

Balliemeanoch Pumped Storage Hydro

Environmental Impact Assessment
Report

Volume 5: Appendices
Appendix 6.3: Habitats

ILI (Borders PSH) Ltd

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Quality Information

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1. Introduction

This appendix supports *Chapter 6: Terrestrial Ecology*. It sets out the methods and findings of the habitat surveys carried out for the Development, including information on Phase 1 habitats, National Vegetation Classification (NVC) types, and notable botanical species.

This appendix is supported by and should be read in conjunction with two figures found within *Volume 3: Figures*:

- Figure 6.3 – Phase 1 habitats;
- Figure 6.4 – National Vegetation (NVC) and notable plants.

This appendix is concerned primarily with terrestrial habitats. Whilst mention is made of NVC types in standing waters, further detail on the macrophyte flora of standing waters, as well as watercourses, is given in *Chapter 7: Aquatic Ecology*. This appendix also discusses the limited coastal habitats within the Development Site at Loch Fyne, including intertidal saltmarsh, however for further information on marine habitats refer to *Chapter 8: Marine Ecology*.

2. Methods

Nomenclature

Vascular plant species are given their common and scientific names when first referred to and their common names only thereafter. Common names of bryophytes are not well-known, and they are referred to by scientific names only. Nomenclature for vascular plants follows Stace (2019) and for bryophytes Atherton *et al.* (2010) unless otherwise stated.

For uniformity, and to avoid potential confusion having two scientific names for one species, where the published NVC community names incorporate out-dated scientific names, they are replaced by current species names.

The term 'NVC type' is commonly used in this appendix for brevity, and can refer to communities or sub-communities.

Field survey

The field survey took place in the periods 8-12 July 2019, 22-24 July 2019, 09-20 August 2021 and 29 September-01 October 2021. Phase 1 habitats and NVC types were recorded concurrently.

Assigned Phase 1 habitats correspond to those set out in the standard Joint Nature Conservation Committee guidance (JNCC, 2010), and notes were made for each habitat of dominant, typical and notable plant species, which reflect conditions at the time of survey. Some non-standard Phase 1 mosaic categories were employed in certain cases, where the dominant NVC types indicated a mosaic of two Phase 1 habitats for which the standard system does not provide a mosaic category (such as blanket bog-wet heath mosaic) – these have been provided logical symbols on the Phase 1 map in *Figure 6.3*. Point locations of notable vascular plants and bryophytes were also recorded.

In considering NVC, the normal procedure was followed whereby homogenous vegetation stands are assigned NVC types (Rodwell 1991a, 1991b, 1992, 1995 and 2000). Reference was made also to other NVC guidance (Averis *et al.*, 2004; Hall *et al.*, 2004). Since NVC communities often occur in patches too small to map amongst more extensive communities, or in complexes that cannot be feasibly mapped within a reasonable timescale, NVC polygons were described as mosaics as necessary, with estimated proportions of mosaic components (the majority of upland polygons were mosaics in this case, typically with multiple smaller extents of NVC types amongst the dominant types, and up to eight mosaic components). Rarely, vegetation considered intermediate between two NVC types was recorded as a transitional type using a hyphen between the two NVC codes. Rarely, vegetation not corresponding to a community in the NVC volumes was assigned a unique code (defined further below). If habitats lacked vegetation, a brief descriptive term was given (e.g. 'Open water'). Identification of NVC types was by experienced professional judgement with cognisance of the above-referenced NVC guidance.

Aerial photography and contour data were used during the field survey, and a GPS unit or GPS-enabled tablet operating ESRI FieldMaps, to maximise survey accuracy.

Desk work

Data gathered in the field were refined in desktop ESRI ArcGIS, directly by the surveyor, with reference to current aerial imagery. Validation checks were carried out on the GIS data to ensure consistency and rectify sliver gaps and overlaps. Mosaics were recorded in the GIS data in the standard way, with NVC types separated by slashes in one attribute, and respective proportions separated by slashes in a separate attribute. Where potential groundwater dependent terrestrial ecosystems (GWDTE) were present in habitat polygons, the potential groundwater dependency was noted in a separate attribute.

For habitat area calculations, the validated GIS data were exported to spreadsheet format, the NVC mosaic components and respective proportions were separated using the text-to-column function, and pivot tables were then used to obtain areas of Phase 1 habitats and NVC types. This was carried out twice, for the entire surveyed area and for habitats within the infrastructure footprint (including all infrastructure, and for these purposes including a 5m buffer on all infrastructure to account for possible worst-case habitat loss beyond the exact footprint).

Limitations

The precise design of the Development evolved over the course of the survey periods, and also at a late date during production of this appendix and *Chapter 6: Terrestrial Ecology*. For these reasons, although the survey extent (as shown by the extent of mapped habitats on *Figure 6.3* and *Figure 6.4*) generally includes an adequate buffer around infrastructure, there are a few limitations in this respect:

- Permanent compounds PC20 (and 530 m of access track to it), PC18 (and 95 m of access track to it) and the northern edge of PC13 are beyond the surveyed area;
- Most of temporary compound TC11, and immediately adjacent access track, are just beyond the surveyed area;
- The survey buffer on the Headpond freeboard locally drops to 200 m rather than 250 m;
- The survey buffer on a short section of access track south of temporary compound TC11 drops to 70 m rather than 100 m.

With regard to the unsurveyed small compounds and limited associated access track sections, the land-take will be extremely small compared to the loss of habitat to the Development as a whole (in particular, the Headpond), and the relevant unmapped land is known from other surveys (and supported by peat probing results) to be dominated by wet heath with localised small areas of peat likely supporting isolated blanket bog patches (of negligible size compared to the blanket bog in the Headpond area). The localised drop in survey buffer around the Headpond to 200 m rather than 250 m has limited consequence since the relevant land slopes significantly upwards away from the Headpond and the surveyed area, such that hydrological impact beyond the surveyed area is not considered possible. This same argument applies to the short stretch of access track with a 70m rather than a 100 m buffer. For these reasons, these habitat survey buffer limitations are not considered significant, and would not detract from the habitat assessment in *Chapter 10: Terrestrial Ecology* sufficiently so as to affect the conclusions.

Where habitat edges are sharp, and coincide with features on base mapping or aerial photography that are considered correct, their placement is based on the accuracy of that data in GIS. Otherwise, habitat edges are best estimates as judged in the field. Note also that habitat transitions can be gradual without sharp boundaries. Habitat mapping and stated habitat areas are necessarily subject to these limitations.

Baseline conditions are increasingly liable to change with further elapsed time since field survey. However, it is unlikely that significant changes to baseline habitats would occur prior to construction in this primarily upland location.

Recorded Habitats and NVC types

Figure 6.3 shows the recorded Phase 1 habitats. It also includes a visual indication of where blanket bog is the wetter oceanic form with abundant sphagnum (NVC type M17a), superimposed on the standard blanket bog symbol.

Figure 6.4 shows the recorded NVC types. It also shows a) numbered Target Notes (which are used here as reference points to indicate the locations of the notable botanical species or species-rich habitats discussed in this appendix), and b) locations of recent burning evidence (at the time of survey).

The recorded NVC communities and sub-communities are listed below with their full names, grouped into habitat categories, and with brief descriptive comments in brackets. However, for the sake of brevity only the codes (e.g. 'M19') are stated in this appendix after this section. Where no sub-community is stated, either a) there are no published sub-communities, or b) the recorded vegetation was not considered a good fit to the published sub-communities or considered intermediate, or c) the vegetation was of low ecological value and low priority and not closely inspected (e.g. agricultural grassland and dense bracken) or was not able to be closely inspected.

Underlined NVC types below are the principal and most abundant vegetation types in the surveyed area. [Square brackets] indicates that the NVC type does not occur within the Development footprint.

- Blanket bog:
 - **M1** *Sphagnum auriculatum* bog pool;
 - **M2** *Sphagnum cuspidatum/fallax* bog pool;
 - [**M3** *Eriophorum angustifolium* bog pool;]
 - **M15c*** – this expansion of the official NVC code indicates that vegetation fitting M15c wet heath is on deep peat and therefore that the habitat is actually degraded blanket bog;
 - **M17** *Trichophorum germanicum-Eriophorum vaginatum* blanket mire (wetter oceanic bog):
 - **M17a** *Drosera rotundifolia-Sphagnum* sub-community (wettest oceanic bog);
 - **M17a degr** – this expansion of the official NVC code indicates very obviously degraded M17a;
 - **M17b** *Cladonia* sub-community (less wet oceanic bog, sometimes hagged);
 - **M17b degr** – this expansion of the official NVC code indicates very obviously degraded M17b.
 - **M18** *Erica tetralix-Sphagnum papillosum* raised and blanket mire (most common on raised bogs):
 - **M18a** *Sphagnum medium-Andromeda polifolia* sub-community;
 - **M19** *Calluna vulgaris-Eriophorum vaginatum* blanket mire (drier boreal bog):
 - **M19a** *Drosera rotundifolia-Sphagnum* sub-community (effectively a transition towards M17);
 - **M19a-c** – this indicates vegetation considered transitional between M19a and M19c;
 - **M19b** *Empetrum nigrum* spp. *nigrum* sub-community (typical drier boreal bog);
 - **M19b degr** – this expansion of the official NVC code indicates very obviously degraded M19b;
 - **M19c** *Vaccinium vitis-idaea-Hylocomium splendens* sub-community (higher altitude drier bog);
 - **M19c degr** – this expansion of the official NVC code indicates very obviously degraded M19c;
 - **M20** *Eriophorum vaginatum* blanket and raised mire (degraded bog):
 - **M20b** *Calluna vulgaris-Cladonia* sub-community (degraded bog probably derived from M19);
 - **Bare peat** – this non-NVC code indicates extents of bare peat in blanket bog (degraded bog);
- Flushes and basin mire vegetation:
 - [**M4** *Carex rostrata-Sphagnum fallax* mire (acid bottle sedge *Carex rostrata*, closely allied to M6);]
 - **M6** *Carex echinata-Sphagnum fallax/denticulatum* mire (acid and typically species-poor flush):
 - **M6a** *Carex echinata* sub-community (typical acid flush with small sedges);
 - **M6b** *Carex nigra-Nardus stricta* sub-community (more grassy acid flush);
 - **M6c** *Juncus effusus* sub-community (soft rush *Juncus effusus* acid flush);
 - **M6d** *Juncus acutiflorus* sub-community (sharp-flowered rush *Juncus acutiflorus* acid flush);
 - **M10** *Carex dioica-Pinguicula vulgaris* mire (basic and more species-rich flush):
 - **M10a** *Carex viridula* spp. *oedocarpa-Juncus bulbosus* sub-community;
 - **M17-M4** – this indicates vegetation considered transitional between M17 bog and M4 mire;
 - **M17-M6** – this indicates vegetation considered transitional between M17 bog and M6 flush;

- **[M20-M6** – this indicates vegetation considered transitional between M20 bog and M6 flush;]
- **M29** *Hypericum elodes-Potamogeton polygonifolius* soakway (very wet vegetation water channels);
- Wet heath:
 - **M15** *Trichophorum germanicum-Erica tetralix* wet heath:
 - **M15a** *Carex panicea* sub-community (flushed wet heath);
 - **M15a degr** – this expansion of the official NVC code indicates obviously degraded M15a;
 - **M15b** Typical sub-community (typical wet heath, often species-poor);
 - **M15b degr** – this expansion of the official NVC code indicates obviously degraded M15b;
 - **M15c** *Cladonia* sub-community (higher altitude and more open with *Cladonia* sp. and/or *Racomitrium lanuginosum*);
 - **[M15 Jsq** – this expansion of the official NVC code indicates degraded wet heath with frequent heath rush *Juncus squarrosus*.]
- Dry heath:
 - **H10-12** – this indicates heath considered transitional between H10 and H12 (i.e. with both frequent bell heather *Erica cinerea* and bilberry *Vaccinium myrtillus*);
 - **H10** *Calluna vulgaris-Erica cinerea* heath:
 - **H10a** Typical sub-community (typical and rather species-poor);
 - **H10b** *Racomitrium lanuginosum* sub-community (higher altitude and more open with *Cladonia* spp. and/or *Racomitrium lanuginosum*);
 - **H10c** *Festuca ovina-Anthoxanthum odoratum* sub-community (grazed and more open / grassy);
 - **H10d** *Thymus drucei-Carex pulicaris* sub-community (basic and more species-rich);
 - **H12** *Calluna vulgaris-Vaccinium myrtillus* heath:
 - **[H12a** Typical sub-community (typical and rather species-poor;]
 - **H12b** *Vaccinium vitis-idaea-Cladonia portentosa* sub-community (higher altitude with cowberry *Vaccinium vitis-idaea* and very rarely (at this site) cloudberry *Rubus chamaemorus*);
 - **H12c** *Galium saxatile-Festuca ovina* sub-community (grazed and more open / grassy);
 - **H18** *Vaccinium myrtillus-Deschampsia cespitosa* heath (not natural at this site, indicative of over-grazing):
 - **H18a** *Hylocomium splendens-Rhytidiadelphus loreus* sub-community;
 - **H21** *Calluna-vulgaris-Vaccinium myrtillus-Sphagnum capillifolium* heath (shady and damp):
 - **H21a** *Calluna vulgaris-Pteridium aquifolium* sub-community;
 - **H22-U6** – this indicates degraded vegetation considered transitional between H22 and U6;
- Marsh / marshy grassland:
 - **M23** *Juncus effusus/Juncus acutiflorus-Galium palustre* rush-pasture (neutral rushy wetland);
 - **M23a** *Juncus acutiflorus* sub-community;
 - **M23a-W** – this indicates M23a that has been planted with young broadleaved trees and is progressing towards woodland;
 - **M23b** *Juncus effusus* sub-community – localised;
 - **M23b-W** – this indicates M23b that has been planted with young broadleaved trees and is progressing towards woodland;
 - **M25** *Molinia caerulea-Potentilla erecta* mire (swards of purple moor-grass *Molinia caerulea*);
 - **M25a** *Erica tetralix* sub-community (acid and at this site derived from wet heath by over-grazing);
 - **[M25b** *Anthoxanthum odoratum* sub-community (more grassy);]

- **M25c** *Angelica sylvestris* sub-community (allied to M23 with neutral wetland herbs);
- **M27** *Filipendula ulmaria*-*Angelica sylvestris* tall-herb fen (meadowsweet *Filipendula ulmaria* dominant);
- **M28** *Iris pseudacorus*-*Filipendula ulmaria* mire (allied to M23 but with yellow iris *Iris pseudacorus*);
- Neutral grasslands:
 - **MG1** *Arrhenatherum elatius* grassland (coarse unmanaged neutral grassland);
 - **MG5** *Cynosurus cristatus*-*Centaurea nigra* grassland (lowland meadow);
 - **MG5(pr)** – this expansion to the official NVC code indicates grassland approximately corresponding to MG5 but of poor quality and likely sown;
 - **MG5a(pr)** – this expansion of the official NVC code indicates grassland approximately corresponding to the *Lathyrus pratensis* sub-community but of poor quality and likely sown;
 - **MG5c** – *Danthonia decumbens* sub-community;
 - **MG6** *Lolium perenne*-*Cynosurus cristatus* grassland (poor agriculturally-improved grassland):
 - **MG6a** Typical sub-community;
 - **MG6b** *Anthoxanthum odoratum* sub-community;
 - **MG7** *Lolium perenne* leys and related grasslands (very poor sown agricultural grassland);
 - **MG9** *Holcus lanatus*-*Deschampsia cespitosa* grassland (damp neutral tufted hair-grassland *Deschampsia cespitosa*):
 - **MG9a** *Poa trivialis* sub-community;
 - **MG10** *Holcus lanatus*-*Juncus effusus* rush-pasture (species-poor rushy pasture):
 - **MG10a** Typical sub-community;
 - **MG10c** *Iris pseudacorus* sub-community;
 - **MG10-W** – this indicates MG10 that has been planted with young broadleaved trees and is progressing towards woodland;
 - **MG11** *Festuca rubra*-*Agrostis stolonifera*-*Potentilla anserina* grassland (coastal grassland);
 - **HI** – this non-NVC code indicates species-poor grassland overwhelmingly dominated by *Holcus lanatus*;
 - **FH** – this non-NVC code indicates non-notable grassland corresponding to the provisional *Festuca*-*Holcus* community (see e.g. the vegetation key in Averis *et al.*, 2004);
- Basic grasslands:
 - **CG10** *Festuca ovina*-*Agrostis capillaris*-*Thymus drucei* grassland (species-rich basic grassland):
 - **CG10a** *Trifolium repens*-*Luzula campestris* sub-community;
 - **CG10b** *Carex pulicaris*-*Carex panicea* sub-community;
 - **U5c** *Nardus stricta*-*Galium saxatile* grassland, *Carex panicea*-*Viola riviniana* sub-community;
- Acid grasslands:
 - **U4** *Festuca ovina*-*Agrostis capillaris*-*Galium saxatile* grassland (typical lower altitude acid grassland):
 - **U4a** Typical sub-community;
 - **U4b** *Holcus lanatus*-*Trifolium repens* sub-community;
 - **U4b-W** – this indicates U4b that has been planted with young broadleaved trees and is progressing towards woodland;
 - **[U4c** *Lathyrus linifolius*-*Stachys officinalis* sub-community;]
 - **U4e** *Vaccinium myrtillus*-*Avenella flexuosa* sub-community;
 - **U5** *Nardus stricta*-*Galium saxatile* grassland (allied to U4 but with abundant mat-grass *Nardus stricta*) (see also U5c under basic grassland above):

- **U5a** Typical sub-community (species-poor);
- **U5b** *Agrostis canina*-*Polytrichum commune* sub-community (damp with mosses);
- **U5e** *Racomitrium lanuginosum* sub-community (higher altitude, more open);
- **U6** *Juncus squarrosus*-*Festuca ovina* grassland (probably mostly not natural at this site, derived from bog or heath by overgrazing):
 - **U6a** *Sphagnum* sub-community;
 - **U6c** *Vaccinium myrtillus* sub-community;
 - **U6d** *Agrostis capillaris*-*Luzula multiflora* sub-community;
 - **U6d flushed** – this expansion of the official NVC code indicates U6d that is flushed;
- **JA** – a non-NVC code used rarely for fairly dry soft-rush *Juncus effusus* with an acid U4-type flora;
- Species-rich rocky ledge:
 - **U17** *Luzula sylvatica*-*Geum rivale* tall-herb community;
- Fern communities:
 - [**U19** *Oreopteris limbosperma*-*Blechnum spicant* fern community (dense lemon-scented fern *Oreopteris limbosperma*);]
 - **U20** *Pteridium aquilinum*-*Galium saxatile* fern community (dense bracken *Pteridium aquilinum*):
 - **U20a** *Anthoxanthum odoratum* sub-community.
- Wet woodlands:
 - **W1** *Salix cinerea*-*Galium palustre* woodland (relatively poor wet grey willow *Salix cinerea*);
 - **W4** *Betula pubescens*-*Molinia caerulea* woodland (acid wet downy birch *Betula pubescens*):
 - **W4b** *Juncus effusus* sub-community;
 - **W4c** *Dryopteris dilatata*-*Rubus fruticosus* sub-community;
 - **W7** *Alnus glutinosa*-*Fraxinus excelsior*-*Lysimachia nemorum* woodland (neutral wet woodland):
 - **W7b** *Carex remota*-*Cirsium palustre* sub-community (flushed neutral wet woodland);
- Dry woodlands / scrub:
 - **W9** *Fraxinus excelsior*-*Sorbus aucuparia*-*Mercurialis perennis* woodland (basic dry woodland):
 - **W9a** Typical sub-community;
 - **W10** *Quercus robur*-*Pteridium aquilinum*-*Rubus fruticosus* woodland (+/- neutral dry woodland):
 - **W10e** *Acer pseudoplatanus*-*Oxalis acetosella* sub-community;
 - **W11** *Quercus petraea*-*Betula pubescens*-*Oxalis acetosella* woodland (acid non-heathy woodland);
 - [**W13** *Taxus baccata* woodland (yew *Taxus baccata* woodland):
 - **W13b** *Mercurialis perennis* sub-community;]
 - **W17** *Quercus petraea*-*Betula pubescens*-*Dicranum majus* woodland (acid heathy woodland);
 - **W24** *Rubus fruticosus*-*Holcus lanatus* scrub (grassy bramble *Rubus fruticosus* agg. scrub);
 - **W25** *Rubus fruticosus*-*Pteridium aquilinum* scrub (bramble *Rubus fruticosus* agg. with bracken);
 - [**W-JK** – a non-NVC code used once only to indicate broadleaved woodland overwhelmingly dominated beneath by dense Japanese knotweed *Reynoutria japonica*, which cannot be satisfactorily assigned to a published NVC type;]
 - **Non-NVC plantation codes BP, MP and CP** – these indicate broadleaved, mixed and coniferous plantations respectively, that do not correspond to published NVC types. The suffix 'y' (e.g. 'CPy') indicates young plantation, and the suffix 'felled' indicates that the plantation was in a felled state but not yet replanted at the time of survey;
- Ruderal ('weed') and other non-NVC tall herbaceous disturbed vegetation:

- **OV24** *Urtica dioica*-*Galium aparine* community (nettle *Urtica dioica* / cleavers *Galium aparine*);
- [OV25 *Urtica dioica*-*Cirsium arvense* community (nettle / creeping thistle *Cirsium arvense*);]
- **OV27** *Chamenerion angustifolium* community (rosebay willowherb *Chamenerion angustifolium*);
- **ferns** – a non-NVC code used for disturbed vegetation in an overhead line wayleave dominated by large ferns but not corresponding to the available NVC types for large ferns;
- **Japanese knotweed** – a non-NVC code used for dense Japanese knotweed not under trees;
- Swamps and tall-herb fens:
 - [S4 *Phragmites australis* swamp and reedbed (species-poor common reed *Phragmites australis* in water;)]
 - **S9** *Carex rostrata* swamp (species-poor bottle sedge in water);
 - [S10 *Equisetum fluviatile* swamp (species-poor water horsetail *Equisetum fluviatile* in water;)]
 - [S22 *Glyceria fluitans* water-margin vegetation (very wet flote-grass *Glyceria fluitans*);]
 - **S28** *Phalaris arundinacea* tall-herb fen (species-poor dense reed canary-grass *Phalaris arundinacea*);
- Aquatic communities:
 - [A7 *Nymphaea alba* community (white water-lily *Nymphaea alba* in water;)]
 - [A8 *Nuphar lutea* community (yellow water-lily *Nuphar lutea* in water;)]
 - **A22** *Littorella uniflora*-*Lobelia dortmanna* community (submerged community with shoreweed *Littorella uniflora* and allied species);
- Saltmarsh:
 - **SM16** *Festuca rubra* saltmarsh community (red fescue *Festuca rubra* and saltmarsh rush *Juncus gerardii* upper saltmarsh).

In cases where a significant part of a polygon is not or barely vegetated, 'OW' has been used for Open Water, and a variety of self-explanatory terms for unvegetated terrestrial ground such as 'rock', 'road' and 'track'. The substantial draw-down zone of the existing reservoir on the Allt Beochlich is coded as 'sediment/ephemeral', and the intertidal zone at Loch Fyne as 'sediment/seaweed'.

Comparison of Survey Area and Development Footprint

The below tables compare the areas of habitats and NVC types within the survey area and the Development footprint (including a 10 m wide strip for all access tracks and a 5 m buffer on all other infrastructure). They also show lost and retained percentages, in comparison to habitat in the surveyed area.

Table 1. Phase 1 habitats.

Habitat	Total (ha)	Area Lost (ha)	area Percentage lost (%)	Percentage remaining (%)
A1.1.1 Broadleaved semi-natural woodland	27.35	0.46	1.67	98.33
A1.1.2 Broadleaved plantation	58.17	1.34	2.30	97.70
A1.2.2 Conifer plantation	127.83	0.54	0.42	99.58
A1.3.2 Mixed plantation	17.43	0.40	2.32	97.68
A2.1 Dense scrub	2.43	0.09	3.67	96.33
A4.2 Felled conifer plantation (at the time of survey)	68.65	0.15	0.22	99.78
B1.1 Unimproved acid grassland	29.27	8.51	29.08	70.92
B1.2 Semi-improved acid grassland	8.68	1.29	14.91	85.09
B2.2 Semi-improved neutral grassland	17.26	0.95	5.49	94.51
B3.1 Unimproved basic grassland	0.50	0.17	34.70	65.30
B4 Agriculturally-improved pasture	27.77	6.60	23.76	76.24

Habitat	Total (ha)	Area Lost (ha)	area Percentage lost (%)	Percentage remaining (%)
B5 Marshy grassland	22.42	1.28	5.70	94.30
B6 Poor semi-improved grassland	2.61	0.09	3.43	96.57
C1.1 Dense bracken	8.18	0.10	1.16	98.84
C3.1 Tall ruderal	0.11	0.04	34.04	65.96
D1.1 Acid dry heath	5.32	4.35	81.65	18.35
D1.2 Basic dry heath	1.85	1.05	56.64	43.36
D2 Wet heath	43.36	6.50	15.00	85.00
D5 Acid grassland/dry heath mosaic	8.56	2.13	24.93	75.07
D6 Acid grassland/wet heath mosaic	21.16	8.58	40.56	59.44
E1.6.1 Blanket bog	402.61	105.08	26.10	73.90
E1.6.1/B1.1 Blanket bog/acid grassland mosaic	28.70	14.62	50.93	49.07
E1.6.1/D1.1 Blanket bog/dry heath mosaic	0.23	0.07	31.86	68.14
E1.6.1/D2 Blanket bog/wet heath mosaic	29.82	8.23	27.59	72.41
E1.6.1/E2.1 Blanket bog/acid flush mosaic	4.70	1.00	21.27	78.73
E1.7 Modified (degraded) bog	97.29	45.60	46.86	53.14
E1.7/B1.1 Modified (degraded) bog/acid grassland mosaic	21.35	2.98	13.96	86.04
E1.7/D1.1 Modified (degraded) bog/dry heath mosaic	0.21	0.13	60.48	39.52
E1.7/D2 Modified (degraded) bog/wet heath mosaic	11.19	11.18	99.89	0.11
E2.1 Acid flush	19.46	6.91	35.52	64.48
E2.2 Basic flush	0.27	0.00	1.70	98.30
E3.2 Basin mire	6.02	3.81	63.30	36.70
G1.3 Oligotrophic standing water	7.55	2.39	31.67	68.33
G2 Running water	3.41	0.86	25.18	74.82
H2.6 Saltmarsh	0.11	0.01	10.38	89.62
(Coastal) Sediment/seaweed	1.92	0.04	1.85	98.15
H8.4JK Coastal grassland (with Japanese knotweed)	0.14	0.02	12.98	87.02
I2.1 Quarry	0.43	0.42	95.81	4.19
J1.2 Amenity grassland	2.63	0.02	0.94	99.06
J3.6 Buildings	1.16	0.21	18.15	81.85
Construction works	0.34	0.16	45.36	54.64
Road	2.28	0.28	12.25	87.75
Track	8.62	3.55	41.22	58.78

The NVC types listed in the table below occur within the Development footprint and are impacted to some degree. Where the percentage lost is zero, this is because the amount lost is extremely small. NVC types that are not impacted at all (shown with square brackets around them in the above list of NVC types) are not included. Names and brief descriptions of these NVC types are given under 'Recorded Habitats and NVC Types' above.

Table 2. NVC types

Habitat	NVC type	Total (ha)	Area Lost (ha)	area Percentage lost (%)	Percentage remaining (%)
Blanket bog	M1	0.15	0.13	88.97	11.03
	M2	0.11	0.05	44.96	55.04
	M15c* (degr. bog)	1.03	0.30	28.85	71.15

Habitat	NVC type	Total (ha)	Area Lost (ha)	area Percentage lost (%)	Percentage remaining (%)
	M17a	105.85	47.01	44.42	55.58
	M17a degr	3.66	1.25	34.10	65.90
	M17b	130.84	33.39	25.52	74.48
	M17b degr	0.88	0.57	64.52	35.48
	M17-M4	0.88	0.88	100.00	0.00
	M17-M6	0.75	0.15	20.50	79.50
	M18a	0.07	0.07	100.00	0.00
	M19a	45.16	14.85	32.89	67.11
	M19a-c	0.60	0.11	17.72	82.28
	M19b	18.52	7.22	39.00	61.00
	M19b degr	7.97	7.07	88.74	11.26
	M19c	127.78	26.77	20.95	79.05
	M19c degr	66.66	19.23	28.84	71.16
	M20	6.64	4.21	63.50	36.50
	M20b	1.31	0.08	5.89	94.11
	Bare peat	0.47	0.19	39.11	60.89
Acid flush	M6a	0.97	0.48	49.71	50.29
	M6b	0.00	0.00	55.93	44.07
	M6c	6.88	2.81	40.81	59.19
	M6d	22.91	7.71	33.65	66.35
Basic flush	M10	0.08	0.05	64.92	35.08
	M10a	0.18	0.00	2.50	97.50
Very wet soakway	M29	0.08	0.05	67.07	32.93
Wet heath	M15a	11.01	5.66	51.34	48.66
	M15a degr	1.73	0.04	2.35	97.65
	M15b	33.11	5.06	15.27	84.73
	M15b degr	19.90	5.41	27.19	72.81
	M15c	10.55	4.64	43.98	56.02
Dry heath	H10-12	0.08	0.06	66.95	33.05
	H10a	0.12	0.01	6.50	93.50
	H10b	3.32	1.50	45.32	54.68
	H10c	4.77	2.23	46.63	53.37
	H10d	0.91	0.85	92.95	7.05
	H12b	0.28	0.08	28.73	71.27
	H12c	0.98	0.30	30.55	69.45
	H18	0.56	0.50	89.02	10.98
	H18a	0.01	0.01	100.00	0.00
	H21a	1.66	0.52	31.59	68.41
	H22-U6	0.18	0.18	100.00	0.00
Marsh / Marshy grassland	M23	1.07	0.06	5.77	94.23
(Neutral rush-pasture/flush (M23);	M23a	11.65	0.84	7.21	92.79
	M23a-W	0.13	0.00	3.63	96.37

Habitat	NVC type	Total (ha)	Area Lost (ha)	area	Percentage lost (%)	Percentage remaining (%)
Purple moor-grass grassland/marsh (M25); Meadowsweet marsh (M27); Poor acid equivalent of M23b (JA).	M23b	4.36	0.26	5.86	94.14	
	M23b-W	0.26	0.01	3.63	96.37	
	M25a	3.26	0.04	1.24	98.76	
	M25c	0.61	0.00	0.30	99.70	
	M27	0.08	0.01	6.97	93.03	
Neutral grassland	MG1	0.22	0.01	3.40	96.60	
	MG5a(pr)	1.79	0.20	11.13	88.87	
	MG6	0.79	0.01	0.64	99.36	
	MG6a	29.27	6.66	22.76	77.24	
	MG6b	3.98	0.55	13.84	86.16	
	MG7	2.26	0.02	1.03	98.97	
	MG9	0.06	0.01	8.82	91.18	
	MG9a	0.76	0.01	1.62	98.38	
	MG10	2.17	0.07	3.41	96.59	
	MG10a	7.31	0.51	6.92	93.08	
	MG10c	0.05	0.01	12.91	87.09	
	MG10-W	1.95	0.07	3.63	96.37	
	MG11	0.04	0.01	12.98	87.02	
	HI	0.07	0.00	1.65	98.35	
Basic (CG10) or slightly basic (U5c) grassland	FH	3.58	0.46	12.91	87.09	
	CG10a	0.37	0.19	51.11	48.89	
	CG10b	0.04	0.00	10.59	89.41	
Acid grassland	U5c	13.92	5.56	39.95	60.05	
	U4a	3.96	1.03	26.03	73.97	
	U4b	6.31	0.53	8.46	91.54	
	U4b-W	0.26	0.01	3.63	96.37	
	U4e	0.37	0.01	3.78	96.22	
	U5a	12.31	4.43	36.02	63.98	
	U5b	6.11	3.66	59.86	40.14	
	U5e	1.95	0.37	18.75	81.25	
	U6	0.38	0.00	0.11	99.89	
	U6a	2.33	1.65	70.63	29.37	
	U6c	18.32	6.80	37.12	62.88	
	U6d	24.60	5.06	20.55	79.45	
	U6d flushed	0.10	0.00	4.75	95.25	
	JA	0.66	0.18	27.20	72.80	
Species-rich rocky ledge	U17	0.03	0.00	2.37	97.63	
Bracken	U20	6.75	0.21	3.11	96.89	
	U20a	2.58	0.04	1.68	98.32	
Wet woodland	W1	0.33	0.00	0.45	99.55	
	W4b	1.37	0.02	1.76	98.24	
	W4c	3.45	0.00	0.00	100.00	

Habitat	NVC type	Total (ha)	Area Lost (ha)	area	Percentage lost (%)	Percentage remaining (%)
	W7	0.35	0.00	0.20	99.80	
	W7b	7.23	0.27	3.80	96.20	
Basic dry woodland	W9a	2.51	0.03	1.15	98.85	
Neutral dry woodland	W10e	6.50	0.19	2.87	97.13	
Acid dry woodland	W11	13.86	0.10	0.69	99.31	
	W17	0.34	0.00	0.09	99.91	
Scrub	W24	1.38	0.07	5.43	94.57	
	W25	0.56	0.02	3.15	96.85	
Non-NVC plantation – broadleaved, mixed, coniferous and felled coniferous ('y'= young)	BP	5.92	0.75	12.74	87.26	
	MP	10.83	0.40	3.68	96.32	
	CP	154.18	0.75	0.49	99.51	
	CPfelled	68.65	0.15	0.22	99.78	
	CPy	12.44	0.12	0.99	99.01	
Ruderal and non-NVC disturbed herbaceous vegetation	OV24	0.13	0.04	29.31	70.69	
	OV27	0.04	0.00	5.62	94.38	
	ferns	0.19	0.01	2.84	97.16	
Swamp	S9	0.29	0.02	5.35	94.65	
	S28	0.01	0.00	12.98	87.02	
Vegetated and non-vegetated open water	A22	3.54	2.34	66.21	33.79	
	OW	3.49	0.11	3.26	96.74	
River	River	3.41	0.86	25.18	74.82	
	Non-NVC managed river bank	0.14	0.00	3.47	96.53	
Saltmarsh and intertidal sediment	SM16	0.11	0.01	10.38	89.62	
	Sediment/seaweed	1.92	0.04	1.85	98.15	
Natural and artificial rock	Rock (natural)	0.52	0.02	3.56	96.44	
	Quarry	0.43	0.42	95.81	4.19	
Urban, gardens and roads/tracks	Buildings	0.48	0.04	7.77	92.23	
	Caravans / garden	0.68	0.17	24.47	75.53	
	House garden	0.08	0.01	10.67	89.33	
	Construction works	0.34	0.16	45.36	54.64	
	Road	2.28	0.28	12.25	87.75	
	Track	8.62	3.55	41.22	58.78	

Habitat Descriptions – Headpond / Loch Awe

Woodland

Plantations

Coniferous woodland within the Headpond / Loch Awe vicinity is ecologically-poor commercial Sitka spruce *Picea sitchensis* of no note, mostly established but in some parts felled and replanted. Near Loch Awe, there is also an area of deer-fenced very recent broadleaved plantation in tubes, on what is more or less an unmanaged neutral grassland. Near Three Bridges there are other very recent broadleaved and mixed plantations on former pasture. These woodlands are of little ecological note and are not discussed further.

Semi-natural woodland

Other woodland in this area comprises semi-natural woodland beside or close to Loch Awe and running in places in narrow strips along watercourses into the lower parts of the hills. Much of this is ancient semi-natural woodland (ASNW).

ASNW beside Loch Awe comprises both wet and dry woodland NVC types. The wet components are W7b, in which the key diagnostic ground flora species, in variable abundance and generally not all present in the same small patch, are meadowsweet *Filipendula ulmaria*, valerian *Valeriana officinalis*, mint *Mentha* sp., remote sedge *Carex remota*, opposite-leaved golden-saxifrage *Chrysosplenium oppositifolium*, marsh hawksbeard *Crepis paludosa*, hemlock water-dropwort *Oenanthe crocata*, yellow pimpernel *Lysimachia nemorum*, marsh marigold *Caltha palustris*, angelica *Angelica sylvestris*, tufted hair-grass *Deschampsia cespitosa*, and occasionally skullcap *Scutellaria galericulata*. Native bluebell *Hyacinthoides non-scripta* and lesser celandine *Ficaria verna* are also frequent. The largest range of wetland species, and the greatest abundance of such W7 woodland, is found outside the Development, beside Loch Awe and to the south of the Allt a' Chrosaid. W7 woodland in and near the tailpond area is most diverse at the north end of the Tailpond, but of much smaller extent than the diverse W7 south of the Allt a' Chrosaid. The canopy species in the W7 are mainly alder *Alnus glutinosa*, but birch is frequent and there are also small amounts of ash *Fraxinus excelsior*, oak *Quercus* sp. and grey willow *Salix cinerea* are also present.

The drier woodland components in the Tailpond area and nearby are mainly W10e. W10 tends to be a more southern NVC type, but in the absence of clearer acid indicators W10 is considered more fitting than W11. This woodland includes carpets of native bluebell *Hyacinthoides non-scripta*, as well as creeping softgrass *Holcus mollis* and bramble *Rubus fruticosus* agg. Other species include lady-fern *Athyrium filix-femina*, male-fern *Dryopteris* sp., greater stitchwort *Stellaria holostea* and in places (typically beside the B840) nettle *Urtica dioica*. Occasionally, there is some indication of base-enrichment with local enchanter's nightshade *Circaea* sp. and herb-robert *Geranium robertianum*, indicative here (with ferns and moderate bryophyte cover and diversity) of W9a.

South of the Allt a' Chrosaid, and extending in places along streamsides into the hills, W11 is also found. This is often dominated by sessile oak *Quercus petraea* in the canopy, although birch *Betula* sp. is also common. The ground flora is very clearly that of W11, with a mix of the grasses common bent *Agrostis capillaris*, sweet vernal-grass *Anthoxanthum odoratum* and creeping soft-grass, abundant moss including the typical species *Thuidium tamariscinum* and *Rhytidiadelphus loreus*, locally dominant bracken *Pteridium aquilinum*, frequent dryopteroid ferns, abundant wood sorrel *Oxalis acetosella*, and various characteristic herbs including wood anemone *Anemone nemorosa*, pignut *Conopodium majus*, common dog-violet *Viola riviniana* and occasionally primrose *Primula vulgaris*. In the largest extent of W11, beside the B840 south of the Allt a' Chrosaid, which is largely deer-fenced, seedling and sapling trees and shrubs were observed, including oak, ash, rowan *Sorbus aucuparia* and hazel *Corylus avellana*.

W11, and locally W9, extends along the Allt Beochlich upstream for about 1km. Further upstream, below the western (Balliemanoch) access track and on the vertiginous southern bank of the watercourses, there is locally an extremely thin strip of woodland. This was not accessible and could only be viewed from the other side, however, it appears to be mainly W11 where more bracken-dominated beneath, and W17 where ericoids are prominent; there is also a small amount of species-rich W9a with dog's-mercury *Mercurialis perennis*, herb-robert, dryopteroid ferns, hawkweed *Hieracium* sp. and occasionally wood cranesbill *Geranium sylvaticum*. An extremely small amount of W9 is also considered to exist at the species-rich ravine at Target Note 2, given presence of a line of stunted birch, hazel, rowan and willow with appropriate species such as dog's-mercury beneath (see 'Species rich ledge / ravine vegetation' below).

Although less relevant to the Development, because it will not construct an access track there, semi-natural woodlands were also recorded at Three Bridges. These are mainly W11 similar to that described above although with a birch tending to dominate in the canopy over sessile oak and occasional hazel and rowan, and associated with extensive bracken patches. There are also small extents of W7 similar to that described above, and several patches of W4, an acidic wet woodland type. This W4 is mostly dominated by birch in the canopy, with occasional grey willow, and purple moor-grass *Molinia caerulea* beneath; it often contains at least some sphagnum (typically *Sphagnum palustre* or *Sphagnum fallax*), as well as tormentil *Potentilla erecta* and the large wetland moss *Polytrichum commune*, with soft rush in places.

Further information on woodland in Tailpond area and proposed translocation area

As set out in the outline Landscape and Ecology Management Plan (oLEMP), mitigation for the minor loss of ancient woodland to the Tailpond will include translocation of ground flora from the Tailpond to the strip of woodland and adjacent ground just to the south, which contains less good quality woodland flora or comprises non-woodland habitat that historically probably was woodland.

The larger part of the ASNW in the Tailpond area is wet woodland constituting W7b, with smaller extents of drier woodland. These are much as described above. Further notes are given below (described from north to south):

- The richest W7b in the Tailpond and translocation area is at the northern end of the Tailpond. There are localised patches of non-native bulbs here (daffodil *Narcissus* sp., crocus *Crocus* sp. and snowdrop *Galanthus nivalis*), however the flora is largely native and much as described above for W7. There are frequent mosses including *Thuidium tamariscinum*, *Brachythecium* sp. and in places *Climacium dendroides*. An extremely small stream in this area, which is not significantly 'indented' into the ground and spreads thinly over the surface towards Loch Awe, has particularly abundant hemlock water-dropwort, and frequent brooklime *Veronica beccabunga*. The trees in this area support epiphytic lichens. Drier woodland beside the B840 is as described for W10;
- The central woodland within the Tailpond is similar to that described in the previous bullet point, but less diverse. There is a small pool close to Loch Awe with abundant tufted hair-grass, and very locally near the B840 there are non-native bulb species;
- Woodland at the southern end of Tailpond is drier with more W10-type flora than W7, however some W7 is still present which is similar but less diverse than that described above, but includes hemlock water-dropwort. The canopy is mixed with oak, alder, ash and willow but little birch, and there is rarely rose *Rubus* sp. and holly *Ilex aquifolium* in the shrub layer, along with immature canopy species. The ground is fairly steeply sloping in places, with bracken locally dominant. Greater woodrush *Luzula sylvatica* is locally abundant. There are occasional native bluebell patches. Some dock *Rumex* sp., creeping buttercup *Ranunculus repens* and willowherb *Epilobium* sp. occur in less good quality patches. Non-native daffodil was rarely noted beside the private residence within the Tailpond area.

Further information on the woodland strip between the Tailpond and Allt a' Chrosaid, where translocation of ground flora from the Tailpond would partly take place, is given below (described from north to south):

- The northern end closest to the Tailpond is contiguous with and much the same as the woodland described in the previous bullet point. However, there one patch of ramsons *Allium ursinum* was also found here, which is the only ramsons found in the zone encompassing the Tailpond and the zone southwards to the Allt a' Chrosaid. There are some non-native garden plants at the edge of the adjacent open zone of bracken and neutral grassland (see *Figure 6.3 Phase 1 habitats (Volume 3: Figures)*);
- The above woodland narrows to a very thin strip between Loch Awe and the bracken/neutral grassland, with mixed alder, oak, ash and willow. The ground flora here is on shingle with leaf litter, and is rather sparse although lesser celandine and greater woodrush are frequent. There are non-native daffodils at the inland edge;
- Adjacent to the caravans that were present during baseline surveys, the woodland becomes still thinner. Lesser celandine was not seen here but there are occasional bluebell patches, whilst other parts of the flora are rather poor with tufted hair-grass, creeping buttercup and soft rush. There are breaks in the woodland strip with neutral grasses and in places shingly substrate.

Non-woodland habitat adjacent to the above woodland, where woodland ground flora translocation and tree planting (as standards) would take place, is a mix of amenity grassland, bramble-dominated scrub, ruderal vegetation and coarse neutral grassland. The larger scrub area includes semi-mature and immature birch, alder and oak.

Blanket Bog

The existing habitat in the footprint of the Headpond, including embankments, and much of the surrounding land, is dominated by blanket bog, however it is frequently degraded to some degree. This degradation is particularly exhibited by poor heather *Calluna vulgaris* cover, and appears to be caused by over-grazing and at least in places burning, and older drainage grips are locally present.

Five locations with evidence of burning (see *Figure 6.4*) were noted at the time of survey, of which four are within the Headpond footprint and one beyond it to the south-west. Some of this burning has taken place in wetter bog (where the most damage can potentially be caused). The obvious evidence of burning seen at these locations comprised burnt remnants of heather stems, and occasionally burnt bryophyte hummocks including those containing sphagnum. Particularly obvious burning was noted at the following two locations, which are in the footprint of the Headpond's southern Embankment:

- Approximately 300 m south of Lochan Airigh – very recent burning with visible remains of burnt heather *Calluna vulgaris*, in wetter blanket bog (M17a) where there are also drainage grips (though still with abundant *Sphagnum papillosum* and occasional *Polytrichum strictum*, both bog indicators);

- Approximately 500 m south-south-east of Lochan Airigh – similar evidence of burnt heather in further M17a (and some drier M17b and M19a), where the intensity of burning appears to have been sufficient to have fully killed some of the heather, some of which appeared not to be regrowing, and where occasional damage to bryophyte hummocks was also noted.

The above five locations are those where burning evidence was obviously visible at the time of survey. However, it is likely that burning has taken place at different times across much of the blanket bog, especially south-east of Lochan Airigh, presumably in attempts to improve grazing value for livestock. Very obvious signs (such as visible burnt vegetation) would be lacking where burning was more historic, but when repeated over decades would contribute to the poorer state of the vegetation, especially in combination with grazing pressure. In addition to reduced heather cover, the combination of over-grazing and (probably) burning is likely to be the cause of the rarity of cloudberry *Rubus chamaemorus* and bog bilberry *Vaccinium uliginosum* (both of which are vulnerable to over-grazing and burning; see e.g. [BSBI Online Plant Atlas 2020](#)). Despite thorough habitat mapping in this zone over several days and in an appropriate season, only three minor occurrences of each of these two species were found (and only single occurrences along the 4 km blanket bog-dominated corridor to Three Bridges, surveyed before it was determined that the Proposed Development would not include construction of an access track there). Although it is unlikely that all extant occurrences of these species will have been found, it is very clear that these species are rare here. Given the suitability of both the general habitat (predominantly blanket bog) and National Vegetation Classification (NVC) types (including abundant M19, a key vegetation type for these species), their great rarity here appears inexplicable except by prolonged over-grazing and (probably) burning. Note that the over-grazing may be predominantly due to deer, since livestock were infrequently encountered during the surveys, although both would contribute.

Degradation of blanket bog vegetation can render classification more difficult, however several forms have been separated. Degraded M19c (denoted as 'M19c degr') is common amongst blanket bog on the higher ground between Lochan Airigh and the existing reservoir – this has abundant hare's-tail cottongrass *Eriophorum vaginatum* and bilberry *Vaccinium myrtillus*, as well as frequent cowberry *Vaccinium vitis-idaea* (characterising the sub-community), but heather *Calluna vulgaris* (which is normally abundant and healthy in M19) is mostly sparse and short (short prostrate heather can be natural in areas of high wind exposure, but that is not applicable here, where overgrazing and burning are the causes). Some areas more closely correspond to M17b – this is similar to the M19 but contains an abundance of more oceanic species not characteristic of M19, in particular deergrass *Trichophorum germanicum*. Locally there is also M20, which almost always constitutes degraded bog vegetation – here, there is limited or absent bilberry amongst the dominant hare's-tail cottongrass, as well as a lack of heather, which distinguishes it as a further state of degradation from degraded M19c. Smaller extents of M19b (which lacks the cowberry indicative of generally higher-altitude M19c) and M19a (in which some species more characteristic of more oceanic M17 occur at moderate frequency and cover) also occur. Areas dominated by 'M19c degr' and M20 have been coded as Phase 1 modified (degraded) blanket bog on *Figure 6.3*, however it should be noted that much of the M19c not so degraded as to be classed as modified nevertheless still often exhibits substandard heather cover, and cloudberry and bog bilberry remain very rare throughout. Indeed, the M19 is overall not particularly notable. It typically (as is usual) contains little sphagnum other than *Sphagnum capillifolium* (which is not a diagnostic bog species), instead usually containing abundant pleurcarpous mosses such as the widespread species *Hylocomium splendens* and *Pleurozium schreberi*.

Certain areas of blanket bog in this zone are very wet with plentiful sphagna, and clearly correspond to M17a, M17 being the wetter and more oceanic bog NVC community. These wetter areas are indicated on *Figure 6.3 Phase 1 habitats (Volume 3: Figures)*, and are on flatter or shallowly-sloping ground. They support abundant *Sphagnum papillosum*, along with typical vascular species (such as hare's-tail cottongrass, deergrass, cross-leaved heath and in places bog asphodel). There is particularly extensive wet M17a at the western end of the proposed southern Embankment, and immediately north-east of Lochan Airigh. Locally this has been coded as modified bog (NVC 'M17a degr') where there was evidence of burning. The M17a is particularly wet at Target Notes 25-27, 41 and 42, with abundant *Sphagnum medium* as well as *S. papillosum*, and scattered white beak-sedge *Rhynchospora alba* was also found at the latter. *S. medium* is common in M18, which is closely related to M17, but this vegetation has mostly been assigned to M17a owing to overall floristics including the abundance of deergrass, which is not characteristic of M18. A small amount of M18a was however recorded at Target Note 23 where *S. medium* is accompanied by cranberry (identification as either of the closely-related *Vaccinium oxycoccos* and *Vaccinium microcarpum* was not conclusive). Very rarely, at Target Note 15 and near Target Note 22, few-flowered sedge *Carex pauciflora* was found in M17a (see 'Notable Flora' below).

Figure 6.4 shows that *S. medium* also occurs at a few recorded locations well outside the footprint of the proposed Headpond and associated infrastructure. It was also recorded at four locations along the survey corridor to Three Bridges. Much more notably, *Sphagnum austini* (Target Notes 30 and 31) and *Sphagnum fuscum* (Target note 50) were noted at one location each, each well beyond the footprint of proposed infrastructure. These two species tend

to be associated with undisturbed bog. *S. austinii* occurs as three small to large hummocks in the middle of a very wet watershed area of M17a, 120 m west of and downslope of temporary compound TC11. *S. fuscum*, as two small hummocks, occurs at the junction of drier M19c and damp M17b, 65 m and 110 m respectively from the proposed southern headpond Embankment and nearest access track. The apparent extreme rarity in this area of these species may also reflect the negative effects of over-grazing and burning, and it is probably not a coincidence that both are in more remote parts of the blanket bog, and in the case of *S. austinii* also in very wet bog afforded some protection from adverse management by that wetness.

The blanket bog does not generally exhibit pronounced hummock and hollow topography, and bog pools are scarce overall. However, two large bog pools, both purposefully avoided by proposed infrastructure, are located at Target Note 34, approximately 70 m from the nearest access track and 65 m from temporary compound TC11 (located upslope), in a topographical hollow draining south-westwards. Small pools occur sporadically in the areas of wet blanket bog elsewhere, often with typical sphagna such as *Sphagnum fallax* and *Sphagnum denticulatum*.

To the west of the Headpond, above the steeper mountain slope, there are considerable extents of further blanket bog, on flat to moderately-sloping ground. This mainly comprises M17b and M19c. The former often exhibits a pronounced hummocky topography and in places haggling, with local peat exposure. Although M17b is named the *Cladonia* sub-community of M17, it can also be characterised by an abundance of the easily-recognisable moss *Racomitrium lanuginosum*, and it is the high frequency of that species that is characteristic here, rather than of *Cladonia* spp. lichens (although these are often sparsely scattered). The M19c is much as described elsewhere, being drier with hare's-tail cottongrass tending to dominate and accompanied by bilberry, cowberry and heather. Very similar vegetation occurs in the blanket bog dominating the vicinity of the access track to Three Bridges, with localised wet M17a on lower ground, similar to that described above.

In the south-eastern part of the Headpond there is a substantial and very irregular elongated zone of particularly haggled blanket bog (easily visible on aerial photography) with significant bare peat exposure. The proposed southern headpond Embankment also covers some localised eroded peat. Other localised areas of exposed bare peat occur elsewhere, including on the high ground to the west of the Headpond, locally to the east and south of the Headpond, and near the southern Three Bridges access track (to be constructed by Blarghour Wind Farm).

Basin Mire

Towards the southern edge of the Headpond footprint, within and considered part of the wider blanket bog system, there is a zone mapped as basin mire (see *Figure 6.3* and *Figure 6.4*). This is very largely impenetrable on safety grounds, being extremely wet and including a proportion of open water. Much of this area appears to be M6c with much *Sphagnum palustre*, *Sphagnum fallax* and soft-rush, grading in places to M2 with sheets of *S. fallax* and *S. cuspidatum*. However, some peripheral vegetation that was able to be inspected is transitional between M6 acid flush and M17a blanket bog and has been coded as 'M17-M6' – this contains extensive sheets of sphagnum including *Sphagnum papillosum* and occasionally *Sphagnum medium*, and frequent hare's-tail cottongrass, but also small sedges characteristic of M6 such as star sedge *Carex echinata* and common sedge *Carex nigra*. There is also a little S9 bottle sedge swamp in this area, and bog bean *Menyanthes trifoliata* occurs in both the S9 and some open water. This very wet complex of vegetation and water may have historically included a small lochan, but is in any case clearly transitional between swamp and drier terrestrial vegetation, and partly corresponds to Annex I Transition mire (which encompasses quaking sphagnum as well as other NVC types not recorded here, such as S27, M4 and M5, although it is possible that such vegetation types could exist in those parts that were too wet and treacherous to enter).

Towards the northern end of the Headpond footprint, there is another low-lying zone mapped as basin mire, again sitting within and considered part of the wider bog system. This is less wet than the example described in the previous paragraph, but the central lowest area includes transitional M17-M4 vegetation. Wet blanket bog vegetation (M17a) also occurs here, as well as genuine acidic flush (M6) and a very small amount of wet soakway (M29) and bog pool (M1). The transitional M17-M4 includes a mix of *Sphagnum palustre*, *Sphagnum denticulatum*, *Sphagnum papillosum* and *Sphagnum fallax*, and a little *Sphagnum cuspidatum*. Although there is abundant bottle sedge *Carex rostrata* here, the abundance of *Sphagnum papillosum*, along with occasional but constant hare's-tail cottongrass, precludes classification as pure M4. Frequent associates comprise star sedge *Carex echinata*, common sedge *Carex nigra*, purple moor-grass and velvet bent *Agrostis canina*; marsh violet *Viola palustris* is also occasional. A small amount of mud sedge *Carex limosa* was found in the wettest parts.

Heaths

There are approximately 20 ha of wet heath within the Development footprint, largely in the Headpond area. However, the most extensive areas of wet heath are outside the footprint, in particular along the western (Balliemeanoch) access track.

Wet heath in and around the Headpond area is predominantly M15b and M15c. M15b is the typical type of wet heath at low to moderate altitude that is very abundant across much of western Scotland, which is not species-rich and here contains abundant deergrass, purple moor-grass and cross-leaved heath, and in places heather, in variable mixes. Occasionally in the Headpond area, but much more frequently on the lower moorland towards Loch Awe, this type of wet heath is degraded by overgrazing (signified by 'M15b degr'), with consequent reduced ericoid cover, and excessive overgrazing closer towards Loch Awe has in places converted it to M25 purple moor-grass swards with negligible or absent ericoids. The M15c, which is also a common vegetation type throughout highland Scotland, occurs at moderate to higher altitude, and is shorter and more open in structure with (at this site) constant and often abundant *Racomitrium lanuginosum*; lichens can also be characteristic of this sub-community but here it is the latter moss that is generally the diagnostic feature. This M15c often also includes some micro-scale rock exposure.

Note that some M15 (in this case M15c) occurs on deep peat, when it then constitutes degraded blanket bog. A small amount of this vegetation lies within the Headpond area.

M15a is a flushed form of wet heath, recorded in various places in and beyond the Headpond area. Often this is not particularly notable, being distinguished by little other than frequent carnation sedge *Carex panicea*, and occasionally it is noticeably degraded by overgrazing (signified by 'M15a degr'). However, the M15a is occasionally species-rich, as discussed under 'Flushed Vegetation' below.

Dry heath is restricted in the surveyed area to locally steeper and drier ground, that is too steep and dry for bog or wet heath. The most extensive dry heath occurs on the mountain slope at and beyond the north-west side of the Headpond, extending to and including the slopes of Sron Breac-liath (the latter being outside the Development footprint). This is mostly H10 with mixed bell heather / heather, which favours drier southerly aspects. H12 with bilberry amongst the heather is less common. The most frequent forms at this site of both H10 and H12 are the more-grazed forms with less dense ericoids and more acid grasses (H10c and H12c respectively). Also present are the more open and/or higher altitude forms H10b (with *Racomitrium lanuginosum*, and often rocky) and H12b (with cowberry, and very rarely cloudberry). Small amounts of the typical forms (H10a and H12a respectively) also occur, with denser ericoids and abundant pleurocarpous mosses such as *H. splendens* and *P. schreberi*. Occasionally, transitional H10-H12 was recorded, in which both bell heather and bilberry are present in more or less equal quantity amongst heather and pleurocarpous mosses. H18 was also locally recorded – this is a heath dominated by bilberry amongst pleurocarpous mosses, without heather (or with very little heather), which is not natural at this site (nor usually elsewhere except at high altitude) but rather caused by overgrazing. Occasionally on more shady slopes, H21a was recorded – this is very much like typical H12, but is damp enough through shading to support frequent *Sphagnum capillifolium*, and other typical species such as hard fern *Blechnum spicant*.

The most notable dry heath in the surveyed area is H10d, a base-rich and more species-rich form of H10 with at least thyme and often other less common species. H10d is discussed under 'Other Notable Habitats' below.

Flushed vegetation

There are frequent acid flushes and riparian vegetation in this upland zone, most commonly M6d dominated by sharp-flowered rush *Juncus acutiflorus*, with typical M6 species such as *Sphagnum palustre*, *Sphagnum fallax* and *Polytrichum commune*, and limited vascular associates in variable quantity such as star sedge and marsh violet. M6c also occurs, and is similar to the M6d (and sometimes mixed with it) but with soft-rush *Juncus effusus* dominant. M6a, in which large rushes are absent and star sedge and other sedges tend to dominate, again with acid sphagna and limited associates, is rare and small in extent in the surveyed area. These types of acid flush are common in the Scottish uplands.

More rarely, there is base-rich flushing. Several base-rich flushes were recorded, small in extent (as is typical) but occasionally in small groups. These occur at Target Notes 4-8, 9, 10, 12, 15, 19-21, 28, 32, 33, 34 (with bog orchid), 36, 40 and 46 (see *Figure 6.4*). Of these 18 locations with base-rich flushes, eight are within the Development footprint. There are very likely to be other similar base-rich flushes sparsely scattered through the surrounding landscape outside blanket bog, particularly to the north-west of the Headpond where there is very uneven terrain with local rocky exposures. A similar range of species was found in the recorded basic flushes, including (although not every one of these was found at each flush) alpine meadow-rue *Thalictrum alpinum*, dioecious sedge *Carex dioica*, flea sedge *Carex pulicaris*, tawny sedge *Carex hostiana*, few-flowered spikerush *Eleocharis quinqueflora*, marsh arrowgrass *Triglochin palustris*, lesser clubmoss *Selaginella selaginoides*, occasionally thyme *Thymus drucei*, base-indicative brown mosses (*Scorpidium revolvens*, *Campylium stellatum*, occasionally *Ctenidium molluscum*) and other bryophytes (such as *Blindia acuta*, *Bryum pseudotriquetrum* and *Philonotis fontana*). A few of the flushes (Target notes 6, 9 and 32) contain frequent yellow saxifrage *Saxifraga aizoides* and correspond to NVC type M11 (a more montane habitat), but the majority are M10 which is otherwise similar but lacks this species or it is scarce.

Flushed wet heath (M15a) also occurs locally. Where this occurs beside part of the western (Balliemanoch) access track (see *Figure 6.4*), this is often noticeably degraded by overgrazing and, regardless, not especially notable in species composition, with only abundant carnation sedge *Carex panicea* indicating M15a, often accompanied by star sedge *Carex echinata*, amongst the typical purple moor-grass, deergrass, cross-leaved heath and variable acid grasses. M15a of similar composition often occurs on the steep mountain slopes within and beyond the north edge of the Headpond, and locally on high ground further west. The most notable M15a occurs at Target Note 19 at the base of the steep mountain slope and within the southern Headpond Embankment footprint – this sits in mosaic with other habitats, and in addition to the typical species also contains lesser clubmoss, flea sedge, marsh arrowgrass, devil's-bit scabious *Succisa pratensis* and *Sphagnum subnitens*.

Rush-pasture and other marsh

Neutral rush-dominated vegetation is scarce in the upland part of the surveyed area, where rushy vegetation is far more often (as is typical amongst blanket bog and related habitats) acidic M6 flush (see above). There are however a few very limited occurrences of M23a in the Headpond area beside watercourses, dominated by sharp-flowered rush but lacking sphagna and other M6 species, but relatively poor quality with few other species (e.g. creeping buttercup *Ranunculus repens* and marsh violet *Viola palustris*), and grading into M6 vegetation.

M23 is much more common, as would be expected, on the lower ground towards Loch Awe. Thin strips, mainly of very poor M23b dominated by soft-rush, occur alongside part of the western (Balliemanoch) access track and result from previous construction of the existing access track. Some M23a occurs near the moorland edge in small quantity in mosaic with M6 acid flush, but the largest extents occur as the dominant or co-dominant vegetation in zones towards Loch Awe mapped as marsh (see *Figure 6.3* and *Figure 6.4*). In these locations, common sorrel *Rumex acetosa*, meadowsweet *Filipendula ulmaria* and marsh bedstraw *Galium palustre* are common, with more sporadic marsh marigold *Caltha palustris*, ragged robin *Silene flos-cuculi* and marsh thistle *Cirsium palustre*. Skullcap *Scutellaria galericulata* occurs rarely. In places, this M23a shows a degree of transition towards M6 with small amounts of tormentil.

In one fenced location south of temporary compound TC04, M23 exists in mosaic with M25c, in which purple moor-grass dominates accompanied by some of the herbs found in the M23 (and hence with a degree of neutral rather than acid character), as well as some bog asphodel *Narthecium ossifragum* and devil's-bit scabious.

M25a occurs as a mosaic component in several areas near the lower part of the western (Balliemanoch) access track, where it essentially represents a severe state of degradation (by overgrazing) of wet heath such that cross-leaved heath and other ericoids are absent or very sparse, with purple moor-grass dominating. This habitat is hence of little ecological value, given that under more favourable management it would be M15 wet heath.

A very small amount of M28 neutral marsh with abundant iris *Iris pseudacorus* was recorded close to Loch Awe beside the B840. This was in mosaic with M23a, both containing similar species including abundant skullcap and frequent marsh marigold.

Species-rich Ledge/Ravine Vegetation

A few rocky ledge and ravine locations were noted with notably species-rich vegetation, as set out below:

- species-rich ledges/ravine vegetation – these are extremely localised. Two significant examples occur outside of the Development footprint west of the southern headpond Embankment, at Target notes 2 and 3 (see *Figure 6.4 National Vegetation Classification (NVC) and notable plants (Volume 3: Figures)*):
 - On a tributary of the Allt Beochlich at target note 2, approximately 360m west of the southern headpond Embankment and 50 m from temporary compound TC08 – this is the best example, in a very steep-sided to vertical ravine approximately 60 m long, along a tributary of the Allt Beochlich. It includes a line of small birch, rowan, eared willow and hazel at the top, with in places effectively a woodland flora (including dog's mercury) effectively forming a very small amount of W9. However, there is also species-rich U17 ledge vegetation, CG10b flushed basic grassland and H10d basic heath. Together these support a very diverse range of species including northern bedstraw, common valerian, marsh hawksbeard, angelica, meadowsweet, yellow saxifrage, flea sedge, grass-of-parnassus, fairy flax, thyme, common dog-violet and male-fern;
 - On the Allt Beochlich at target note 3, approximately 110m west of the southern headpond Embankment and 30 m from an access track bridge – this has rocky habitat on the north side of the Allt Beochlich, including some U17 and CG10a, with a few small hazels and willows, and a diverse range of species much like that listed for target note 2 above.

Two other species-rich ledge locations were found:

- In the headpond area at target note 37: a small amount of U17 along the upper Allt Beochlich, with northern bedstraw, eared willow, meadowsweet, great woodrush, thyme, devil's-bit scabious, wood cranesbill and apparently natural rosebay willowherb;
- Near the Three Bridges access track at target note 54: a very species-rich small, narrow ravine including U17, CG10 and H10d, with a wide range of species including thyme, northern bedstraw, yellow saxifrage, green spleenwort, lesser clubmoss, grass-of-parnassus, wood cranesbill, oak fern and three stunted rowans within the ravine edge; also alpine meadow-rue very shortly upstream in adjacent flushed U4.

Other notable habitats

A number of species-rich habitats that are localised in the survey area (and elsewhere in highland Scotland outside of particularly obviously base-rich regions) were recorded, as follows:

- Basic flushes – several of these were recorded, at target notes 4-8, 9, 10, 12, 15, 19-21, 28, 32, 33, 34 (with bog orchid – see above), 36, 40 and 46 (see *Figure 6.4 National Vegetation Classification (NVC) and notable plants (Volume 3: Figures)*). Of these 18 locations with base-rich flushes, eight are within the Development footprint. There are likely to be others sparsely scattered through the surrounding landscape. Other species frequently found in these base-rich flushes include the small sedges dioecious sedge (a base-indicator and one of the diagnostic species of this vegetation type), flea sedge (also a base-indicator), carnation sedge, common yellow-sedge *Carex demissa* and less commonly tawny sedge (again, a base-indicator). More notably, alpine meadow-rue is again often present, and sometimes lesser clubmoss *Selaginella selaginoides*. There is also a variable range of more common vascular and bryophyte associates including few-flowered spike-rush (another base indicator), hairy lady's-mantle *Alchemilla filicaulis*, self-heal *Prunella vulgaris*, eyebright *Euphrasia* sp., milkwort *Polygala vulgaris*, and the base-indicative mosses *Blindia acuta*, *Campylium stellatum*, *Scorpidium revolvens* and *Scorpidium scorpidoides*. Very occasionally (at Target Notes 6, 9 and 32) stoney forms of these flushes also contain frequent yellow saxifrage and then correspond to the more montane M11, although the flora in this case is otherwise much like the M10;
- Flushed wet heath – occurs locally, mainly on the steep mountain slope at and beyond the northern edge of the Headpond. Mostly not specially-diverse, and often distinguished only by abundant carnation sedge, however more species-rich M15a with lesser clubmoss and marsh arrowgrass occurs at target note 19 (see *Figure 6.4*);
- Basic grassland and basic heath – NVC type CG10 occurs in small quantity on the mountain slopes at and beyond the west side of the Headpond, however it is not generally of special note. Similarly, U5c also occurs in this area but is mostly not particularly diverse, often being separated from more typical acid U5 primarily by an abundance of carnation sedge. However, seven locations were noted with more notable diverse flora, as listed below (these are all flushed to a degree, but best fit the stated grassland or heath communities rather than basic flush):
 - CG10b is one of the components of the species-rich ravine at Target Note 2 (see *Figure 6.4 National Vegetation Classification (NVC) and notable plants (Volume 3: Figures)*), described above, and also at another ravine between the Headpond and Three Bridges at Target Note 54, both of which are unaffected by the Development;
 - CG10b on part of the steep slope north-east of Lochan Breac-liath (see *Figure 6.4 National Vegetation Classification (NVC) and notable plants (Volume 3: Figures)*), in mosaic with U5c and flushed M15a and M10, contains alpine meadow-rue *Thalictrum alpinum*, an arctic/alpine base-indicator, and locally-frequent northern bedstraw *Galium boreale*. Typical CG10b species such as fairy flax *Linum catharticum*, carnation sedge and thyme are also present. This slope is largely outside the Development footprint;
 - U5c and a small amount of CG10b on sloping ground just north of Target Note 10 (see *Figure 6.4 National Vegetation Classification (NVC) and notable plants (Volume 3: Figures)*). – this contains typical species of U5 and CG10, but with frequent carnation sedge, and also fairy flax and thyme in the CG10b.
 - CG10b and U5c containing alpine meadow-rue, with thyme and in places lesser clubmoss and northern bedstraw, at target notes 8 and 11 (see *Figure 6.4 National Vegetation Classification (NVC) and notable plants (Volume 3: Figures)*). The latter is within the Development footprint;

- CG10b and U5c containing northern bedstraw, with thyme, bird's-foot trefoil, eyebright and common dog-violet, at target note 14 (see *Figure 6.4 National Vegetation Classification (NVC) and notable plants (Volume 3: Figures)*). This is within the Headpond area;
- U5c containing lesser clubmoss, with carnation sedge, tawny sedge, flea sedge, eyebright and a little thyme, at target note 29 (see *Figure 6.4 National Vegetation Classification (NVC) and notable plants (Volume 3: Figures)*). This is just beyond the Headpond freeboard; and,
- H10d containing northern bedstraw, with thyme and the lady's-mantle *Alchemilla filicaulis* (this is split into two sub-species with different common names – the identity was not certain, but both are fairly widespread in NHZ 14), found at Target Note 13 (see *Figure 6.4 National Vegetation Classification (NVC) and notable plants (Volume 3: Figures)*) within the Headpond footprint. Similar unaffected H10d occurs in small quantity at the species-rich ledge/ravine at Target Notes 2 and 54. Other H10d not noted to contain northern bedstraw occurs more extensively on the mountain slopes, the larger part within the Headpond footprint but some beyond it, including a substantial strip of steep south-facing hillside near Lochan Breac-liath.

Acid Grassland

Small knolls, often amongst M19c, where not vegetated with drier M19c, commonly support forms of upland acid grassland, especially U6 with an abundance of heath rush *Juncus squarrosus*. Some of the U6, which as a natural community is mainly montane (Rodwell, 1992; Averis *et al.*, 2004), has likely been derived from blanket bog by overgrazing, and in places degraded M19c with very short heather and sparse heath rush is effectively a transitional state towards U6. This is especially likely where there is U6a, which contains sphagnum and is almost certainly derived from blanket bog. More grassy forms of U6, either U6d with acid grasses or similar U6c with bilberry, tend to highlight localised drier, non-peaty ridges and slopes, and are probably derived from wet or dry heaths by overgrazing. The code 'U6d flush' was used once only to indicate a small area of vegetation of limited diversity and note beside the western (Balliemanoach) access track, with abundant heath rush but also abundant carnation sedge and purple moor-grass.

The steep mountain slopes in the vicinity of the western Headpond but also extending beyond it vertically and horizontally, supports a variety of grasslands. The grassland is on the whole acidic, with frequent U5a, the typical form of U5 with much mat-grass *Nardus stricta* and low species diversity. U5a is also widespread elsewhere within and beyond the Headpond. Occasionally, U5b has been recorded, which is noticeably damper with patches of the moss *Polytrichum commune* and/or occasional sphagnum species. Particularly on the higher ground west and east of the Headpond, patches of U5e also occur, a more open and often rocky form with much *Racomitrium lanuginosum*, but otherwise similarly species-poor. Some U5 has been classed as U5c, which exhibits base-influence and is described under 'Other notable habitats' above.

Acid grassland without significant mat-grass, corresponding to the very common U4 NVC type, is widespread in small quantity through and beyond the Headpond area. In most cases on this site it has probably been derived from heath through overgrazing. Above the moorland line recorded U4 is, as would be expected, mainly U4a (typical with a mix of common acid grasses, pleurocarpous mosses, and relatively few herbs), occasionally U4e with an abundance of bilberry (closely approaching H18). Near and on the lower ground by Loch Awe recorded U4 is mostly U4b, subject to a degree of degradation by more intense grazing and perhaps other forms of management – this is far less mossy with a composition reflecting gradation towards neutral and more improved grassland. U4c, which is species-rich, was recorded once only in small quantity at an unaffected location along the surveyed area to Three Bridges.

The occasionally-recorded 'JA' (which stands for 'Juncus Acid') is species-poor and of no note – it comprises acid grassland vegetation with abundant soft-rush, rather like an acid equivalent of MG10. It is insufficiently wet to assign to M6 flush/mire, and clearly too acid to class as MG10. Similar vegetation is mentioned in Averis *et al.* (2004).

Basic Grassland

As noted above, some U5, particularly on the mountain slope at and beyond the west side of the Headpond and occasionally elsewhere, was considered to be U5c. U5c exhibits slight base-enrichment but it should be noted that much of this U5c is not especially species-rich, being separated here from U5a primarily by an abundance of carnation sedge *Carex panicea*. Higher quality more species-rich U5c with species such as alpine bistort *Persicaria alpina* and thyme *Thymus polytrichus*, as can be found in the Breadalbanes, was not generally seen, however a few more species-rich examples were noted as discussed under 'Other Notable Habitats'.

Occasional small pockets of CG10a which are more obviously base-rich, with abundant thyme as well as common dog-violet *Viola riviniana* and accompanying species similar to those of U4 acid grassland. More notable and very locally-recorded CG10b is described under 'Other Notable Habitats'.

Neutral Grassland

Neutral grassland occurs as entirely non-notable patches on lower ground near Loch Awe. These are mostly MG10 (species-poor grazed pasture with abundant soft rush). A minority is coarse MG1 in disturbed situations dominated by false oat-grass *Arrhenatherum elatius* and Yorkshire fog *Holcus lanatus* with a limited range of associates including ruderal species, such as common sorrel *Rumex acetosa*, ribwort plantain *Plantago lanceolata*, creeping buttercup *Ranunculus repens*, in places garden plants, and very locally black knapweed *Centaurea nigra*.

This is also a small amount of poor MG10 near Three Bridges, which includes a very small amount of poor MG5 (labelled as 'MG5pr') with black knapweed and red clover *Trifolium pratense* in a disturbed situation with fly-tipped material.

Fern communities

Dense bracken, corresponding to the NVC type U20 (where inspected closely, U4a without ericoids), is common as scattered patches on the lower ground towards Loch Awe. This is of no note, except locally at Target Note 1 (see 'Notable Recorded Vascular Plants' below).

The only other fern community in this area is U19, which is dominated by lemon-scented fern *Oreopteris limbosperma*, with an accompanying flora much like U4 acid grassland. It was only recorded once, near the lower part of the Allt Beochlich, well beyond the nearest infrastructure. It is fairly common in the highlands.

Swamps and aquatic communities

The recorded swamp and aquatic communities in this area are largely associated with standing waters:

- Lochan Airigh – this is a fairly typical oligotrophic standing water. At least parts, and it is assumed probably the majority, of the submerged substrate support the A22 NVC community, with shoreweed and water lobelia *Lobelia dortmanna*. This community is species-poor and common in more stony oligotrophic Scottish waterbodies;
- Lochan Breac-liath – this was also seen to contain the A22 community;
- Lochan Romach – vegetation in this lochan is mainly A7 (floating white water-lilies *Nymphaea alba*) and S4 (thinly spread common reed *Phragmites australis* across open water), with smaller amounts of S10 (thinly-spread species-poor water horsetail *Equisetum fluviatile* in standing water) and peripheral S9 (species-poor bottle sedge in standing water);
- Loch Awe – the periphery of Loch Awe in and beyond the Tailpond area was noted to frequently support abundant shoreweed, again corresponding to the A22 community.

In addition to the above, small amounts of S9 bottle sedge swamp was also recorded in the southern of the two basin mire areas at the Headpond (see Figure 6.3), and S9 and S8 (floating yellow water-lily *Nuphar lutea*) were also recorded in unaffected parts of the surveyed area between the Headpond and Three Bridges.

Further details on the macrophyte flora of standing waters, as well as watercourses, are given in *Appendix 7.1: Aquatic Ecology Baseline Report (Volume 5: Appendices)*.

Habitat Descriptions – Inveraray

There are two parts to the Development at Inveraray, in the north/north-east and west/south-west, and largely following existing forestry/estate tracks. The below descriptions work from north to south.

Woodland

Plantation west of Inveraray

The majority of woodland in the Inveraray section is plantation. Parts of this are Plantation on Ancient Woodland Sites (PAWS).

The plantation of most note is west of Inveraray. Most of this plantation is coniferous, but there is also a more restricted extent of mature broadleaved plantation (often of beech *Fagus sylvatica* but including scattered mature oaks) in which there are patches of native woodland flora including patchy carpets of bluebell *Hyacinthoides non-scripta*, sparse enchanter's nightshade *Circaea* sp., primrose *Primula vulgaris*, remote sedge *Carex remota*, wood

sedge *Carex sylvatica*, and rarely (close to the southern edge of the broadleaved plantation) dog's mercury *Mercurialis perennis* and yellow pimpernel *Lysimachia nemorum*. These ground flora species, and the mature oaks, are likely relict ancient woodland flora. Note that the mature oaks, and the best of the ground flora, is on the east (Inveraray) side of the existing forestry track. Some of the oaks are immediately adjacent to the track, and others are closer to or beside the fields of pasture.

Surveyed broadleaved plantation just north-west of Inveraray in the periphery of Inveraray Castle Ground is a mix of mature oak and European lime *Tilia x europaea*, with frequent beech. The flora is generally of no note, although there is locally frequent enchanter's-nightshade, and the invasive non-native species salmonberry *Rubus spectabilis* is also locally frequent.

The rest of the plantation west of Inveraray is of little note, almost entirely comprising species-poor mature, dense, non-native forestry (mostly of Sitka spruce, in places larch *Larix* sp.) or recent replacement planting of the same non-native forestry on ground that has been highly disturbed during recent clear-felling. Local mature broadleaved plantation towards the proposed jetty at Loch Fyne is dominated by dense beech with a poor to negligible ground flora.

Of note for negative reasons is a moderate extent of broadleaved plantation of sycamore (with ash locally) overwhelmingly dominated beneath by Japanese knotweed, present to the east of the proposed jetty at Loch Fyne.

Plantation north / north-east of Inveraray

The most notable plantation in this area is an historic avenue of two rows of clearly planted and uniform mature yew *Taxus baccata* at the farther north-east of the Development Site. Since it is obviously planted, it is not considered to constitute the Annex I habitat H91J0 *Taxus baccata* woods of the British Isles, which are known in the UK only in England and Wales (see [Yew-dominated woodland \(Taxus baccata woods of the British Isles\) – Special Areas of Conservation \(jncc.gov.uk\)](https://jncc.gov.uk)). However, this small yew plantation does support a rather sparse and native flora including ramsons *Allium ursinum*, and thus still corresponds reasonably well to NVC type W13b. Other frequent species here include herb-robert, wood avens *Geum urbanum*, wood sorrel and enchanter's-nightshade, with local dog's-mercury and remote sedge; however, there is also abundant non-native salmonberry.

The mixed plantation areas comprise variable mixes of non-native conifers, sycamore, birch, ash and beech, but also frequently contain abundant and in places dominant non-native and invasive rhododendron *Rhododendron ponticum*. Thus they mainly exhibit a poor to absent flora, and in these cases are simply referred to on *Figure 6.4 National Vegetation Classification (NVC) and notable plants (Volume 3: Figures)*, as 'MP' rather than a published NVC type. However, the very steeply-sloping mixed plantation at the eastern end of the surveyed area does very occasionally include small amounts of good native woodland flora such as dog's-mercury, remote sedge and enchanter's-nightshade. Where these mixed plantations occasionally exhibit sufficient flora to class as an NVC type, this is shown on *Figure 6.4 National Vegetation Classification (NVC) and notable plants (Volume 3: Figures)*. – thus patches of neutral W10 and more acid W11 occur within some of the mixed plantation, and these include small patches of bluebell along with species such as wood sorrel, dryopteroid ferns, hard fern and creeping soft-grass.

The broadleaved plantations are somewhat better quality. These comprise variable canopies of sycamore, oak, beech, birch and sometimes ash, but there is again often abundant non-native rhododendron, and sometimes also salmonberry. There is however sufficient ground flora to assign NVC types, which include W11 (with e.g. hard fern, wood sorrel, acid grasses), W10 (more neutral in character, with dryopteroid ferns) and (nearer the River Aray) W9 (with clear basic influence, such as abundant enchanter's nightshade amongst dryopteroid ferns and non-acid grasses). These broadleaved plantations occasionally exhibit native bluebell patches.

Semi-natural woodland

There is very little semi-natural woodland in the surveyed area near Inveraray. Small patches north of Inveraray are mainly poor quality W7b, with neutral wetland species such as tufted hair-grass and soft rush but very limited diversity (compared to the good W7 by Loch Awe described above) and in places signs of disturbance (such as broad-leaved dock *Rumex obtusifolius* and nettle *Urtica dioica*). Other small patches are dry neutral W10, often with frequent bramble or raspberry *Rubus idaeus* but also dryopteroid ferns, and in places more rhododendron.

West of Inveraray, there are small patches of dry acidic birch (W11), some further W10 with bramble, bracken and patchy bluebell, and occasionally birch with abundant ericoids (heather and bilberry) constituting W17. Locally, there are also small amounts of birch with a wet neutral (W7b, with neutral wetland species such as tufted hair-grass, creeping buttercup and rarely smooth-stalked sedge *Carex laevigata*, and acid neutral birch (W4c) with frequent *Sphagnum palustre* and *Sphagnum fallax* in the ground flora.

Marsh / marshy grassland

There is extensive marshy/marshy grassland to the west of Inveraray, adjacent to the forestry plantation. This is beyond the footprint of proposed infrastructure. The majority comprises forms of M23 rush-pasture, both M23a dominated by sharp-flowered rush, which is more species-rich, and somewhat poorer M23b dominated by soft-rush. These are commonly both present in mosaic, in places also with MG10 (grassy soft-rush vegetation lacking in wetland species, of much less note). The M23a, as noted, is more species-rich, and in particular valerian and meadowsweet are abundant. Other clear wetland species here include skullcap, ragged robin, lesser spearwort, greater bird's-foot trefoil *Lotus pedunculatus*, marsh violet and marsh woundwort *Stachys palustris*. More rarely there is marsh hawksbeard and yellow iris, and tufted hair-grass is often frequent. The M23b tends to contain fewer of these species. A few small patches of M23a similar to the above also occur alongside the section of the proposed access route north-east of Inveraray.

Locally within the M23 mosaic, there are small amounts of M6d, also dominated by sharp-flowered rush but acidic with *Sphagnum fallax* and lacking in the above neutral wetland herbs.

A very small amount of M25c marshy grassland was recorded in the field next to the proposed jetty. This is dominated by purple moor-grass but with large wetland herbs including in this case angelica, meadowsweet and devil's-bit scabious.

The only other marsh type recorded in the Inveraray area is M27, overwhelmingly dominated by meadowsweet and present in small quantity beside the proposed access route north of Inveraray, close to the River Aray.

Dry grassland

There is extensive agriculturally-improved pasture of no note (MG6) within the survey area both west and north of Inveraray, and occasionally patches of amenity grassland in garden and golf course areas. In transition to the above-described marsh/marshy grassland, there is commonly a zone of MG10a, species-poor grassy soft-rush vegetation. In one location west of Inveraray, the dominant rush in the MG10a is sharp-flowered rush rather the soft-rush – this is a non-NVC type not accounted for in the published NVC volumes, however it is of no particular note being similarly grazed and species-poor. Very locally towards the proposed jetty, a small amount of MG9 was recorded, a rather species-poor slightly damp grassland overwhelmingly dominated by dense and tussocky tufted hair-grass.

Of a little more note are localised areas of semi-improved neutral grassland that include some grassland resembling poor quality MG5 lowland meadow and swards best assigned to the non-NVC 'Festuca-Holcus' grassland. Almost all of the MG5 has been coded as 'MG5a(pr)' to indicate that it is a poor example of MG5 that is almost certainly sown and clearly not as herb-rich as typical MG5. The largest extents of these grasslands are in the field opposite the proposed jetty, through which the access route to the jetty passes. Yorkshire fog and common bent tend to dominate amongst the grasses, with abundant common sorrel *Rumex acetosa* (a species common in several grassland types) and frequent meadow buttercup *Ranunculus acris* and yarrow *Achillea millefolium*. Lesser stitchwort *Stellaria graminea* and cocksfoot are occasional. With these species alone, the sward is best assigned to the Festuca-Holcus type, since it is not poor enough to class as agriculturally-improved grassland, but not rich enough to assign to MG5. However, black knapweed and ribwort plantain are locally frequent, and particularly the former, where present, provides a closer fit to MG5, albeit still poorer than typical MG5. The very evenness of these swards, which are quite heavily grazed in a fairly flat lowland enclosed pasture field, further suggests that they are sown. Very small damp patches are grassy with iris (MG10c). At the northern side of this field, in mosaic with marshy grassland and not near any proposed infrastructure, a very small amount of genuine MG5c was recorded – this is the slightly acidic form of MG5, here with common bent, common sorrel, tormentil, ribwort plantain, bird's-foot trefoil *Lotus corniculatus*, cat's-ear *Hypochaeris radicata* and autumn hawkbit *Scorzoneroides autumnalis*.

Other dry neutral grassland in the Inveraray survey area is restricted to small amounts of ruderal ('weedy') MG1 with dense false oat-grass and cocksfoot, and a very small amount of similarly ruderal coastal grassland corresponding to MG11. The latter contains scattered Japanese knotweed, amongst a variable and partly maritime mix of red fescue, tufted hair-grass, bent grass, tall fescue *Festuca arundinacea*, scurvy-grass *Cochlearia* sp., campion *Silene* sp. and curled dock *Rumex crispus*.

Acid grassland, as would be expected, is largely absent from the lowland survey area around Inveraray, however a very small amount of U4a (fairly typical but disturbed with scattered rhododendron) was recorded in a power line wayleave north-east of Inveraray.

Saltmarsh

Saltmarsh was recorded only in extremely small quantity, as a very thin and fragmentary strip in the vicinity of the proposed jetty, at the edge of Loch Fyne. There are variable mixes here of saltmarsh rush *Juncus gerardii*, sea

plantain *Plantago maritima*, thrift *Armeria maritima*, sea arrowgrass *Triglochin maritima*, sea aster *Aster tripolium*, sea sandwort *Honckenya peploides* and scurvy-grass. It should be noted that such narrow and discontinuous saltmarsh is widespread around Scottish sea lochs, and the tiny amount within the survey area is therefore not of particular note. The only substantial saltmarsh on Loch Fyne appears to be a zone at its head, very distant from the Development.

Other habitats

Other habitats in the Inveraray survey area are of no note, comprising dense bracken (both U20 and W25, the former more grassy and the latter with bramble), patches of gorse scrub, highly managed vegetation on the bank of the River Aray, a quarry in the plantation west of Inveraray used for machinery/materials storage (and containing a small body of water with negligible vegetation), and built-up areas, roads and tracks.

Notable Flora

Desk study information

The desk study found records of 22 priority SBL lichen species within 2km of Development Site, comprising *Gabura fascicularis*, *Leptogium brebissonii*, *Leptogium burgessii*, *Leptogium cyanescens*, *Lobaria amplissima*, *Lobaria pulmonaria*, *Lobaria scrobiculata*, *Lobaria virens*, *Micarea alabastrites*, *Micarea xanthonica*, *Nephroma laevigatum*, *Opegrapha fumosa*, *Pannaria conoplea*, *Parmeliella parvula*, *Parmeliella triptophylla*, *Peltigera collina*, *Pseudocyphellaria citrina*, *Pseudocyphellaria norvegica*, *Ptychographa xylographoides*, *Sticta fuliginosa*, *Sticta limbata* and *Sticta sylvatica*. None of these particular records are from within the Development Site, the nearest being *L. pulmonaria* shortly north of Inveraray in grid square NN0910. These species mainly occur in high quality well-established semi-natural woodland (including ancient woodland, especially for *Lobaria* spp.), although some can also occur on rocks in sheltered, humid locations. Suitable habitat for such species close to the Development footprint or nearby appears limited to extant ancient semi-natural woodland along Loch Awe.

Additionally, there are eight records of two priority SBL moss species within 2km of the Development Site, comprising *Dichodontium flavescens* and *Palustriella commutata*. The two closest are in the steep-sided ancient semi-natural woodland along the Allt Beochlich close to Loch Awe (at NN0116), which is the edge of the Development Site but well beyond the Development footprint. By reference to the British Bryological Society (BBS) (<https://www.britishbryologicalsociety.org.uk/learning/species-finder/>), the habitat of *D. flavescens* is mainly silt-covered boulders and tree bases along the middle reaches of watercourses, and ravines and crags. Within the Development footprint, such habitat is confined to crags, significant examples of which are beyond the Headpond where there will be negligible to no impact. *P. commutata* is most likely to occur on wet base-rich cliffs and in basic flushes – the majority of potentially viable rock exposures are outside the Development footprint, and there are more known basic flushes outside the Development footprint than within it. Despite SBL listing, both these species are also widespread in Scotland and not under threat.

The Environmental Statement for Blarghour Wind Farm (Ramboll/ESB/Coriolis Energy, 2018) includes a survey for by Highland Ecology, in which it is noted that a sedge that may have been tall bog-sedge *Carex magellanica* was found in the wetter blanket bog approximately 200m south-west of permanent compound PC09. This was not seen during field survey for the Development but could easily have been missed if very localised (as is the case) and especially if grazed (as is quite possible). Tall bog-sedge is not nationally rare or scarce, nor a priority SBL species, however it is sparsely distributed in mainly western Scotland. There are three tetrad records within the hectad containing the Headpond (<https://bsbi.org/maps>), and the edges of the other two are 1.5-3km south of the closest parts of the Development footprint.

The desk study did not find any other records of notable or protected plant, lichen or fungi species.

Notable recorded sphagna

Two notable sphagnum species were found during the field surveys, both at single locations:

- *Sphagnum austinii* – found as three hummocks (one very large) near each other in an area of particularly wet, sphagnum-rich M17a blanket bog (located at target notes 30 and 31 on *Figure 6.4 National Vegetation Classification (NVC) and notable plants (Volume 3: Figures)*); this location is a watershed area approximately 85 m from the limit of the eastern Headpond freeboard (located downslope), and 100m from the nearest access track (located upslope); and,
- *Sphagnum fuscum* – found as two small hummocks between the southern edge of the Headpond and nearest access track, at the junction of drier M19c blanket bog and damp M17b blanket bog (target note 49 on *Figure 6.4 National Vegetation Classification (NVC) and notable plants (Volume 3: Figures)*); this location

is approximately 60m from the Headpond (located very slightly downslope) and 80 m from the nearest access track (located upslope).

These two sphagnum species were not found anywhere else in the surveyed area, including the wide surveyed strip along the Three Bridges access track route. The wider habitat around the surveyed area appears similar with respect to condition (often suboptimal owing to grazing pressure and potentially, in places, past burning), and it is very likely that these species are equally rare in the wider area (in support of this, surveys for Blarghour Wind Farm (Ramboll/ESB/Coriolis Energy, 2018) did not report these species). Distribution maps provided by the British Bryological Society (BBS) (<https://www.britishebryologicalsociety.org.uk/learning/species-finder/>), supported by commercially-available records shown on the NBN Atlas (from the BBS), indicates that both these species are rare in NHZ 14, and that these records from the Development Site are new hectad (10x10km square) records.

Note that microscopic analysis was not carried out to separate *Sphagnum fuscum* from *Sphagnum beothuk*, however given the altitude and habitat (and that the nearest BBS records are *S. fuscum*) it is very likely that it is *S. fuscum* (Hill, 2017). Microscopic analysis is not necessary for *Sphagnum austinii* when growing normally with typical colouration and in very dense and solid hummocks, as it was at the recorded location.

Sphagnum medium was also recorded at 14 locations (target notes 17, 25-27, 39, 41, 42, 45, 50, 52, 53, 55 and 57; see *Figure 6.4 National Vegetation Classification (NVC) and notable plants (Volume 3: Figures)*). This species is not rare or scarce but does tend to be local and is associated with wetter and usually higher quality bog habitat (in the UK it was formerly referred to and is better known as *Sphagnum magellanicum*). Whilst characteristic of the NVC type M18, in all but one case (where a small amount of cranberry was recorded – see above) the vegetation is more akin to M17a (for example, in the abundance of deergrass) and considered part of the wider extents of that community. Of these 14 locations, eight are within the Development footprint (mainly the Headpond). It is most abundant at target note 42 (where there was also a little *Polytrichum strictum* and white beak-sedge) and target notes 25-27, all in the Headpond area. However, it is frequent at target note 45 approximately 170m east of the Development footprint, and at target note 53 approximately 130m uphill of the Three Bridges access track (where there is also transitional bog-flush vegetation and a little M4 transition mire adjacent to an oligotrophic lochan). The Environmental Statement for Blarghour Wind Farm (Ramboll/ESB/Coriolis Energy, 2018) indicates that *S. medium* also occurs occasionally in bog elsewhere in the local area.

Notable recorded vascular plants

A number of notable vascular plants were recorded during the field survey. None of these are rare or scarce nationally, but are either noticeably and probably unnaturally scarce locally, or indicate higher quality habitat. Distribution and habitat information in this section is taken from the Botanical Society of the British Isles (BSBI) Plant Atlas 2020 (<https://plantatlas2020.org/>).

The following three species, in particular the first two, are probably scarce at the Development Site owing to degradation of the blanket bog, mainly by grazing but in places by burning (which almost certainly occurred more widely historically but would leave no obvious sign other than likely contributing to species-poverty):

- Cloudberry – widespread in the highlands and although at the edge of its range at the Development Site there are several hectad records in the vicinity. It is often common in M19c blanket bog, but is very scarce in the survey area despite the frequency of M19c, and was found in small quantity at only four locations (target notes 35, 44, 48 and 51; see *Figure 6.4 National Vegetation Classification (NVC) and notable plants (Volume 3: Figures)*, three of which are within the Development footprint. Likely to be present but similarly sparse across other nearby blanket bog;
- Bog bilberry – widespread in the highlands and north-eastern NHZ 14. It can be moderately common in M19c blanket bog and associated heaths, however, it is also very scarce in the survey area and found in very small quantity at only four locations (target notes 22, 23, 47 and 56; see *Figure 6.4 National Vegetation Classification (NVC) and notable plants (Volume 3: Figures)*), two of which are within the Development footprint. Likely to be similarly sparse across other nearby blanket bog;
- Cranberry – widespread in NHZ 14 but often present in only a few tetrads per hectad, and mostly confined to blanket bog. Found only once in small quantity at the edge of wet blanket bog with *Sphagnum medium* within the Headpond area (target note 24; see *Figure 6.4 National Vegetation Classification (NVC) and notable plants (Volume 3: Figures)*). Its extreme rarity in the survey area, considering that there are several areas of similarly wet blanket bog that appear suitable, may be connected to habitat degradation. Likely to be similarly rare across other nearby blanket bog.

Several other species, also not rare or scarce nationally but localised in the Development vicinity, were also recorded:

- Bog orchid – this species has a somewhat disjunct distribution but is concentrated towards western Scotland and is known from almost all hectads at and around the Development Site, mostly only from single tetrads (2x2km squares) but at up to eight tetrads per hectad north of the Development Site. It is extremely inconspicuous and therefore almost certainly under-recorded. However, it only grows in wet mires with perpetual water movement. It was found once in the survey area, in an M10 basic flush approximately 18m north of the northern headpond Embankment and 35m from the nearest access track (target note 34; see *Figure 6.4 National Vegetation Classification (NVC) and notable plants (Volume 3: Figures)*), where 14 individual plants were noted. Given the difficulty in finding this species, it may be present in other similar very wet flushes sparsely scattered through the survey area and without doubt beyond it;
- Fragrant orchid – widespread across highland Scotland including NHZ 14, but often with only a few tetrad records per hectad. It was found once only in the survey area, in U4 acid grassland with thin bracken, beyond the Development footprint (target note 1; see *Figure 6.4 National Vegetation Classification (NVC) and notable plants (Volume 3: Figures)*). It does not occur in blanket bog and would therefore be scarce in the open uplands of the local area, which are dominated by blanket bog;
- Lesser twayblade – widespread across highland Scotland including NHZ 14, but with often only a few tetrad records per hectad. Like bog orchid it is very inconspicuous and probably under-recorded. It was found once only in the survey area, beyond the Development footprint amongst sphagnum and other moss under Sitka spruce at the edge of Upper Sonachan plantation (target note 18; (see *Figure 6.4 National Vegetation Classification (NVC) and notable plants (Volume 3: Figures)*), where approximately 40 plants were found in close proximity. Likely to occur elsewhere in suitably mossy parts of the plantation and perhaps on the open moorland (although ericoid cover is often not dense enough to provide sufficient shelter for this species in the Headpond area);
- Few-flowered sedge – widespread in wetter blanket bog in highland Scotland, and much of NHZ 14 although only in a few tetrads per hectad. It was only found twice in the survey area, at the northern end of the Headpond area (target note 15; see *Figure 6.4 National Vegetation Classification (NVC) and notable plants (Volume 3: Figures)*), and locally in the wet M17a bog north-east of Lochan Airigh. It is not clear why it is so scarce in the survey area given presence of other local but apparently suitable wetter blanket bog. Likely to be similarly scarce across nearby blanket bog;
- Stone bramble – widespread in highland Scotland, including NHZ 14, although it is normally found in only a small number of tetrads per hectad, and mostly occurs in rocky woodland (absent from the Development Site) or suitable rocky or ravine sites (very localised in this area). It was found once in small quantity on vertical rock with ledges beside a stream within the Headpond area (target note 38; see *Figure 6.4 National Vegetation Classification (NVC) and notable plants (Volume 3: Figures)*). It may also be present on other similar but less accessible rocky ledges within and beyond the Development Site, however these are very scarce.

A number of other species were recorded that are not rare or scarce but occur in species-rich habitats that are localised in the survey area (and elsewhere in highland Scotland outside of particularly obviously base-rich regions). These are discussed under species-rich ledge/ravine vegetation and other notable habitats above.

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