178	727325	Spraint	Old spraint at join of tributary to Alt Cruachan.
17	207875	728877	Hover	Historic resting site within overhanging rocks. No recent signs but old spraint staining visible. Not used for some time.
18	208080	729055	Spraint	Old spraint on rock by the shore.
19	208345	729249	Hover	Feature marked as a holt in previous surveys. Large pile of boulders with deep sheltered space inside. This did not extend into the banks. Old and fresh spraint on rocks inside. Judged to be a hover rather than a holt. Camera deployed and no activity was confirmed over the deployment period.
20	212951	727862	Spraint	Spraint on prominent rock.
21	212761	727654	Spraint	Fresh spraint on rock.
22	212859	727758	Hover	Sheltered space on rocks under beech tree. Lots of spraint here, both old and new.
23	212725	727633	Spraint	spraints on rock along shore.
24	209739	726221	Potential holt	Potential holt 200 m from Site boundary in boulder pile with worn path to entrance. No spraints nearby and large badger latrine outside entrance. Otter seen inspecting hole on camera trap but no confirmed use, but could be used as a holt in the future.
25	214503	729372	Spraint	On mid-stream boulder.
26	214174	728956	Spraint	Both old and recent spraints.
27	213888	728614	Spraint	Two spraints at river confluence.
28	214240	729041	Hover	Likely hover in bank, 1 m above current water level. Faint run into cavity but no spraints.



Target note	x	Y	Sign	Comments
29	214577	729413	Spraint	Under road bridge.
30	213745	728179	Spraint	Under A85 road bridge.
31	207609	726545	Spraint	Old spraint on a rock at the water edge.
32	207585	726530	Spraint	At least three fresh spraints on a rock at the edge of a burn.
33	207579	726530	Spraint	Old spraint on a rock in the middle of the burn.
34	208230	725982	Spraint	Old spraint on a rock.
35	208199	726080	Spraint	Old spraint on the end of concrete jetty.
36	207902	726348	Spraint	Old spraint on concrete block in the water.
37	206000	727360	Holt	Suspected holt in rocks on steep rocky bank 1.5 km west of the Study Area. Single otter observed using boulder pile during previous ornithology surveys in the area.



Appendix D Camera Monitoring Results



Appendix D1: Camera Location 1.

Date	Time	Species	Activity
06/08/2021	20:00	Otter	Two otters that appeared to be last years cubs coming in and investigating couch.
06/08/2021	21:58	Otter	Single dog otter investigating couch area cautiously.
07/08/2021	20:19	Otter	Single dog otter coming in from the west side of couch and using couch area to rub on trees and groom for a few minutes.
08/08/2021	21:26	Otter	Two young otters play fighting.
08/08/2021	23:25	Otter	Single otter on camera rubbing against tree.
09/08/2021	19:59	Otter	Single smaller otter on camera emerged from the water from the east.
09/08/2021	21:36	Otter	Three otters, presumably mother and two of last years cubs, come in from the east side of couch and stay at couch climbing trees and grooming.
10/08/2021	05:12	Mink	Mink climbing around slope at couch.
10/08/2021	06:33	Mink	Mink moving east out of shot.
10/08/2021	20:47	Otter	Four otters. Two urinate and secrete anal jelly at couch.
10/08/2021	21:29	Otter	Single otter coming in from the east side of couch sniffing around.
11/08/2021	06:23	Otter	Two otters sniffing around couch.
11/08/2021	06:39	Otter	Single otter coming in from the west side of couch and sniffing around couch.
11/08/2021	17:00	Tawny owl	Tawny owl on camera at couch.
11/08/2021	21:13	Otter	Three otters coming in from the east side of couch and sniffing around couch.
12/08/2021	04:12	Tawny owl	Tawny owl on camera at couch.
14/08/2021	17:33	Otter	Single dog otter lies on couch grooming and rubbing on tree for a few minutes.
14/08/2021	20:43	Otter	Two otters coming in from the east side of couch and sniffing around.
15/08/2021	19:56	Otter	Three otters at couch.
16/08/2021	18:18	Otter	Single dog otter grooming within couch.
16/08/2021	20:11	Otter	Three otters at couch.
17/08/2021	20:39	Otter	Single dog otter coming in form the east side and sniffing couch.
21/08/2021	01:13	Otter	Single otter briefly on camera traveling east.
18/8/21- 25/8/21			Camera was in a different position east of the couch during this time and picked up little activity immediately east of the couch. Camera was then moved back to focus on the couch on 25/8/21.
30/08/2021	05:44	Otter	Single otter at couch grooming on the tree.
31/08/2021	06:17	Otter	Three otters lying in couch and grooming/socialising.
31/08/2021	20:32	Otter	Single otter briefly at couch.
08/09/2021	19:16	Otter	Single otter at couch resting and curled on the ground.
08/09/2021	19:23	Otter	Up to five otters at the couch at once. Four otters present for the majority of this time, lying in a pile together and resting/grooming and playing.
11/09/2021	18:32	Otter	Three otters at the couch briefly resting and grooming.
11/09/2021	20:24	Otter	Single otter briefly at couch.
12/09/2021	07:04	Otter	Two otters briefly socialising at couch.
12/09/2021	16:08	Otter	Single otter at couch.
16/09/2021	06:10	Otter	Single otter at couch.



Date	Time	Species	Activity
16/09/2021	06:17	Otter	Two otters briefly socialising at couch.
17/09/2021	19:25	Otter	Single otter briefly at couch.
22/09/2021	18:58	Otter	Three otters briefly at couch.
23/09/2021	19:08	Otter	Single otter briefly at couch.
25/09/2021	18:53	Otter	Single otter climbing tree at couch.
26/09/2021	18:23	Otter	Single otter at couch.
28/09/2021	06:35	Otter	Two otters briefly at couch.
28/09/2021	06:55	Otter	Single otter at couch.

Appendix D2: Camera Location 2.

Date	Time	Species	Activity
19/08/2021	03:57	Pine marten	Pine marten carrying large egg (presumed to be a chicken egg) and heading west to east.
25/08/2021	09:22	Red squirrel	Red squirrel briefly passing camera.
01/09/2021	10:44	Red squirrel	Red squirrel briefly passing camera.
01/09/2021	09:06	Roe deer	Female roe deer around camera.
10/09/2021	01:15	Roe deer	Female roe deer grazing.
14/09/2021	17:22	Buzzard	Buzzard in front of camera on the ground.
18/09/2021	18:22	Red squirrel	Red squirrel briefly passing camera.
20/09/2021	12:13	Red squirrel	Red squirrel briefly passing camera.
21/09/2021	17:15	Red squirrel	Red squirrel briefly passing camera.

Appendix D3: Camera Location 3.

Date	Time	Species	Activity
19/08/2021	07:40	Badger	Single badger traveling from direction of the hole and continuing west.
23/08/2021	22:06	Badger	Single badger traveling from the west and inspecting latrine and hole entrance and then travels east.
25/08/2021	07:41	Red deer	Red deer stag passing camera.
25/08/2021	20:19	Red deer	Young red deer stag passing camera.
26/08/2021	07:58	Red deer	Red deer stag passing camera.
29/08/2021	16:50	Red squirrel	Red squirrel briefly passing camera.
31/08/2021	20:56	Badger	Single badger traveling from the west and inspecting latrine area. Appeared to be a different individual than earlier clips.
02/09/2021	15:29	Red squirrel	Red squirrel briefly passing camera.
05/09/2021	04:21	Badger	Single badger traveling from the west and inspecting latrine and hole entrance.
11/09/2021	08:28	Red squirrel	Red squirrel briefly passing camera.
17/09/2021	21:11	Otter	Three otters travel in from the east and two briefly inspect hole. No sign of entry.
19/09/2021	05:34	Badger	Single badger sniffing in area around hole. No signs of exit/entry.



Date	Time	Species	Activity
26/09/2021	08:09	Otter	Single otter travels in from the west and inspects hole before clip cuts off.
26/09/2021	08:22	Otter	Single otter is in area in front of hole before camera clips end with head facing into hole. Absence of any clips of otter exiting between 26/09/21 and 29/09/21 suggests otters do not use the hole as a holt.

Appendix D4: Camera Location 4.

Date	Time	Species	Activity
-	-	-	No activity recorded.

Appendix D5: Camera Location 5.

Date	Time	Species	Activity
20/08/2021	16:54	Red squirrel	Red squirrel traveling north to south.
22/08/2021	14:58	Pine marten	Pine marten traveling east to west.
24/08/2021	07:50	Roe deer	Male roe deer in front of camera.
26/08/2021	17:42	Red squirrel	Red squirrel foraging in area in front of camera.
27/08/2021	05:26	Red squirrel	Two pine martens traveling west to east.
27/08/2021	07:18	Pine marten	Pine marten traveling west to east.
29/08/2021	05:25	Pine marten	Pine marten traveling south to north.
29/09/2021	05:38	Pine marten	Pine marten traveling south to north.
29/09/2021	09:41	Red squirrel	Red squirrel traveling east to west.
30/08/2021	10:01	Red squirrel	Red squirrel traveling east to west.
30/08/2021	20:31	Pine marten	Pine marten running east to west.
31/08/2021	04:23	Red deer	Red deer in area in front of camera.
31/08/2021	06:07	Pine marten	Two pine martens traveling west to east.
31/08/2021	11:46	Red squirrel	Red squirrel foraging in area in front of camera.
31/08/2021	12:23	Red squirrel	Red squirrel traveling west to east.
31/08/2021	13:29	Red squirrel	Red squirrel traveling south to north.
31/08/2021	15:30	Red squirrel	Red squirrel traveling south to north.
31/08/2021	21:04	Red deer	Red deer traveling south.
31/08/2021	21:17	Pine marten	Pine marten traveling west to east.
01/09/2021	08:41	Red squirrel	Red squirrel traveling south to north.
01/09/2021	09:22	Red squirrel	Red squirrel traveling north to south.
01/09/2021	17:22	Red squirrel	Red squirrel traveling north to south.
01/09/2021	18:01	Red squirrel	Red squirrel traveling south to north.
01/09/2021	18:26	Red squirrel	Young red squirrel traveling north to south.
01/09/2021	20:30	Red deer	Red deer running south.
02/09/2022	05:30	Roe deer	Female roe deer in area in front of camera.
02/09/2021	09:04	Red squirrel	Red squirrel traveling north to south.
03/09/2021	19:57	Red squirrel	Red squirrel traveling north to south.



Date	Time	Species	Activity
03/09/2021	08:20	Red squirrel	Red squirrel traveling north to south.
03/09/2021	16:30	Red squirrel	Young red squirrel traveling north to south.
03/09/2021	17:06	Red squirrel	Two red squirrels, adult and young, traveling west to east.
03/09/2021	23:35	Pine marten	Pine marten traveling west to east.
04/09/2021	10:53	Red squirrel	Red squirrel traveling south to north.
05/09/2021	05:38	Pine marten	Pine marten traveling east to west.
06/09/2021	06:34	Pine marten	Pine marten traveling east to west.
06/09/2021	22:45	Pine marten	Pine marten traveling west to east.
08/09/2021	06:25	Fox	Fox traveling east to west.
09/09/2021	19:29	Red deer	Female red deer grazing in front of camera.
10/09/2021	19:28	Red deer	Red deer stag in front of camera.
12/09/2021	09:30	Red squirrel	Red squirrel traveling north to south.
14/09/2021	18:20	Red squirrel	Red squirrel carrying food and traveling south.
15/09/2021	04:18	Pine marten	Pine marten traveling north to south.
20/09/2021	20:23	Fox	Fox traveling west to east.
24/09/2021	03:19	Fox	Fox traveling east from in front of camera.
25/09/2021	10:59	Red squirrel	Red squirrel foraging in front of camera.
27/09/2021	19:13	Pine marten	Pine marten running south to north.

Appendix D6: Camera Location 6.

Date	Time	Species	Activity
19/08/2021	18:33	Red deer	Young stag grooming in front of camera.
21/08/2021	15:10	Pine marten	Pine marten inspecting camera briefly then scent marking/leaving scat in front of hole entrance.
23/08/2021	03:50	Red deer	Red deer stag running past camera.
24/08/2021	07:49	Pine marten	Pine marten traveling west to east.
24/08/2021	12:17	Pine marten	Pine marten scent marking/leaving scat close by to hole.
25/08/2021	14:16	Red squirrel	Red squirrel inspecting hole.
25/08/2021	10:28	Red squirrel	Red squirrel foraging in front of camera.
29/08/2021	08:58	Pine marten	Pine marten traveling west to east.
29/08/2021	13:24	Pine marten	Pine marten traveling east to west.
31/08/2021	17:33	Red squirrel	Red squirrel sitting outside entrance to hole.
04/09/2021	16:20	Red squirrel	Red squirrel traveling west to east.
04/09/2021	19:13	Red deer	Herd of reed deer traveling through plantation.
05/09/2021	15:59	Pine marten	Pine marten scent marking/leaving scat close by to hole.
05/09/2021	18:41	Red deer	Single red deer on camera.
07/09/2021	08:02	Red deer	Two red deer stags gently rutting.
08/09/2021	03:41	Fox	Single fox traveling east to west.
09/09/2021	19:05	Red deer	Single red deer traveling east to west.
09/09/2021	19:35	Red deer	Female red deer traveling through plantation.
13/09/2021	06:24	Pine marten	Brief clip of pine marten inspecting camera.



Date	Time	Species	Activity
13/09/2021	13:34	Red squirrel	Brief clip of red squirrel moving past camera.
15/09/2021	09:16	Fox	Fox moving east to west.
19/09/2021	09:26	Red squirrel	Brief clip of red squirrel moving past camera.
21/09/2021	07:36	Red deer	Herd of red deer traveling west to east.
21/09/2021	10:24	Red squirrel	Red squirrel inspecting hole.
22/09/2021	02:33	Fox	Fox traveling west.
22/09/2021	23:30	Pine marten	Pine marten traveling north to south.
24/09/2021	14:49	Red squirrel	Red squirrel traveling south.
25/09/2021	14:53	Red squirrel	Red squirrel sitting outside entrance to hole.
29/09/2021	11:06	Red squirrel	Red squirrel traveling east to west.



Appendix E Water Vole Target Notes



Target note	Description	Suitability for water vole
A	Slow flowing ditches through field. Majority of the area was poached by cattle.	Isolated section of ditch with only minimal areas of suitability. Small sections of dense rush on banks that were more suitable for water vole with better feeding resource.
В	Rocky ditch that flows through wet meadow habitat.	Slower flowing ditch but rocky substrate and banks that limited burrowing suitability.
С	Ditch through wet meadow habitat/rush pasture with willow scrub.	Limited suitability for water vole in comparison to other areas within the Site with good feeding habitat.
D	Ditch through grazed field. Limited suitable vegetation along the banks but isolated habitat.	Isolated section of ditch with only minimal areas of suitability.
E	Network of ditches through wet heath/bog and flush. Majority of the banks are shallow. Upstream of the track tended to be rocky substrate.	Most suitable habitat for water vole within the Site context. Extensive suitable habitat with network of ditches. Some denser areas of rush would provide plentiful feeding and burrowing on steeper banks.
F	Flat area within valley downstream of dam that was a flush and dominated by rush species.	Relatively isolated habitat but suitable feeding areas and ditches for water vole.
G	Series of small ditches down the hillside surrounding the reservoir that had steep peat banks and ditches continued underground in places. Typical of small tributaries around the reservoir.	Limited suitability in small stretches of ditches where ditch habitat resembled those typically used by upland water vole populations. However, these ditches were isolated within the surrounding landscape.



Appendix F Badger Survey Target Notes



Target note	x	Y	Sign	Comments
1	214299	729065	Latrine	Fresh latrine along fence line within plantation woodland.
2	214118	728748	Disused mammal hole	Single mammal hole within plantation woodland. No spoil or hairs but hole extended into slight bank. Camera deployed but no signs of use by any mammals. Pine marten recorded scent marking around this area.
3	214148	728909	Foraging	Bee nest dug out by badger near river bank.
4	-	-	Outlier sett	Previously recorded outlier sett on hillock within open ground with a dense bracken cover over the entrance. The hole did not appear to have been recently used but there was a badger hair identified at the entrance.
5	-	-	Potential outlier sett	Hole within boulder pile that extended back into the hillside. Large latrine outside entrance and evidence of infrequent use by badger passing by on nearby camera trap. Mammal path recorded traveling south. Otter also inspected the hole on camera trap footage.
6	209739	726221	Latrine	Large latrine.

Appendix G Red Squirrel Survey Target Notes



Target note	x	Y	Sign	Comments
1	208030	726814	Feeding remains	Piles of eaten hazelnuts within hollow at base of oak tree.
2	209651	726200	Feeding remains	Pile of eaten hazelnuts and acorns within sheltered space under boulder.
3	214267	729028	Drey	Drey in a fork between branches on a pine tree.
4	210940	726314	Feeding remains	Piles of eaten hazelnuts at base of birch tree.
5	211140	726631	Feeding remains	Piles of eaten hazelnuts at base of birch tree.
6	210409	726157	Drey	Drey in a birch tree within woodland.
7	211763	727014	Sighting	Red squirrel seen within trees.
8	211764	727075	Drey	Drey in pine tree along track.
9	211902	727219	Drey	Drey in fork of birch tree along track.
10	212355	727560	Sighting	Red squirrel seen crossing the road towards Loch Awe.
11	208868	726460	Drey	Drey within woodland.
12	208964	726405	Drey	Drey within woodland.



Appendix H Pine Marten Survey Target Notes



Appendix H1: Pine marten habitat survey target notes.

Target note	Description	Suitability for pine marten
A	Extremely steep sided SAC oak woodland along slope. Largely inaccessible due to terrain and dense vegetation at the time of the survey.	Known to contain numerous craggy boulder piles suitable for den sites. Pine marten recorded regularly during previous camera trapping in 2019, but no dens confirmed. Pine marten are also known for visiting bird feeding tables at Cruachan Visitor Centre. Numerous old mature trees were likely to have cavities suitable for dens.
В	Extremely steep sided SAC woodland along slope. Largely inaccessible due to terrain and dense vegetation at the time of the survey.	Assumed to contain numerous craggy boulder piles suitable for den sites. Numerous old mature trees were likely to have cavities suitable for dens.
С	Extremely steep sided SAC woodland along slope. Largely inaccessible due to terrain and dense vegetation at the time of the survey.	Assumed to contain numerous craggy boulder piles suitable for den sites. Numerous old mature trees were likely to have cavities suitable for dens.
D	Woodland areas on gentler slope with mature oaks and boulder piles in places. Good connectivity of habitat both east and west and intersected by many watercourses. Not all areas were accessible due to dense vegetation at the time of the survey.	Old mature trees were likely to have cavities suitable for dens.
E	Woodland areas on gentler slope with mature oaks and boulder piles in places. Good connectivity of habitat both east and west and intersected by many watercourses.	Craggy boulder piles likely to provide suitable den sites. Old mature trees were likely to have cavities suitable for dens.
F	Plantation woodland, fringed by natural regeneration of alder, birch and oak. Most trees were advanced in the plantation, with some areas growing on large embankments and some more boggy areas. Two ruined buildings were within the woodland.	No notable boulder piles found with holes. Ruined buildings had no holes for dens. Pine trees unlikely to have cavities suitable for dens. Pine marten were recorded regularly within this woodland on camera traps in 2021.
G	Woodland areas on gentler slope with mature oaks and boulder piles in places. Good connectivity of habitat both east and west and intersected by watercourses. Not all areas fully accessible due to vegetation at the time of the survey.	Old mature trees were likely to have cavities suitable for dens. Not all areas fully accessible due to vegetation.
Н	Woodland areas within 250 m buffer on gentler slope with mature oaks and boulder piles in places. Good connectivity of habitat both east and west and intersected by watercourses.	Craggy boulder piles likely to provide suitable den sites. Old mature trees and fallen dead trees were likely to have cavities suitable for dens. Pine marten were recorded infrequently on camera trap in this location.
I	Scattered woodland on a rocky crag with mature oaks and boulder piles in places. Limited connectivity with other habitats but relatively isolated above the pylon way-leave.	Craggy boulder piles likely to provide suitable den sites. Old mature trees and fallen dead trees were likely to have cavities suitable for dens.
J	Woodland areas on slope with mature oaks and boulder piles in places. Good connectivity of habitat both east and west and intersected by watercourses.	Craggy boulder piles likely to provide suitable den sites. Old mature trees and fallen dead trees were likely to have cavities suitable for dens.
К	Woodland areas on a very steep slope with mature oaks and boulder piles in places. Good connectivity of habitat both east and west and intersected by watercourses. A large portion was inaccessible due to the gradient of the slope and height of vegetation at the time of the survey.	Although access was not possible to all areas of this woodland, craggy boulder piles likely to provide suitable den sites. Old mature trees and fallen dead trees were likely to have cavities suitable for dens.
L	Woodland areas on a very steep slope with mature oaks and boulder piles in places. Good connectivity of habitat both east and west and intersected by watercourses. A large portion was inaccessible due to the gradient of the slope and height of vegetation at the time of the survey.	Although access was not possible to all areas of this woodland, craggy boulder piles likely to provide suitable den site. Old mature trees and fallen dead trees were likely to have cavities suitable for dens. Lower sections were very boggy and not considered suitable for den sites.



Target note	Description	Suitability for pine marten
М	Woodland sections through Loch Awe amidst private ground. Some larger more extensive sections of oak woodland.	Old mature trees are likely to provide suitable den sites. Many homeowners in this area report pine marten feeding at their bird tables.

Appendix H2: Pine marten survey target notes.

Target note	х	Y	Sign	Comments
1	210206	726393	Scat	Fresh scat on bridge over existing access track.
2	209662	726320	Scat	Old weathered scat on rock by watercourse.
3	214226	728972	Scat	Fresh scat along mammal path within plantation woodland.
4	210957	726314	Scat	Old weathered scat on fallen deadwood.
5	214213	728950	Scat	Two scats on mammal path.
6	214105	728777	Scat	Old scat on moss pile.
7	214162	728676	Scat	Fresh scat within plantation woodland.
8	214110	728760	Scat	Fresh scat within clearing in plantation.
9	209567	726480	Scat	Two suspected scats on existing access track road next to bridge culvert. One older and one fresh.
10	212392	727425	Scat	Fresh scat on steps down to Loch Awe railway station.







Tree tag	Area of Site	Easting	Northing	Description of PRFs	Bat roost suitability	Species
1	East (River Strae/Allt Mhoille)	214188	729161	Flaking bark features in upper sections. Large tree with potential features not visible from ground level.	Moderate	Oak
2	East (River Strae/Allt Mhoille)	214169	728972	Lifted bark at 3 m on main trunk.	Low	Alder
3	East (River Strae/Allt Mhoille)	214114	728910	Basal cavity feature at 1.5 m.	Moderate	Alder
4	East (River Strae/Allt Mhoille)	214024	728807	Dead limb at 5 m with woodpecker holes.	Moderate	Scots pine
5	East (River Strae/Allt Mhoille)	213929	728715	Standing dead tree with lifted bark at 5 m. Unsafe to climb.	Low	Alder
6	East (River Strae/Allt Mhoille)	213886	728677	Tear out features on limbs between 3 m and 5 m.	Moderate	Alder
7	East (River Strae/Allt Mhoille)	213896	728670	Snapped limb with splintered bark at 2.5 m.	Low	Elm
8	East (River Strae/Allt Mhoille)	213936	728512	Large tree not able to be fully inspected from ground level due to foliage.	Moderate	Oak
9	East (River Strae/Allt Mhoille)	213937	728430	Broken limbs at various heights with potential cavities.	Moderate	Alder
10	East (River Strae/Allt Mhoille)	213903	728439	Various features in old tear outs.	Moderate	Alder
11	East (River Strae/Allt Mhoille)	213818	728356	Various dead wood features.	Moderate	Alder
12	East (River Strae/Allt Mhoille)	213798	728327	Various dead wood features. Unsafe to climb.	Moderate	Alder
13	East (River Strae/Allt Mhoille)	213764	728264	Two small trees with various dead wood features.	Moderate	Alder
14	East (River Strae/Allt Mhoille)	213863	728603	Deep feature at 3 m.	Moderate	Alder
15	East (River Strae/Allt Mhoille)	213843	728617	Knothole at 2 m facing onto field.	Moderate	Alder
16	East (River Strae/Allt Mhoille)	213782	728630	Shallow knotholes at various heights.	Low	Alder
17	East (River Strae/Allt Mhoille)	213754	728634	Large upward facing cavity at 4 m.	Low	Alder
18	East (River Strae/Allt Mhoille)	213711	728653	Large tree not able to be fully inspected from ground level due to foliage.	Moderate	Ash
19	East (River Strae/Allt Mhoille)	213702	728658	Knothole at 3 m overhanging river.	Low	Alder
20	East (River Strae/Allt Mhoille)	213675	728680	Deep cavity at 3.5 m.	Moderate	Alder
21	East (River Strae/Allt Mhoille)	213557	728647	Large tree not able to be fully inspected from ground level due to foliage.	Moderate	Ash
23	East (River Strae/Allt Mhoille)	213618	728769	Various knotholes visible.	Moderate	Alder
24	East (River Strae/Allt Mhoille)	213620	728765	Basal cavity at 1 m.	Low	Alder
25	East (River Strae/Allt Mhoille)	213631	728759	Small tree with tear out feature at 2 m. Bird nest in base of the feature.	Moderate	Alder



Tree tag	Area of Site	Easting	Northing	Description of PRFs	Bat roost suitability	Species
26	East (River Strae/Allt Mhoille)	213653	728734	Large tree not able to be fully inspected from ground level due to foliage.	Moderate	Ash
27	East (River Strae/Allt Mhoille)	213663	728721	Twisted dead limb with splintered sections at 3.5 m.	Moderate	Alder
28	East (River Strae/Allt Mhoille)	213710	728677	Cavity in trunk at 3 m. Unsafe to climb.	Moderate	Alder
29	East (River Strae/Allt Mhoille)	213298	728334	Cavities visible in trunk and foliage likely obscuring features in upper sections.	Moderate	Oak
30	East (River Strae/Allt Mhoille)	213295	728251	Various mature trees along railway line. Not accessible.	Moderate	Various
31	East (River Strae/Allt Mhoille)	213324	728159	Group of mature trees in inaccessible ground. PRF's visible via binoculars.	Moderate	Various
32	East (River Strae/Allt Mhoille)	213454	729263	Various knotholes visible.	Moderate	Alder
33	East (River Strae/Allt Mhoille)	213428	729294	Various shallow knotholes.	Low	Alder
34	East (River Strae/Allt Mhoille)	213429	729379	Strip of small alders. One has a rothole at base on trunk at 1.5 m with upward facing feature.	Low	Alder
35	East (River Strae/Allt Mhoille)	213296	729428	Snapped limb at 4 m with upward facing feature. Unsafe to climb.	Low	Alder
36	East (River Strae/Allt Mhoille)	213284	729440	Minimal lifted bark at 3 m. Unsafe to climb.	Low	Alder
37	East (River Strae/Allt Mhoille)	213275	729448	Frost crack up limb 2 m to 4 m. Other snapped limbs at 5 m. Unsafe to climb.	Moderate	Alder
38	East (River Strae/Allt Mhoille)	213259	729468	Cavity at base at 2 m. Knotholes in upper limbs. Unsafe to climb.	Moderate	Alder
39	East (River Strae/Allt Mhoille)	213239	729498	Tear out at 3 m. Unsafe to climb.	Moderate	Alder
40	East (River Strae/Allt Mhoille)	213236	729499	Basal cavity at 1 m. Various snapped limbs in upper sections. Unsafe to climb.	Moderate	Alder
41	East (River Strae/Allt Mhoille)	213202	729535	Snapped limb at 2.5 m with minimal cavity.	Low	Alder
42	East (River Strae/Allt Mhoille)	213082	729614	Group of three large mature oaks on mound with numerous PRFs. Outwith boundary.	High	Oak
43	East (River Strae/Allt Mhoille)	213351	729342	Stripped section on trunk with various shallow cavities extending in to deadwood.	Low	Alder
44	East (River Strae/Allt Mhoille)	213385	729314	Single shallow knothole at 3 m.	Low	Alder
45	Existing access track	211456	726711	Hazard beam at 5 m. Potential for features higher.	Moderate	Oak
46	Existing access track	211451	726689	Large tree not able to be fully inspected from ground level due to foliage.	Moderate	Oak
48	Existing access track	211412	726637	Two Large trees next to each other, not able to be fully inspected from ground level due to foliage.	Moderate	Oak
49	Existing access track	211444	726672	Snapped limb at 3 m with minimal cavities.	Low	Oak
50	Existing access track	211449	726688	Large tree not able to be fully inspected from ground level due to foliage.	Moderate	Oak



Tree tag	Area of Site	Easting	Northing	Description of PRFs	Bat roost suitability	Species
51	Existing access track	211458	726690	Two snapped limbs with cavities at 4 m and 6 m.	Moderate	Oak
53	Existing access track	211351	726675	Large tree not able to be fully inspected from ground level due to foliage.	Moderate	Oak
54	Existing access track	211349	726672	Large tree not able to be fully inspected from ground level due to foliage.	Moderate	Oak
55	Existing access track	211256	726567	Group of five large oaks with various PRFs and of a size to have features in higher canopy. Limited access due to vegetation height.	Moderate	Oak
56	Existing access track	211285	726583	Deadwood visible. Tree of a size to have features in higher canopy.	Moderate	Oak
57	Existing access track	211250	726612	Large oak 15 m uphill of main track. Not able to be fully inspected due to dense foliage.	Moderate	Oak
58	Existing access track	211212	726542	Group of six large mature oaks. Located 10 m downhill of track. Recorded as one grid reference due to difficult access with dense vegetation. All trees displayed PRFs.	Moderate	Oak
59	Existing access track	211226	726625	Large tree with many dead limbs. Cavity at the base. Deep knothole at elbow of limb at 4 m.	Moderate	Oak
60	Existing access track	211274	726653	Large tree not able to be fully inspected from ground level due to foliage.	Moderate	Oak
61	Existing access track	211093	726551	Multiple cavities in lower limbs.	Moderate	Oak
62	Existing access track	211070	726544	Large tree not able to be fully inspected from ground level due to foliage.	Moderate	Oak
63	Existing access track	211052	726478	Large tree not able to be fully inspected from ground level due to foliage.	Moderate	Oak
64	Existing access track	211008	726433	Multiple high quality PRFs on large tree. Scattered on trunk and on limbs.	High	Oak
65	Existing access track	211039	726438	Large tree with multiple tear out features and snag limbs.	Moderate	Oak
66	Existing access track	211043	726450	Group of three large oaks in close proximity with multiple PRFs.	Moderate	Oak
67	Existing access track	210950	726430	Large tree not able to be fully inspected from ground level due to foliage.	Moderate	Oak
72	Existing access track	209596	726468	Tree along watercourse on steep slope. Deadwood on limb at 3 m that is upward facing. Unsafe to climb.	Low	Oak
73	Existing access track	209763	726471	Dead tree overhanging watercourse on cliff. Lots of fissures on multiple limbs. Unsafe to climb.	Moderate	Ash
74	Existing access track	209321	726535	Multiple knotholes visible.	Moderate	Oak
75	Existing access track	209291	726555	Multiple deep knotholes visible.	Moderate	Ash
76	Existing access track	209286	726547	Broken limb at 4 m with cavity.	Moderate	Ash
77	Existing access track	209095	726589	Knothole at 4 m and knothole in elbow of limb at 4.5 m. Unsafe to climb.	Moderate	Ash
78	Existing access track	208718	726736	Tear out in limb with cavity at 4 m. Unsafe to climb.	Moderate	Oak



Tree tag	Area of Site	Easting	Northing	Description of PRFs	Bat roost suitability	Species
79	Existing access track	208724	726728	Group of four trees on steep slope that was not accessible. One tree had visible PRFs with a knothole at 3 m and 4 m. Unsafe to climb.	Moderate	Ash
80	Existing access track	208825	726701	Various snapped limbs with cavities. Unsafe to climb.	Moderate	Ash
81	Existing access track	208608	726885	Dead tree with splits and hollows due to decay. Unsafe to climb.	Moderate	Oak
82	Existing access track	210192	726393	Thick ivy up trunk with thick enough overlapping sections to provide roosting feature. Unsafe to climb due to slope.	Low	Oak
84	Existing access track	210192	726391	Small snag limb at 4 m. Unsafe to climb.	Low	Oak
85	Existing access track	210603	726369	Various snapped limbs with cavities. Unsafe to climb.	Moderate	Oak
86	Existing power station	207860	726781	Large tree at entrance to power station. Previously felled limbs have created cavities from 4 m to 8 m.	Moderate	Oak
91	Existing power station	207876	726813	Large tree with many high quality PRFs.	High	Oak
92	Existing power station	207865	726817	Large tree with dense ivy likely obscuring potential features.	Moderate	Oak
93	Existing power station	207856	726829	Large tree with dense ivy likely obscuring potential features.	Moderate	Oak



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