



Technical Appendix 7.2

Habitats Baseline Report

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1 Introduction

1.1 Project Background

1. This appendix presents information relevant to the Harestanes South Windfarm Extension (hereafter the 'Proposed Development'). It should be read in conjunction with the Environmental Impact Assessment (EIA) Report for full details of the Proposed Development.
2. The Site earmarked for the Proposed Development is located at Forest of Ae, Dumfries; encompassed by the Application Boundary shown on **EIA Report Figure 1.2: Application Boundary**.

1.2 Brief and Objectives

3. Baseline data are required to inform an Ecological Impact Assessment (EcIA) of the Proposed Development, which forms **Chapter 7: Ecology and Biodiversity** of the EIA Report. This report presents baseline data collected from a desk-based review of existing data and current data from field surveys.
4. Specifically, this report describes the Site's baseline vegetation. Records of notable plant species have been obtained up to 5km from the Application Boundary. National Vegetation Classification (NVC) surveys have been undertaken across a targeted area at the Site ('NVC Survey Area') which encompasses:
 - turbines, borrow pits, plus a buffer of up to 250m; and
 - new access tracks, control building and met mast, plus a buffer of up to 100m.
5. These NVC survey buffers have been applied to help identify potential Groundwater Dependent Terrestrial Ecosystems (GWDTEs) within the Proposed Development's potential zone of influence based on the depth of ground excavations associated with each element of the Proposed Development, in accordance with guidance from the Scottish Environment Protection Agency (SEPA, 2017). For plant communities identified herein with the potential to be GWDTEs, the qualification and likelihood of GWDTEs and potential impacts on GWDTEs, are addressed within **Chapter 6: Hydrology, Hydrogeology, Geology and Soils** using a combination of NVC data and other characteristics.
6. The purpose of the NVC surveys was also to identify habitats considered to have nature conservation importance under the European Union Habitats Directive and Nature Conservation (Scotland) Act 2004.
7. The NVC survey did not fully cover: existing access tracks from the gate at the far south of the Site, north to the Developable Area (i.e. where turbines are clustered); existing access tracks between the west and east parts of the Developable Area; nor cable routes which extend from the Developable Area north to the existing substation. This is addressed in **Section 2.3: Existing Access Tracks Survey Methods** and **Section 2.5: Notes and Limitations**.

2 Methods

2.1 Existing Data Review

8. A desk study was undertaken in April 2020 to review existing ecological baseline information available in the public domain and held by relevant third parties.

9. Relevant to this appendix, notable plant records were sourced from South West Scotland Environmental Information Centre (SWSEIC) up to 5km from the Application Boundary. SWSEIC also provided habitat maps available up to 5km from the Application Boundary.
10. Ecology reports which supported the operational Harestanes Windfarm (ScottishPower, 2004) were reviewed to contextualise the field survey results.

2.2 National Vegetation Classification Survey Methods

11. An NVC survey was undertaken on 23 and 24 July, and 26 and 27 August 2020 across targeted areas at the Site (as per **Section 1.2 Brief and Objectives**). The survey was undertaken by a WSP Principal Ecologist with over six years of experience undertaking habitat assessments, and a working knowledge of the link between hydrology and plant communities; useful to inform GWDTE identification. The WSP Principal Ecologist holds associate membership of the Chartered Institute of Ecology and Environmental Management (CIEEM) and is 'capable-accomplished' of habitat identification and evaluation, as per their competency framework (CIEEM, 2019).
12. The survey was completed in line with NVC guidelines (Rodwell, 2006), classifying communities in accordance with the NVC system (Rodwell, 1991-2000). The NVC survey method provides a standardised system for classifying and mapping plant communities and enables surveys to be carried out to a consistent level of detail and accuracy. Homogenous stands and mosaics of vegetation were mapped in the field as distinct polygons (areas). These polygons were surveyed qualitatively to record dominant and constant species, sub-dominant species and other species present. The DAFOR (Dominant, Abundant, Frequent, Occasional, Rare) scale was used when taking target notes. For the purpose of this survey, the DAFOR scale simply indicates a species abundance relative to the cover of other associates within a particular community; there are no fixed percentages of cover associated with the DAFOR scale.
13. NVC communities were attributed to the polygons using surveyor experience and matching field data against published floristic tables. Where a mosaic of differing communities or sub-communities was encountered and distinct stands could not be easily separated, the broad area has been mapped as a single polygon.
14. NVC field guides for heaths and mires (Elkington *et al.*, 2001), grasslands (Cooper, 1997) and woodlands (Hall *et al.*, 2004); and An Illustrated Guide to British Vegetation (Averis *et al.*, 2004) were referred to during the surveys and later during preparation of this appendix to corroborate findings and aid in community assignment.
15. Quadrat sampling was not used in this survey as it is not always necessary if vegetation types can be reliably identified in the field using sufficient qualitative data. Most NVC communities and sub-communities are defined by inter-stand frequency, not by the abundance of the constituent species. It is better in many cases to record several qualitative samples than one quantitative sample; furthermore, qualitative information can be vital for understanding the dynamics and trends in vegetation patterns.
16. Post-survey, polygons were digitised to show the assemblage of distinct plant communities up to 250m from proposed turbines, borrow pits, the control building and the met mast. Target notes were recorded of species composition and where differences within the same communities were observed across the Site (influenced by changes in land use, topography, aspect, etc.). Target notes were also recorded of particular species interests along access tracks proposed to be upgraded or where new access tracks have been routed; however, NVC communities along the access tracks have not been mapped unless they also fall within 250m of turbines or borrow pits (see **Section 2.4: Notes and Limitations**). Target notes are included in **Appendix B**.

2.3 Existing Access Tracks Survey Methods

17. A review of aerial imagery was undertaken to identify sensitive habitats, classified by the industry standard Phase 1 habitat technique (Joint Nature Conservation Committee, 2010), along existing access tracks from the south of the Site to the substation in the north of the Site. This was consolidated by a drive-by ground truthing exercise to confirm Phase 1 habitat types, which was undertaken ad hoc to site visits for the targeted NVC field surveys.
18. Phase 1 habitat points have been mapped along these existing tracks, which highlight the consistency of tall herb vegetation, scrub, rush pasture and dry heath; but do not map the full extent of these trackside habitats.

2.4 Nomenclature

19. Scientific nomenclature used in reporting of the NVC baseline of the Site for higher plant species (e.g. vascular, flowering plants) follows that provided in the latest edition of New Flora of the British Isles (Stace, 2019) and is included in **Appendix C** only. Nomenclature for lower species follows that provided in Mosses and Liverworts of Britain and Ireland (British Bryological Society, 2010).
20. Non-NVC terminology has been used for areas of coniferous plantation (CP), broadleaved plantation (BP), and felled plantation (FP). In the case of felled plantation, NVC community mosaics have been assigned to indicate the current succession of plant communities (e.g. FP – U4/H12 indicates a grassy heath succession). Clearly defined, typical NVC communities have not established over felled plantation at the Site (unless stated by target notes); these communities are indicative of the current short-term succession only.

2.5 Notes and Limitations

21. The results of the NVC survey, and the matches made in describing communities, represent a current community evaluation (as opposed to one seeking to describe what the community was before any human interference or may become in the future). In the absence of changes in land use, hydrology, or otherwise, and depending on the sensitivity and condition of communities identified, it is likely that NVC data remain valid for up to five years.
22. Habitats along existing access tracks proposed for upgrade are homogenous throughout the Site. These predominantly comprise lengths of soft rush dominated marshy grassland/damp neutral grassland adjacent to the tracks, tall herb vegetation amongst the marshy grassland and in locally dominant stands, and scrub vegetation. Dry heath and blanket bog fringe the edge of and underly coniferous plantation over wider, more extensive areas beyond the tracks. It is anticipated that works associated with the proposed upgrades to existing tracks or for trackside cable installation would be localised and result in relatively marginal loss of homogenous habitats. Cable markers were observed along the trackside north of the Developable Area indicating that existing cables run trackside, with these rush/ tall herb/ scrub habitats now well-established over existing cables. Overall, recording of Phase 1 habitat points along these tracks was therefore considered to be sufficient to inform an EIA and Habitat Management Plan (as opposed to mapping of NVC plant communities up to 100m from these existing access tracks). A similar approach was adopted to mapping habitats at the Site for the operational Harestanes Windfarm Environmental Statement (ScottishPower, 2004).

3 Results

3.1 Existing Data

23. A broad habitat map of the Forest of Ae was provided by SWSEIC (**Figure 7.2.1, Appendix A**). The figure indicates that the area is dominated by coniferous woodland, with grassy-heath and upland heath habitats across open areas to the north east and south. Neutral grassland and rush pasture appear to extend over small areas to the south, and south west. Broadleaved and mixed woodland has been mapped along main watercourses through the Forest of Ae. An isolated patch of blanket mire, comprising mostly heather, has been mapped from within the coniferous plantation to the south west.
24. SWSEIC provided 13 records of species which are considered rare or important within Dumfries, listed on the Dumfriesshire Rare Plant Register (DRPR), Dumfries and Galloway Local Biodiversity Action Plan (DGLBAP) and/or Scottish Biodiversity List (SBL). These data were collected by the Botanical Society of Britain and Ireland (BSBI) between 2010 and 2020; and are summarised in **Table 3.1**. The locations of notable plants are shown on **Figure 7.2.2 (Appendix A)**.
25. SWSEIC also provided 14 records of non-native invasive plant species: nine records of Japanese knotweed *Reynoutria japonica* at the River Annan; and five records of giant hogweed *Heracleum mantegazzianum* at Carse of Ae. These data were collected by Annan District Salmon Fishery Board (ADSFB). No records were provided from within the Developable Area. The nearest record was of Japanese knotweed, 1km south east along the A701 road.

Common name	Scientific name	Priority list	Location	Grid reference
Yellowish fork-moss	<i>Dichodontium flavescens</i>	SBL; DGLBAP	St Ann's Bridge, up and downstream along Kinnel Water	NY0693
Floating bur-reed	<i>Sparganium angustifolium</i>	DRPR	Loch Ettrick	NX99L
White beak-sedge	<i>Rhynchospora alba</i>	DRPR	Spedlins Flow	NY0807487522
Bog-rosemary	<i>Andromeda polifolia</i>	DGLBAP; DRPR	Spedlins Flow	NY08Y
Bog-rosemary	<i>Andromeda polifolia</i>	DRPR	Edwards Rig	NY09T
Bog-rosemary	<i>Andromeda polifolia</i>	DRPR	Lochwood	NY09Y
Heath pearlwort	<i>Sagina subulata</i>	DRPR	Stidriggs Wood	NY09U
Willow	<i>Salix cinerea x myrsinifolia</i> = <i>S. x strepida</i>	DRPR	Glenkiln	NY09A
Broad-leaved osier	<i>Salix viminalis x caprea</i> = <i>S. x smithiana</i>	DRPR	Shieldhill	NY035856
Silky-leaved osier	<i>Salix viminalis x cinerea</i> = <i>S. x holosericea</i>	DRPR	Shieldhill	NY035856
Common stork's-bill	<i>Erodium cicutarium</i>	DRPR	Spedlins Flow	NY08Y
Mountain everlasting	<i>Antennaria dioica</i>	DRPR	Whitestanes Moor	NX97228888
Fool's parsley	<i>Aethusa cynapium</i>	DRPR	Stidriggs Wood	NY09U

Table 3.1 - Notable plant species recorded by BSBI up to 5km from Application Boundary

3.2 Field Survey Results

26. No specimens of the aforementioned notable species revealed through the desk study were recorded from the NVC Survey Area during field surveys. The NVC communities mapped during the field survey broadly align with the high-level habitat map provided by SWSEIC.
27. The findings of the NVC survey broadly align with that recorded within the wider Forest of Ae prior to construction of the operational Harestanes Windfarm (ScottishPower, 2004).
28. The Site comprises coniferous plantation woodland, with narrow rides of heath, mire or grassland habitats. Large areas of recently felled woodland present an intermediate, short-term succession of neutral damp vegetation or acidic heath on sloping aspects; typical NVC communities have not yet established in these areas. Semi-natural broadleaved woodlands are localised to valleys, forming riparian corridors along the Clachanbirnie Burn and Glenkiln Burn. Acidic heath and grassland habitats, and neutral rush pasture, occur in mosaic with these broadleaved woodlands. Discrete sedge fens and swamps are localised in forestry rides in the west by Turbine 1, and to the north of Turbine 6.
29. All plant communities mapped from the NVC Survey Area are illustrated on **Figure 7.2.3 (Appendix A)**; habitats are generally homogenous across the landscape. A total of 143 target notes detailing species composition and distinct features (e.g. ponds) throughout the Site are presented in **Appendix B**.
30. The following section sets out to describe the plant communities relevant to each turbine location; then borrow pit locations; and then access routes. Where a particular stand of vegetation is considered of increased conservation importance by virtue of relatively better condition / species-richness / structural diversity / rarity in the wider landscape, this is highlighted in the sections below. NVC plant community names have been underlined on their first mention throughout the following sections for clarity.

3.2.1 Turbine 1

31. Coniferous plantation dominates the survey buffer surrounding Turbine 1. The Clachanbirnie Burn extends through a valley in the east, with a mosaic of semi-natural heath, bracken, rush, grassland and wet woodland communities (**Photo 2**).
32. Areas of the H12 *Calluna vulgaris*-*Vaccinium myrtillus* heath community are localised to higher elevations on the slopes of the valley, extending from the forestry edge, and comprise mature heather and bilberry shrubs with tormentil. This community is common, representing a large extent of upland dry heath across Scotland and forming the recognisable, visually appealing purple heather landscapes (Averis *et al.*, 2004).
33. Purple moor-grass is occasional at most, but prevails more frequently through a forestry ride mapped as an M15 *Trichophorum germanicum*-*Erica tetralix* wet heath mosaic component.
34. Dense patches of the U20 *Pteridium aquilinum*-*Galium saxatile* community generally occur at lower elevations, near to the watercourse. Bracken tends to be exclusively dominant over a grassy sward. This community occurs on well aerated and often moist soils which are base-poor to circumneutral (Cooper, 1997). It is a community of little ecological value.
35. Grassland communities through the Clachanbirnie Burn valley include pockets of the U4 *Festuca ovina*-*Agrostis capillaris*-*Galium saxatile* grassland community with sweet vernal-grass, common bent, wavy hair-grass and tormentil (TN10). The U4 grassland is accompanied by stands of MG9 *Holcus lanatus*-*Deschampsia cespitosa* grassland community, where lush Yorkshire-fog becomes dominant and tufted hair-grass is abundant; frequent associates include foxglove, angelica and marsh thistle (TN11). MG9 is a form of grassland found mainly on permanently moist and periodically inundated circumneutral soils across large areas of the British lowlands (Cooper, 1997). It is a grassland of tall grasses and rushes.
36. The relatively damp M23 *Juncus effusus*-*acutiflorus*-*Galium palustre* rush-pasture community also extends through this valley, common in the basin adjacent to the burn, and in mosaic with grass and heath communities through the



Photo 2 - View from north to south through Clachanbirnie Burn valley in east of Turbine 1 buffer; MG9/MG10 neutral, damp grassland in foreground with short sward of U4 grassland beyond, then U20 bracken in central basin; purple tinges of H12 dry heaths on slopes and W7 wet woodland in background.



Photo 1 - View towards Rough Cleuch valley; species-rich M23 in foreground and W7 willow woodland; purple H12 dry heath on opposite slope.

forestry ride to the north of the turbine. Rushes dominate with a typical assemblage of neutral associates including angelica (TN8). This rush-pasture occurs over a variety of moist, moderately acid to neutral, peaty and mineral soils in the cool and rainy lowlands of western Britain. It is a community of gently-sloping ground around the margins of soligenous flushes, as a zone around topogenous mires and wet heaths, and especially widespread in ill-drained, comparatively unimproved or reverted pasture. The vegetation is often ill-defined and characterised by the abundance of either soft rush or sharp-flowered rush, sometimes both, in a ground of mesophytic herbs common in moist agricultural grassland. The rushes often have a high ground coverage but they may also be sparse (Elkington *et al.*, 2001).

37. The W7 *Alnus glutinosa*-*Fraxinus excelsior*-*Lysimachia nemorum* woodland community occurs through the southern reaches of the valley and openings in forestry rides. These woodlands comprise grey willow, hawthorn, hazel and birch trees, with occasional coniferous trees naturally seeded from the adjacent plantation. The field layer is reflective of a damp neutral sward with creeping soft-grass. W7 is a woodland type typical of moist to very wet mineral soils which are only moderately base-rich and not very eutrophic. It is most extensive in the wetter parts of Britain. There is a wide variation of species and characteristics covered by this community; typical canopy species may be lacking where understory species (e.g. willow) can dominate over a field layer reflective of M23 neutral mire (Hall *et al.*, 2004), as is the case at the Site.

3.2.2 Turbine 2

38. Similarly, coniferous plantation dominates the buffer surrounding Turbine 2. Uniform rides extend through the plantation forestry, predominantly comprising M15 wet heath with a dominance of purple moor-grass. Heather and bilberry are relatively constant; heather becoming abundant in patches. Tormentil and heath bedstraw are frequent. Associated bryophytes are occasional to frequent, broadly including *Rhytidiadelphus loreus*, *Rhytidiadelphus squarrosus*, *Polytrichum commune*, *Sphagnum capillifolium*, and *Sphagnum fallax* (TN1-3). Wet heath shifts towards M19 *Calluna vulgaris*-*Eriophorum vaginatum* blanket mire where tussocks of hare's-tail cottongrass become prominent (TN4), alongside *Sphagnum capillifolium* and *Polytrichum commune*.
39. A valley extends to the east of Turbine 2, with relatively deep slopes either side of the Rough Cleugh and an open space for a mosaic of semi-natural habitats (**Photo 1**). The assemblage of communities echoes that through the Clachanbirnie Burn valley (Turbine 1); H12 dry heath occurs on the upper slopes, and swathes of damp neutral rush pasture and grassland extend through the valley in mosaic with the U20 bracken and W7 wet woodland communities. Willow dominates these extents of W7 woodland. Patches of M23 rush pasture are relatively species-

rich; associates include abundant creeping buttercup, marsh thistle, common sorrel, marsh bedstraw, and common spotted-orchid (TN5).

3.2.3 Turbine 3

40. Coniferous plantation extends to the east; and recently felled plantation on a west-facing slope dominates the centre of the survey buffer. The area of felled plantation presents a relatively dry, grassy-heath succession (non-NVC FP – U4/H12). In the northern portion, *Rhytidiadelphus loreus* dominates with wavy hair-grass (**Photo 3**). Indeed, most H12 *Calluna-Vaccinium* heaths are derived from woodland clearance (Averis *et al.*, 2004); further evidenced at the Site where dry heath fringes mature and felled stands.



Photo 3 – Recent fell with grassy-heath succession (FP - U4/H12); and towards W7/M23 along Glenkiln Burn.

41. Riparian W7 woodland extends along the Glenkiln Burn to the west, with frequent willow, rowan, alder, birch, angelica. Bracken is frequent around the edges of this W7 wet woodland. The field layer comprises creeping soft-grass, with frequent common sedge, wood sorrel, common dog-violet and marsh thistle. The M23 rush mire community interchanges with woodland and bracken along Glenkiln Burn. An area of mature H12 dry heath gently slopes between the edge of the former forestry and riparian valley.

3.2.4 Turbine 4

42. The survey buffer surrounding Turbine 4, due north from Turbine 3, comprises coniferous plantation to the east and a large extent of recent fell to the west. Species composition is broadly homogenous with other areas of recent fell, presenting a succession of grassland and heath (FP – MG10/H12/M15).
43. Distinct from other areas, a linear corridor with continuous *Sphagnum fallax* extends along and down the slope; presumed aligning with an old forestry ride (**Photo 5**). *Sphagnum capillifolium* is also abundant. Associates range from hummocks of *Polytrichum commune*, to soft rush aligning with the *M6 Carex echinata-Sphagnum recurvum/auriculatum* mire community. Heath rush is locally frequent, with purple moor-grass and patchy heather of low cover; this area represents a mosaic of the M6 community with *U6 Juncus squarrosus-Festuca ovina* grassland (TN63-65).
44. Sharp-flowered rush mire aligning with *M23a Juncus acutiflorus* sub-community fans across an opening into the coniferous plantation to the south east (TN57-58). Frequent to abundant associates include frequent marsh thistle, marsh bedstraw, angelica, common sorrel, bracken, woodrush and foxglove (**Photo 4**).



Photo 5 – Sphagnum associated with M6/U6 carpets previous forestry ride.



Photo 4 – M23a fans across opening in coniferous plantation (TN60).

3.2.5 Turbine 5

45. Coniferous plantation dominates. M19 blanket mire is found along forestry rides to the east of the existing track, accompanied by pockets of *M6c Juncus effusus* sub-community (TN77 and TN83). Relatively small areas of MG9 damp grassland occur in the south, adjacent to the existing access track and a small lay-by.
46. In the north, a disused quarry is now dominated by the *M23b Juncus effusus* sub-community; a species-poor swathe of soft rush mire in a bowl (TN87). Marsh bedstraw and common sorrel are abundant; marsh thistle, foxglove and ragwort are also present. Willow is abundant, and there are pockets of willow-dominated W7 woodland with an M23 understory.
47. The southern parts of the quarry present a green-grey sward of Yorkshire-fog with soft-rush, tufted hair-grass, marsh thistle, coltsfoot, common sorrel, creeping buttercup and marsh willowherb (TN80). This grassland aligns with the MG10 community.
48. On top of the slope and along the edge of mature plantation, ericoid vegetation reflects the M19 bog and H12 dry heath communities (TN81). H12 dry heath is visible amongst clearings in the plantation to the north of Turbine 5 (TN79).
49. At a very localised area by the existing track to the quarry on the edge of coniferous plantation, willow dominates over *Sphagnum fallax* and *Polytrichum commune* (TN78). The vegetation is wet underfoot; a water table visible in parts. Tormentil, heath bedstraw, creeping buttercup and creeping soft-grass were recorded here.
50. A small area of *S10 Equisetum fluviatile* swamp sits in the north corner adjacent to the existing access track (TN78). Water horsetail is dominant.

3.2.6 Turbine 6

51. The central, west and southern areas of the buffer around Turbine 6 are dominated by coniferous plantation. To the far north east, a grassy succession extends over felled plantation (FP – U4/MG10).
52. A relatively wide forestry ride to the west extends over level ground and comprises tussocks of M19 blanket mire vegetation with locally frequent patches of heather and bilberry shrubs; purple moor-grass and hare's-tail cottongrass are constant. Deergrass occurs in the northern reaches (TN101 and TN104).
53. A valley extends behind the north of the mature coniferous plantation aligning with an unnamed tributary watercourse flowing west to east. A series of pools have formed at the upper reaches of the tributary; sedge-rich

mires have established around and emerge from these ponds. Bottle sedge is locally dominant, emerging from open water alongside pondweed, reflective of the S9 *Carex rostrata* swamp. Sedges are also associated with *Sphagnum* (**Photo 7**). Carnation sedge, forget-me-not, scabious, bog asphodel and marsh bedstraw are locally frequent elsewhere in the fringes (TN108 and TN09; **Photo 6**). These areas are mapped as a mosaic of S9 with the M5 *Carex rostrata-Sphagnum squarrosum* mire, and M23 rush mire more widely. The area is relatively sheltered and provides optimal habitat for butterflies and moths. Patches of H12 dry heath cover small mounds in this area. The ponds appear to be fed by a narrow flush which originates within the conifer plantation; neutral herbs including selfheal, hawkbit and marsh willowherb line the flush (TN110).



Photo 6 – Bottle sedge mire.



Photo 7 – Species-rich sedge mires emerging from pools and rush mire surrounding.

3.2.7 Turbine 7

54. A quarried area extends across the south west of the survey buffer around Turbine 7. Young coniferous woodland has been recently planted to the west, over rush dominated pasture (TN113). Mature coniferous plantation covers much of the remainder of the buffer.
55. A circular clearing in the plantation at the end of a forestry ride comprises tussocks of hare's-tail cottongrass, purple moor-grass and bilberry; aligning with the M19 blanket bog community (TN117). This area is a typical example of M19 mire, with blanket bog vegetation of ombrogenous peats on high-level plateaux. M19 is usually confined to deeper peats, usually more than 2 m thick, on flat or gently-sloping ground. The vegetation is generally dominated by mixtures of hare's-tail cottongrass and ericoid sub-shrubs (Elkington et al., 2001).
56. The tussock vegetation continues through the forestry ride but the frequency of hare's-tail cottongrass is reduced. Other associates include tormentil, occasional soft rush and *Polytrichum commune*. Along the forestry ride, M6c occurs in mosaic with M15 vegetation. A relatively large patch of *Sphagnum fallax* and soft rush (M6c) carpets the ride to the north and occurs occasionally in association with further stretches of M19/M15 mire (TN119-120).
57. A relatively wet area of W7 willow dominated woodland with a M23a understory and pockets of M6c breaks through an opening in the plantation to the north east, extending down the north-facing hillside (**Photo 8**, TN121).



Photo 8 – M23a/W7 in clearing to north east of Turbine 7 (TN121).

58. West beyond the plantation, M23 rush mire extends either side of an unnamed tributary watercourse which feeds the Glenkiln Burn. Heath (H12) and acid grassland (U4) covers sloping ground between the M23 valley mire and conifer plantation (TN111, TN123, TN124).

3.2.8 Turbine 8

59. Relatively young, semi-mature coniferous plantation extends over the majority of this area; semi-natural habitats are limited to forestry rides only. The relatively northern ride presents M23 rush pasture with soft rush, sharp-flowered rush, marsh bedstraw, marsh thistle, tormentil and tufted hair-grass (TN137). M23 also follows the Yellowtree Grain watercourse in the east, forming a mosaic with patches of MG10 in parts to the south east.
60. The southern ride comprises M15 wet heath vegetation with patches of bilberry, heather and cross-leaved heath; purple moor-grass is dominant where heather is absent but other associated remain constant (TN140). Tormentil, heath bedstraw and heath rush are present. Localised patches of hare's-tail cottongrass and *Sphagnum* are present in the south of this ride (TN141). This M15 wet heath community is characteristic of moist and generally acidic and oligotrophic peats and peaty mineral soils in the wetter western and northern parts of Britain. It is also associated with thinner or better drained areas of ombrogenous peat (Elkington et al., 2001). It is a vegetation type with few constants and a wide variation in the pattern of dominance and in associated flora.
61. Willow dominates scrubby woodland along the existing access track.

3.2.9 Borrow Pit 1

62. This area extends adjacent to the west of an existing quarried area. Mature coniferous plantation dominates. Damp neutral grassland and rush pasture extends over marginal areas to the south.
63. The M23 neutral rush mire community follows the southern border of mature plantation along an original forestry ride (TN115); the adjacent M23 habitat presents overgrown, now inconspicuous stumps from a historic fell (TN114). Along the plantation edge and within this borrow pit area, a swathe of soft rush and sharp-flowered rush dominates with marsh bedstraw, marsh thistle and common sorrel. The wider extent of M23 now established over felled woodland comprises sharp-flowered rush, soft rush, angelica, marsh willowherb, marsh thistle, marsh bedstraw, creeping buttercup; with species remnant from early succession such as bracken, tufted hair-grass, foxglove and ragwort (TN114 and TN129). Immature willow is scattered.
64. In the southwest corner of the borrow pit area, Yorkshire-fog is dominant with tufted-hair grass, representing MG9 *Holcus lanatus-Deschampsia cespitosa* grassland.

3.2.10 Borrow Pit 2

65. This area is located exclusively within coniferous plantation. A relatively wide but sheltered forestry ride bisects (from east to west) mature plantation in the southern part of the borrow pit area, over a steep east-facing slope. The H12 dry heath community dominates, comprising mature heather and bilberry shrubs; heath bedstraw, occasional *Sphagnum* and relatively abundant *Hylocomium splendens* (**Photo 9**, TN55). A few stands of gorse are located at the foot of the forestry ride by the existing access track.
66. To the west of this borrow pit area, beyond the existing access track, an extensive area of recently felled plantation extends over a west-facing slope, towards Glenkiln Burn in the valley basin. A succession of grassy heath appears over the recently felled slopes (FP – U4/H12). Semi-natural habitats which mosaic through the Glenkiln Burn valley, including M23 rush mire, U20 bracken and W7 willow woodland, are homogenous with that described in respect of Turbines 3 and 4.



Photo 9 – Mature H12 dry heath through sloping forestry ride within borrow pit 2 (TN55).

3.2.11 Borrow Pit 3

67. Again, mature coniferous plantation exclusively dominates this borrow pit area. Vegetation within forestry rides beyond the borrow pit area generally reflects M15 wet heath with tussocks of purple moor-grass, ericoids (tough,

hardy, heather-like plants), and bryophytes; some areas shifting to M19 bog habitat with increased cover of hare's-tail cottongrass (TN1-4).

68. The wider area to the north, east and west is also covered by plantation woodland. To the west beyond the adjacent existing access track, the land slopes further west into the valley along the Clachanbirmie Burn. Immediately adjacent to the existing access track where it travels parallel to the borrow pit area, U20 bracken dominates the upper slope, with pockets of Yorkshire-fog dominated grassland and varying associates from tufted hair-grass to soft rush (MG9/MG10 neutral grassland). Wetter areas of rush pasture (M23) also occur along this slope.
69. Semi-natural habitats which mosaic through the main Glenkiln Burn valley, including M23 rush mire, U20 bracken and W7 willow woodland, are homogenous with that described in respect of Turbine 1.

3.2.12 New Access Tracks

70. New extensions to access tracks for Turbines 1, 2, 5, 6 and 8 will predominantly extend through coniferous plantation.
71. The new access track associated with Turbine 1 will cross two areas of semi-natural, predominantly mire-based habitats lining tributaries of the Clachanbirmie Burn. Of particular interest, the track will extend adjacent to a discrete sedge mire dominated by bottle sedge with abundant bedstraw; aligning with the M9 community (**Photo 10**, TN21). This sedge mire fringes a small stand of willow; forget-me-not, creeping buttercup, common sorrel, angelica and marsh willowherb were also recorded but of relatively low frequency and generally restricted to where the community interchanges with M23. The water table was visible at the time of survey, with a slight flow through mire.



Photo 10 – Bottle sedge and bedstraw fen fringing willow, located in forestry ride by new access track (TN21).



Photo 11 – Areas of H21 Sphagnum dominated heath (TN20 and TN23).

72. Also relatively distinct, along the edge of the plantation, dry heath aligns with the H21 community and a large extent of H21 is present further west in a clearing amongst mature plantation. Heather is patchy over a carpet of *Sphagnum capillifolium* (**Photo 11**). Other associates include bilberry, *Sphagnum papillosum*, *Polytrichum commune* and *Hylocomium splendens* (TN20 and TN23).
73. The new access track towards Turbine 2 will extend over M15 wet heath vegetation occurring through forestry rides.
74. New extensions to access tracks for Turbines 3 and 4 extend along west facing slopes of recently felled plantation. A succession of grassy heath extends across the route earmarked for Turbine 3(TN43). For access to Turbine 4, a mosaic of grassy heath and damp neutral tall-herb and grass vegetation prevails (TN62, TN66).

75. For Turbine 7, the access will be predominantly through coniferous plantation. In the south of the track where it joins the existing track, it will extend through a mosaic of M23 rush pasture and MG10 damp neutral grassland established over old felled woodland; then through young coniferous plantation (TN129-131).
76. The new access track associated with Turbine 8 will extend predominantly through young, semi-mature coniferous plantation. The track will cross through a relatively open forestry ride presenting M23 rush mire, with soft rush and sharp-flowered rush, marsh bedstraw, marsh thistle, tormentil and tufted hair-grass (TN137). Purple moor-grass and Yorkshire-fog become locally dominant in discrete areas. Narrow drainage tracks are visible through the young plantation, with a cover of rushes and purple moor-grass (TN138).
77. Finally, the new access to the met mast will extend predominantly through coniferous plantation. Artificial drainage ditches extend through this compartment of woodland, with a cover of rushes and *Sphagnum* mapped as M6. The new access will extend from existing forestry tracks, in proximity to Yellowtree Grain watercourse which has a mosaic of M23/MG10 vegetation.

3.2.13 Existing Access Tracks

78. Existing access tracks proposed for upgrade throughout the Developable Area at the Site are typically lined by a combination of tall herb vegetation (bracken, rosebay willowherb, foxglove), scrub (willow, bramble, raspberry), and species-rich herbaceous forbs (small flowering plants). Forbs include common bird's-foot-trefoil, tufted vetch, eyebright, white clover and selfheal (**Photo 12**).
79. Where elevated verges extend alongside existing access tracks to be upgraded, these often support dry heath reflective of larger extents of H12 at the Site (**Photo 13**).



Photo 12 – Herb-rich flora common along the fringes of existing access tracks (TNX).



Photo 13 – H12 dry heath common along sloped verges of existing access track towards Turbines 9-11.

80. An existing forestry track towards Turbine 6, subject to upgrade, extends adjacent to areas of M23 rush pasture which mosaics with damp neutral grassland over ground sloping east towards coniferous plantation; artificially created settlement ponds are also present to the east of this forestry track. To the west, M23 rush mire mosaics with areas of dense bramble with neutral associates including creeping buttercup, rushes, thistle, tufted hair-grass, birds-foot-trefoil reflective of the *W24 Rubus fruticosus-Holcus lanatus underscrub community* (TN90). Young coniferous plantation occurs at the western edges of the forestry track with grey willow in clearings at edges. W7 willow woodland is abundant with conifers interspersed, and an underlying damp neutral mire of sharp-flowered rush, marsh thistle and common nettle (TN98).
81. Where bramble intertwines bracken along the verges of an existing forestry track south of Borrow Pit 3, also fringing semi-natural broadleaved woodland (W7), this community has been mapped as *W25 Pteridium aquilinum-Rubus fruticosus underscrub*.

82. The open vegetation communities OV25 *Urtica dioica*-*Cirsium arvense* community and OV27 *Epilobium angustifolium* community also occur along existing tracks, where common nettle and rosebay willowherb form relatively small but dominant stands, respectively.
83. Phase 1 habitat points along the existing tracks from the gate at the far south of the Site, towards the existing substation in the north, are displayed on **Figure 7.2.4**. Whilst the extents of trackside habitats have not been mapped, this figure demonstrates the consistency of habitats encountered at the Site. Trackside habitats comprise lengths of soft rush dominated marshy grassland/damp neutral grassland which extend through tracts at slightly lower elevation to the tracks. Tall herb vegetation and relatively ruderal associates (including rosebay willowherb, bracken, creeping thistle, common nettle) occur amongst the marshy grassland and can form locally dominant stands in places. Scrub vegetation (including willow and broom) is also scattered throughout and can be relatively dense in parts. Semi-natural broadleaved woodland occurs at corners of mature coniferous plantation and through wider rides; willow occurs in association with birch, alder, rowan and hazel. Heath and blanket bog fringe the edge of coniferous plantation and underly plantation over wider, more extensive areas beyond the tracks. In the far south of the Site, at a lower elevation from the core Forest of Ae, the existing access track extends through grazing pasture and improved grassland.

3.2.14 Control Building

84. Felled plantation on a west-facing slope blankets the area earmarked for the control building; this is the same broad area described in relation to Turbine 4.

3.3 Summary

85. **Table 3.2** presents an overview of plant communities mapped from the NVC Survey Area. The relative conservation importance of each habitat has been inferred using the Interpretation Manual of European Union Habitats (European Commission, 2013); the Scottish Biodiversity List (Scottish Government, 2013); and the Dumfries and Galloway Local Biodiversity Action Plan (Dumfries and Galloway Biodiversity Partnership, 2009).
86. The communities encountered at the Site are common across much of the NVC Survey Area. Areas proposed for turbines and associated infrastructure extend predominantly within mature or recently felled coniferous plantation. Semi-natural habitats are restricted to riparian zones through valleys and along forestry rides, although even then are likely influenced by forestry drainage and management.
87. There are opportunities for habitat enhancement through the Proposed Development. This baseline will allow for identification of viable enhancements and ensure that changes remain in keeping with the typical assemblage of semi-natural areas.

NVC community	Relevant Annex I habitats	Relevant SBL habitats	Relevant DGLBAP habitats
Grassland			
U4 <i>Festuca ovina</i> - <i>Agrostis capillaris</i> - <i>Galium saxatile</i> grassland	-	-	Acid grasslands
U6 <i>Juncus squarrosus</i> - <i>Festuca ovina</i> grassland	-	-	Acid grasslands
MG9 <i>Holcus lanatus</i> - <i>Deschampsia cespitosa</i> grassland	-	-	Neutral grasslands
MG10 <i>Holcus lanatus</i> - <i>Juncus effusus</i> rush-pasture	-	-	Neutral grasslands

NVC community	Relevant Annex I habitats	Relevant SBL habitats	Relevant DGLBAP habitats
Heath			
H12 <i>Calluna vulgaris</i> - <i>Vaccinium myrtillus</i> heath	Areas of H12 at the Site reflect species composition which aligns with 4030 European dry heaths; 31.21 – Sub-montane <i>Vaccinium-Calluna</i> heaths. These are heaths rich in <i>Vaccinium</i> species, usually with <i>Calluna vulgaris</i> , of the northern and western British Isles.	Upland heathland	Upland heaths
H21 <i>Calluna vulgaris</i> - <i>Vaccinium myrtillus</i> - <i>Sphagnum capillifolium</i> heath	4030 European dry heaths; 31.21 – Sub-montane <i>Vaccinium-Calluna</i> heaths. Heaths rich in <i>Vaccinium</i> species, usually with <i>Calluna vulgaris</i> , of the northern and western British Isles.	Upland heathland	Upland heaths
M15 <i>Trichophorum germanicum</i> - <i>Erica tetralix</i> wet heath	4010 Northern Atlantic wet heaths with <i>Erica tetralix</i> . Humid, peaty or semi-peaty heaths, other than blanket bogs, of the Atlantic and sub-Atlantic domains with <i>Erica tetralix</i> .	Upland heathland	Upland heaths
Bog			
M19 <i>Calluna vulgaris</i> - <i>Eriophorum vaginatum</i> blanket mire	Extents of M19 mapped near proposed turbines are relatively small and therefore unlikely to align with 7130 Blanket bogs (*if active); "active" meaning still supporting a significant area of vegetation that is normally peat forming.	Blanket bog	Blanket bogs
Fen, mire and swamp			
M5 <i>Carex rostrata</i> - <i>Sphagnum squarrosum</i> mire	7140 Transition mires and quaking bogs. Oligotrophic water-land interfaces with <i>Carex rostrata</i> are included in this habitat type.	Upland flushes, fens and swamps	Fens
M6 <i>Carex echinata</i> - <i>Sphagnum recurvum</i> /auriculatum mire	-	Upland flushes, fens and swamps	Fens
M9 <i>Carex rostrata</i> - <i>Calliergon cuspidatum</i> /giganteum mire	7140 Transition mires and quaking bogs. Oligotrophic water-land interfaces with <i>Carex rostrata</i> are included in this habitat type.	Upland flushes, fens and swamps	Fens
M23 <i>Juncus effusus</i> /acutiflorus- <i>Galium palustre</i> rush-pasture	-	Upland flushes, fens and swamps	Fens
S9 <i>Carex rostrata</i> swamp	7140 Transition mires and quaking bogs. Oligotrophic water-land interfaces with <i>Carex rostrata</i> are included in this habitat type.	Upland flushes, fens and swamps	Marshes

NVC community	Relevant Annex I habitats	Relevant SBL habitats	Relevant DGLBAP habitats
S10 <i>Equisetum fluviatile</i> swamp	-	Upland flushes, fens and swamps	Marshes
Semi-natural woodland			
W7 <i>Alnus glutinosa</i> - <i>Fraxinus excelsior</i> - <i>Lysimachia nemorum</i> woodland	-	Lowland mixed deciduous woodland	Native wet woods
Tall herb and scrub			
U20 <i>Pteridium aquilinum</i> - <i>Galium saxatile</i> community	-	-	-
OV25 <i>Urtica dioica</i> - <i>Cirsium arvense</i> community.	-	-	-
OV27 <i>Epilobium angustifolium</i> community	-	-	-
W24 <i>Rubus fruticosus</i> - <i>Holcus lanatus</i> underscrub	-	-	-
W25 <i>Pteridium aquilinum</i> - <i>Rubus fruticosus</i> underscrub	-	-	-
Non-NVC			
Coniferous plantation (CP)	-	-	-
Broadleaved plantation (BP)	-	-	-
Felled plantation (FP)	-	-	-

Table 3.2 - Summary of NVC communities

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Appendix A – Figures

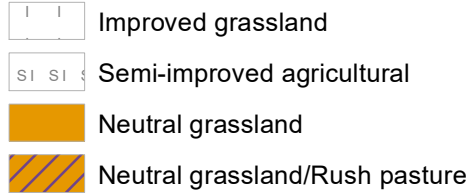
- Figure 7.2.1 – Broad Habitat Map (SWSEIC)
- Figure 7.2.2 – Notable Plant Species Records (SWSEIC)
- Figure 7.2.3 – National Vegetation Classification Baseline
- Figure 7.2.4 – Existing Access Trackside Phase 1 Habitats

Figure 7.2.1 - Broad Habitats Map

Legend

Habitat Types

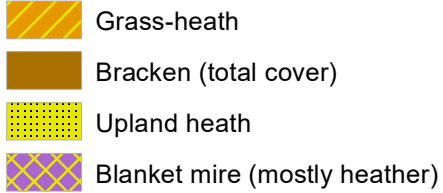
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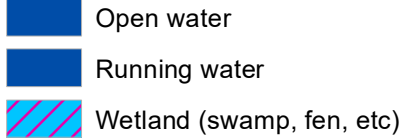
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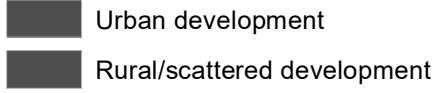
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Wetlands



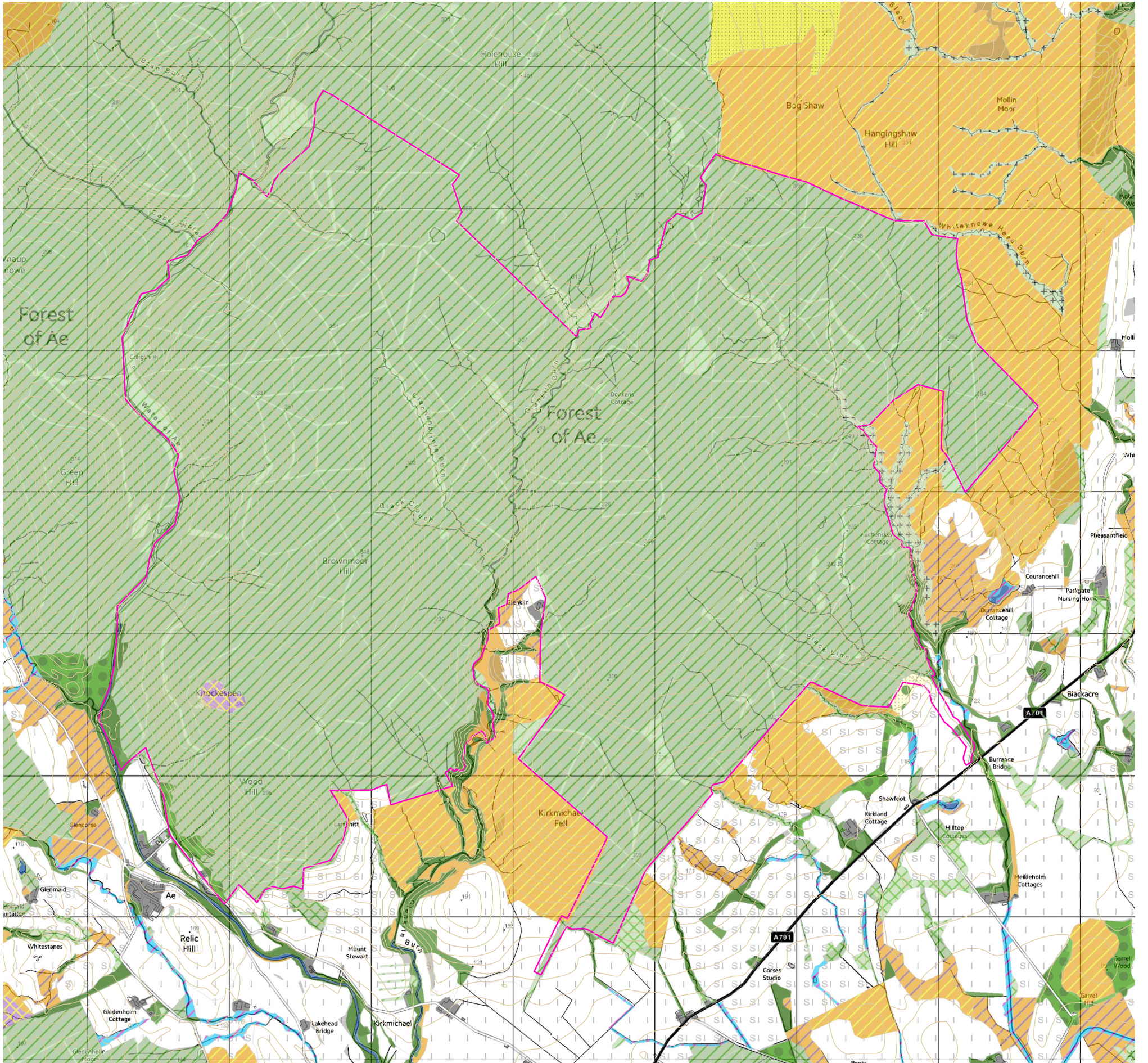
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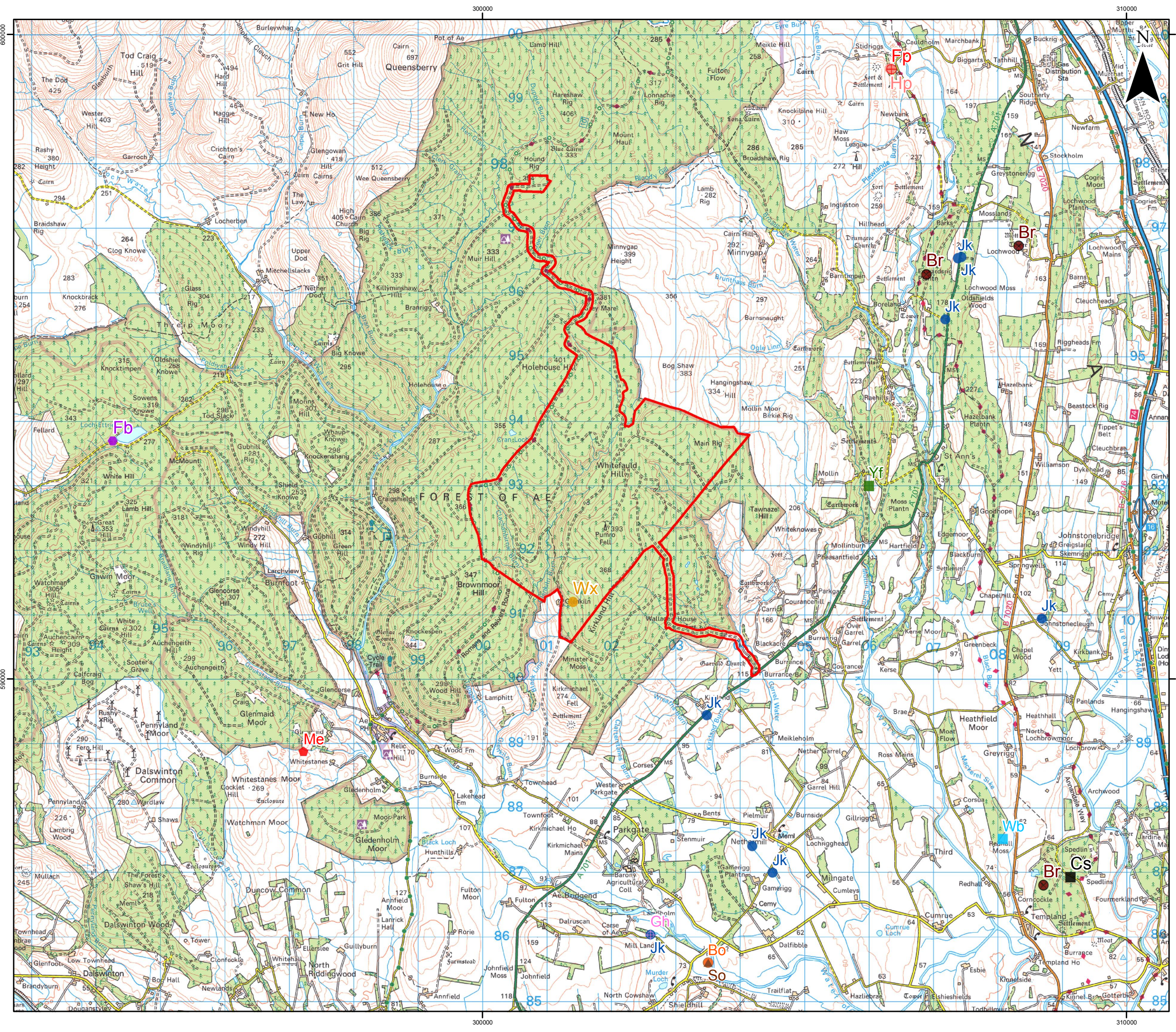


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South West Scotland
Environmental
Information
Centre





Legend

Application Boundary


Notable Plant Species

- Bog-rosemary
- Broad-leaved Osier
- Common Stork's-bill
- Floating Bur-reed
- ⊕ Fool's Parsley
- Giant Hogweed
- Heath Pearlwort
- Japanese Knotweed
- ◆ Mountain Everlasting
- ▲ Silky-leaved Osier
- White Beak-sedge
- Willow
- Yellowish Fork-moss

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0 1.5 3 Km

Rev	Date	By	Comment
A	01/10/2020	MS	First Issue.



Harestanes South Windfarm Extension

Figure 7.2.2 - Notable Plant Species Records

Drg No	HARESTANES_WSP_I_038
Rev	A
Date	16/11/2020
Scale	1:55,000 @ A3