Denny to Wishaw Network Upgrade

Environmental Impact Assessment Report

Volume 3 Appendices

Appendix 8.1 Overhead Lines Habitat Results

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Volume 3, Appendix 8.1 Overhead Lines Habitat Results

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Appendix 8.1

1 Introduction

This appendix accompanies Volume 1, Chapter 8 of the Environmental Impact Assessment Report (EIA Report). It describes in detail the baseline condition of habitats in the Zone of Influence (ZoI) of the New Build Overhead Line ("WB"), AA Route Undergrounding ("AA") and CB Route Removal ("CB") components of the 'Project' and Uprated Overhead Lines ("XX , XR and ZG) (as described in Volume 1, Chapter 4)[1].

This appendix is supported by the following figures located within Volume 2: Figures:

- Figure 8.3: Phase 1 Habitat Survey Results,
- Figure 8.4: Priority and Notable Habitats and Invasive Non-Native Species Survey Results; and
- Figure 8.5: Potential Groundwater Dependent Terrestrial Ecosystems.

Relevant legislation and national planning policy pertaining to habitats is discussed in Chapter 8 Biodiversity.

Note that the details with respect to the habitats associated with the substations are provided in Chapter 8 due to the limited extend of the habitats associated with the works at these locations.

2 Methods

Desk study methods and ZoI used are described in Chapter 8 Biodiversity.

Field Survey

The Phase 1 habitat survey was carried out following the standard method described by the Joint Nature Conservation Committee (JNCC)[2], by which areas of land are assigned to habitat types and ecological 'target notes' are recorded. The habitat survey was carried out of the Sites, plus a minimum 50m buffer where access was possible and safe. Details on the survey areas used for each component are provided in Chapter 8 Biodiversity.

Habitats were also classified according to the UK Habitat Classification (UKHab) system[3] and habitat condition assessment was undertaken in line with the statutory biodiversity metric[4], to provide the information required to support the Biodiversity Net Gain (BNG) assessment.

Notes were made for each habitat which reflect conditions at the time of survey; and relevant ecological characteristics were documented. Typical and important/notable plants were recorded using the DAFOR (D=dominant; A=abundant; F=frequent; O=occasional; R=rare) scale, including any occurrence of invasive non-native species (INNS) of plant.

In all areas of habitat identified by the initial habitat survey as being notable (e.g. Annex I habitats, habitats listed on Scottish Biodiversity List (SBL)[5]) or potential Groundwater

[1] The habitats methods and results for other components of the project are detailed separately in Appendix 8.13 for the Cumbernauld Substation Extension, and within the main chapter for the other components.
[2] JNCC (2010). *Handbook for Phase 1 Habitat Survey – a Technique for Environmental Audit.* Joint Nature Conservation Committee, Peterborough.
[3] UKHab Ltd (2023). *UK Habitat Classification Version 2.0.* Available at: https://www.ukhab.org/
[4] DEFRA (2023). *Statutory biodiversity metric tools and guides*. November 2023. Available at: Statutory biodiversity metric tools and guides - GOV.UK
[5] As per the SBL definitions prior to a NatureScot update on 19 December 2025. Available: Scottish Biodiversity List | NatureScot

Dependent Terrestrial Ecosystems (GWDTE) a National Vegetation Classification (NVC) survey was carried out following published guidelines[6,7]. The survey buffer was extended to a maximum of 250m (details on the survey areas used for each component are provided in Chapter 8 Biodiversity) for wetland vegetation that had potential to be dependent on groundwater. Non-NVC types which include 'Ja', 'Je' and Mx' are described in Averis, 2015[8].

Throughout this appendix, species are given their common and scientific names when first referred to and their common names only thereafter. All distances are cited as the shortest distance 'as the crow flies', unless otherwise specified. Locations are given as Ordnance Survey Grid References (OSGR).

The majority of habitat surveys took place from June 2025 to September 2025, with additional surveys conducted until January 2026 to accommodate for design changes.

Limitations and Assumptions

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 the Geographic Information System (GIS). Otherwise, habitat edges are best estimates as judged in the field. Note also that habitat transitions can be gradual without sharp boundaries.

The vast majority of surveys were conducted during the optimal time of year for habitat surveys. NVC surveys for notable habitats were carried out during the peak of the flowering season, from June to the end of September. In some instances, fieldwork was conducted at a sub-optimal time of year, when floristic species-richness would have been under-recorded. However, this is considered to be a minor limitation only, since sufficient indicator species were visible at all times such that all habitats could be accurately assigned a broad habitat type and/or an NVC community.

Access was severely restricted due to lack of landowner permission from tower CB027 to CB029 (which includes CB-B04 and AA010). From inspection of aerial photography and surveying from a distance from adjacent land, the vast majority of the habitats in the area of restricted access are species-poor arable fields, with little to no importance to nature conservation. Woodlands in this area, including much of Drum Wood, are listed on the Ancient Woodland Inventory (AWI), and are part of a continuous block of long-established woodland of plantation origin (LEPO), other parts of which were surveyed in adjacent land. These woodlands appear to be homogeneous with each other, based on inspection of aerial photography. It can therefore be assumed, with a reasonable level of confidence, that the AWI woodlands in the non-accessed area are similar in character and species composition to the other parts of the same woodland block that were seen closely. For this assessment, where there was more than one habitat type option for habitats within areas of restricted

[6] SEPA (2014). Guidance on Assessing the Impacts of Windfarm Development Proposals on Groundwater Abstractions and Groundwater Dependent. Version 2. October 2014. Available at: https://www.sepa.org.uk/media/143868/lupsgu31_planning_guidance_on_groundwater_abstractions.pdf Terrestrial Ecosystems

[7] SEPA (2024). *Guidance on Assessing the Impacts of Developments on Groundwater Dependent Terrestrial Ecosystems*. August 2024. Available at: guidance-on-assessing-the-impacts-of-developments-on-groundwater-dependent-terrestrial-ecosystems.docx

[8] Averis, B. and Averis, A. (2015). Plant Communities Found In Surveys By Ben And Alison Averis But Not Described In The UK National Vegetation Classification. Unpublished document.

access that were not closely inspected, on a precautionary basis the higher quality type is assumed. This is not considered a significant limitation because these woodland patches would be overvalued rather than undervalued in the assessment.

Lack of access to other areas (shown on Figure 8.3) was not considered a limitation because these areas were generally private gardens or built-up areas industrial areas. The habitats within these areas can reliably be assumed to be artificial and of low value for biodiversity. Where areas of higher value habitats (e.g. woodland) were not accessed, this was along existing access tracks, and no loss of this habitat is anticipated.

3 Baseline Conditions

Habitats across the WB, AA and CB route

Habitats recorded during field survey are shown on Figure 8.3: Phase 1 Habitat Survey Results and important / notable habitats are highlighted on Figure 8.4: Figure 8.4: Priority and Notable Habitats and Invasive Non-Native Species. The recorded habitats are described below under headings corresponding to Phase 1 Habitat Survey definitions. NVC codes are provided for notable habitats only and are labelled on Figure 8.4. Where applicable, habitats listed on **Annex I of the Habitats Directive** are shown in bold and are underlined and SBL priority habitats[5] are underlined. For brevity, in the below text generally only the Annex I habitat codes are given – the full names of those recorded are as follows: **H4010 Northern Atlantic wet heaths with *Erica tetralix***, **H4030 European dry heaths**, **H7130 Blanket bog**, **H7120 Degraded raised bogs still capable of natural regeneration**, and **H7140 Transition mires and quaking bogs**.

The entire Study Area is considered to be in a climatically lowland[9] location. For the purposes of this appendix, in order to better describe locations, the Study Area is divided into three sections, referenced as the following:

- northern – (WB059 (Bonnybridge Substation) to WB038 (north of Beam Road, South Drum Clay Pits Wildlife Site (WS)) of the WB route, CB039 (Bonnybridge Substation) to CB022 (immediately south of Beam Road) of the CB Route, plus the entirety of the AA Route) – this section ranges from approximately 10m above sea level (ASL) at Bonnybridge and Falkirk in the northern extreme, to 120m ASL at South Drum Clay Pits Wildlife Site (WS) south of High Bonnybridge;
- central – (WB038 (north of Beam Road, South Drum Clay Pits WS) to WB021(Cumbernauld Substation) of the WB route and CB022 (immediately south of Beam Road) to CB001(Cumbernauld Substation) of the CB route) – the land south of Skipperton Burn up to (but not including) Palacerigg Country Park (West) Site of Importance to Nature Conservation (SINC) near Cumbernauld; this section ranges from approximately 120m to 170m ASL;
- southern – (WB021(Cumbernauld Substation) to WB001 (Glenmavis)) – extending from and include Palacerigg Country Park West SINC to the extreme south of the WB route, terminating at Glenmavis; this section ranges from approximately 160m to 180m ASL.

[9] In accordance with Bunce, R.G.H., Wood, C.M. and Smart, S.M. (2018) 'The ecology of British upland landscapes. I. Composition of landscapes, habitats, vegetation and species', *Journal of Landscape Ecology*, 11(3), pp. 120-135.

The northern section is characterised by agricultural fields, with blocks and parcels of notable woodland, including some listed on the AWI, with some areas of peatland habitats and wetlands. Woodlands are common and include Lowland Mixed Deciduous Woodland (LMDW), associated with Roughcastle Wildlife Site (WS) (also listed on the AWI as LEPO) and with Tippetcraig WS. Wet Woodland is also present, e.g. on the Rowan Tree Burn. Scattered trees, scrub habitats, Hedgerow and non-notable hedgerows are frequent in the northern section. Degraded Lowland Raised Bog (**H7120**) is present within South Drum Claypit WS and Wester Drum WS. Acid grassland, both unimproved and semi-improved, is found in isolated patches, the largest within South Drum Claypit WS. Lowland Fen occurs largely within largely within Wester Drum WS and South Drum Claypit WS, but also Roughcastle WS and rarely elsewhere.

Watercourses in the north include sizable watercourses such as the Rowan Tree Burn as well as minor ditches and small streams. Standing water habitats include Ponds in Wester Drum WS and South Drum Claypit WS. North of the Forth and Clyde Canal, is dominated by arable fields.

The central section is dominated by peatland habitats, with occasional blocks of coniferous plantation woodland. Woodland habitats also include some infrequent LMDW in blocks and parcels associated with Wester Drum WS and Forest Woods SINC. Wet Woodland is infrequent, including fragments within Forest Wood Scottish Wildlife Trust (SWT) Reserve and Forest Woods SINC. Blanket Bog (**H7130**), which is largely degraded save for one intact area (located within Graystone Knowe WS), is present in large swathes across Graystone Knowe WS, East Fannyside Muir SINC, West Fannyside Moor SINC, Forest Wood SWT Reserve, Forest Woods SINC and Bruntrigg Moor (Palacerigg) SINC. Lowland Heathland (**H4010** and **H4030**) occurs in localised areas, such as within Forest Woods SINC and Graystone Knowe WS. Marshy grassland includes Purple Moor-grass and Rush Pastures (PMRP) and Lowland Fen within and near Graystone Knowe WS and Bruntrigg Moor (Palacerigg) WS. Grasslands are widespread, with semi-improved neutral grassland common, including damp, species-poor grazing pastures.

Watercourses include moderately-sized named watercourses, such as the Walton Burn, and small watercourses (such as the Skipperton Burn) and wet ditches. Standing water habitats include eutrophic water bodies and Ponds within Forest Woods SWT Reserve.

The southern section is characterised by agricultural fields, with blocks and parcels of notable woodland, including some listed on the AWI, with some areas of peatland habitats and wetlands. LMDW is present within Palacerigg Country Park, Luggie Water: Glenhove-Jockey's Well, Cleuch and Cameron Burn: Cameron Glen SINCs. Wet Woodland is present in parcels and blocks, particularly within and near Palacerigg Country Park, Riggend and Glenmavis. Mixed woodlands, both semi-natural and plantation occur, which have poor structure and/or a poor ground flora within Palacerigg Country Park SINC. Scattered trees, scrub habitats and Hedgerow and non-notable hedgerows are common in the southern section. Lowland Raised Bog (**H7120**) is present within and adjacent to Cullochrigg SINC, northeast of Riggend. Lowland Heathland (**H4010** and **H4030**) occurs in scattered areas, particularly within Cullochrigg SINC. Marshy grassland, including PMRP and Lowland Fen occurs in highly localised areas, such as within Cleuch SINC and Cameron Burn: Cameron Glen SINC. Semi-improved neutral grassland is common, and includes damp, grazing pastures, along with cultivated land and improved grassland.

Watercourses in the south include sizable watercourses such as the Luggie Water and Cameron Burn, but many are small and highly modified. Standing water habitats include Ponds within Cameron Glen SINC.

The habitats within the entire Study Area as a whole are described in detail in the following paragraphs.

Woodland

Ancient Woodland and Ancient Trees

Woodland listed on the AWI within 1km of the Sites are outlined below and shown on Figure 8.2 Ancient Woodland, Peatland and Watercourses. Detailed descriptions of woodlands listed on the AWI within the habitat survey area are provided below.

Within 1km of the Sites there are 46 areas of AWI woodland, of which 22 are ancient semi-natural woodland (ASNW), 24 are LEPO and two are identified on the Roy map[10]. Two areas listed in the AWI as ASNW and seven as LEPO will be crossed by the proposed overhead line (i.e. will incur some loss within the proposed overhead line corridor). These are:

- between towers WB016-WB017 – ASNW associated with the Luggie Water Glenhove-Jockey's Well SINC. These are a mosaic of notable woodlands, non-notable plantation and scrub. Wet Woodland is present, and dominated by several willow species *Salix* spp., with hazel *Corylus avellana*, alder *Alnus glutinosa* and ash *Fraxinus excelsior,* with a herb-rich ground flora, including water avens *Geum rivale*, meadowsweet *Filipendula ulmaria*, valerian *Valeriana officinalis* and angelica *Angelica sylvestris*. LMDW is also present, characterised by a canopy locally dominated by beech *Fagus sylvatica*, with frequent sessile oak *Quercus petraea* and downy birch *Betula pubescens*; the ground flora is moderately diverse, largely comprising ferns, grasses and mosses. Present elsewhere within this area are non-notable / species-poor plantations dominated by beech, and dense gorse *Ulex europaeus* scrub;
- between towers WB053-WB052 – LEPO associated with Roughcastle WS. Comprised of LMDW dominated by a mix of birch species *Betula* spp., with abundant blaeberry *Vaccinium myrtillus* and ferns, with non-notable habitats dominated by bracken *Pteridium aquilinum*, or species-poor birch-dominated woodland and scrub;
- between towers AA002-AA003 (CB036) – LEPO associated with Roughcastle WS. Comprised of Wet Woodland dominated by downy birch over a grassy ground flora with soft-rush *Juncus effusus*; also mixed plantation of Scots pine *Pinus sylvestris* and larch *Larix decidua* on peaty soils, with birch regeneration in wind-throw gaps. Dense scrub of gorse and bramble *Rubus fruticosus* agg. is frequent in patches, plus one area of continuous bracken. Open habitats include acid grassland, Lowland Fen, non-notable and species-poor marshy grassland, neutral and acid semi-improved grasslands;
- adjacent to tower WB052 – LEPO associated with Roughcastle WS. Comprised of LMDW, Lowland Heathland (***H4010***) and areas of hardstanding access tracks. The LMDW includes broadleaved woodland dominated by silver birch *Betula pendula* with abundant rowan *Sorbus aucuparia*, frequent beech, and occasional pedunculate oak *Quercus*

[10] Terminology for ancient woodland classification is taken from NatureScots Guide to Understanding the Scottish AWI - https://www.nature.scot/doc/guide-understanding-scottish-ancient-woodland-inventory-awi

robur and larch. The ground flora features acid and neutral grasses, ferns and mosses. The Lowland Heathland (***H4010***) is dominated by heather *Calluna vulgaris* and blaeberry, with various mosses;

- near towers WB051-WB050 – LEPO associated with Roughcastle WS. Comprised of LMWD, Wet Woodland and non-notable habitats. The LMDW is dominated by birch, with abundant rowan, frequent oak, and sycamore *Acer pseudoplatanus*, with neutral grasses, ferns, bramble and bracken. The Wet Woodland has a canopy of grey willow *Salix cinerea*, with pedunculate oak and beech saplings, and a shrub layer of bramble and gorse. The ground layer has neutral grasses, soft-rush, ferns, common nettle *Urtica dioica*, creeping buttercup *Ranunculus repens*, and broad-leaved helleborine *Epipactis helleborine*. Other habitats include semi-improved neutral grassland, as well as areas of dense bracken and hardstanding tracks;
- between towers WB047-WB048-WB049 – LEPO not associated with an LNCS. Mostly mixed plantation with some LMDW, semi-improved neutral grassland, dense willow / gorse scrub and hardstanding. The LMDW has a mix of birch, pedunculate oak, Sitka spruce *Picea sitchensis*, with occasional alder and willow *Salix* spp., and a ground flora of bramble, grasses and ferns. The plantations have a greater abundance of Sitka spruce and a poorer ground flora with a deep leaf litter layer;
- between towers WB045-WB046 – LEPO not associated with an LNCS. Comprised of mixed plantation, dense birch / willow scrub and Wet Woodland. The Wet Woodland is adjacent to the Rowan Tree Burn and is dominated by grey willow and downy birch, with a ground layer of tufted hair-grass *Deschampsia cespitosa*, water avens, mosses and ferns. The mixed plantation has Scots pine as the dominant species, with Sitka spruce and various infrequent broadleaved species; the ground flora is sparse, consisting mainly of needle litter, with ferns and grasses;
- within tower compound CB028 and near CB027-CB024 – LEPO. Includes a small fragment of Wet Woodland dominated by downy birch over purple moor-grass *Molina caerulea* near to CB026, but is mostly Scots pine plantation, with occasional downy birch and Sitka spruce on blaeberry, bracken and pleurocarpous mosses. Open habitats include degraded Blanket Bog (**H7130**) and semi-improved neutral grassland. Note that the area around CB027 to CB28 was not surveyed (see limitations above). However, the woodland appears likely to be Scots pine plantation woodland (likely the same as similar woodland nearby), with Wet Woodland (or possibly dense scrub) dominated by birch / willow species nearer to CB028 (likely maintained by periodic felling within the CB overhead line corridor), and species-poor agricultural land;
- between towers WB023-WB024 (CB007-CB005) – LEPO associated with Forest Woods SINC. The area has no wooded habitats and is almost entirely degraded Blanket Bog (**H7130**) heavily modified by burning and drainage. There is also a small oligotrophic pond; and,
- between towers WB021-WB021A (CB004-CB002) – LEPO associated with Bruntrigg Moor SINC, Glencryan Woods SINC, Palacerigg Country Park (West) SINC, Forest Wood SWT Reserve and Forest Woods SINC. Comprises mixed plantation, degraded Blanket Bog (**H7130**)**,** dense bracken, and Wet Woodland dominated by downy birch and rowan on

damp, acidic ground with purple moor-grass, blaeberry and acid mosses. There is also a non-native conifer plantation of larch, lodgepole pine *Pinus contorta*, and Sitka spruce, and an area of self-seeded birch.

One tree listed on the Ancient Tree Inventory lies within the overhead line corridor and would be felled to accommodate the Project. This tree is between towers WB051-WB052 at OSGR NS 84900 80010, within Roughcastle WS. It is a large beech tree, which is not particularly remarkable and was not identified as possessing features suitable for roosting bats in ecology surveys.

Semi-natural woodland

Broadleaved semi-natural woodlands within the Study Area comprise three types: LMDW, Wet Woodland and other semi-natural broadleaved woodland types that are not of sufficient quality to be considered as priority woodland types.

The locations of LMDW are listed below.

In the northern section:

- WB057-WB056, CB038-CB037 and AA001CSE-AA002 – between Bonnybridge Substation and the Forth and Clyde Canal WS, along the Rowan Tree Burn;
- WB053-WB049, CB037-CB034 and AA001-AA005 – within and between the Forth and Clyde Canal WS and the B816 road, associated with the Roughcastle WS (in part listed as LEPO);
- WB050 and WB047 – Howierig Wood (in part listed as LEPO);
- CB023-CB022 – small parcels within Tippetcraig WS;
- WB043-WB042 – within and adjacent to Wester Drum WS;

In the central section:

- None within or immediately adjacent to the Site;

In the southern section:

- WB021-WB020 – a small parcel within Palacerigg Country Park (West) SINC;
- WB017-WB016 – within Luggie Water: Glenhove -Jockey's Well SINC (in part listed as ASNW on the AWI);
- WB013-WB011 – within and adjacent to Cleuch SINC; and,
- WB008-WB006 – within and adjacent to Cameron Burn: Cameron Glen SINC.

LMDW corresponds to the following types:

- Dry, neutral woodlands of the NVC types W10-*Pteridium aquilinum-Rubus fruticosus* woodland and W10a typical sub-community with woody species which include silver birch, downy birch, sycamore, pedunculate oak, rowan and hawthorn *Crataegus monogyna*. The ground flora is of neutral grasses including Yorkshire-fog *Holcus lanatus*, creeping soft-grass *Holcus mollis*, cock's-foot *Dactylis glomerata*, and rough meadow-grass *Poa trivialis*. Ferns such as broad buckler-fern *Dryopteris dilatata* and male-fern *Dryopteris filix-mas*, along with bracken and bramble. Other frequent plants include common nettle, cleavers *Galium aparine* and wood sorrel *Oxalis acetosella*;

- Dry, acid woodlands of the NVC types W16 *Quercus spp.-Betula spp.-Avenella flexuosa* woodland, W16a sub-community, dominated by silver birch and downy birch with pedunculate oak, sessile oak and rowan, and, in some areas, beech (a species outside of its natural range here). Ground flora includes blaeberry, wavy hair-grass *Avenella flexuosa*, broad buckler-fern and hard-fern *Blechnum spicant*; and,
- Dry, neutral to acid woodlands that do not easily fit into an NVC type, but have a diverse mix of woody species (as listed above), but are most commonly dominated by birch species or beech. The ground flora is species-poor and often covered in a deep layer of leaf litter.

Non-notable dry woodlands occur that do not fit into an NVC type and do not have a varied canopy, but still are defined as "semi-natural", such as within Shank Burn East SINC. These include woodlands dominated by immature birch species or by mature beech, with minor canopy components of rowan, grey willow and immature oak species forming a sparse understorey. The ground flora is species-poor, with neutral grasses, ferns and mosses, often with a deep leaf litter layer. Some such woodlands show signs of disturbance, such as grazing, drainage, or quarrying.

Wet Woodland occurs throughout the Study Area, mostly as localised copses and also as more extensive parcels and blocks. The locations in which Wet Woodland is principally located are listed below.

In the northern section:

- near WB052, CB037-CB032 and AA001-AA006CSE – associated with Roughcastle WS and associated with the Rowan Tree Burn (in part listed as LEPO);
- WB046-WB044 – Drum Wood (in part listed as LEPO);
- within Wester Drum WS and South Drum Claypit WS;

In the central section:

- WB031-WB030 and CB015-CB014 – a small copse on the boundary of Graystone Knowe WS, along the Walton Burn;
- WB030-WB025 and CB014-CB008 – scattered parcels;
- WB024-WB021 and CB007-CB002 – fragments / parcels within Forest Wood SWT Reserve and Forest Woods SINC (some listed as LEPO);

In the southern section:

- WB022-WB019 – within Palacerigg Country Park (West) SINC;
- WB017-WB016 – within Luggie Water: Glenhove-Jockey's Well SINC (listed as ASNW);
- WB013-WB012 – within Cleuch SINC;
- WB009-WB007 – patches within Brackenknowe Plantation and along the Cameron Burn; and,
- WB007-WB004 –extensive blocks associated with Whinrigg SINC and Cullochrigg SINC.

Wet Woodland corresponds to the following NVC types:

- Neutral to moderately base-rich Wet Woodland of the NVC types W7 *Alnus glutinosa-Fraxinus excelsior-Lysimachia nemorum* woodland. In examples fitting W7a *Urtica dioica* sub-community, woody species include grey willow, eared willow *Salix aurita*, and goat willow *Salix caprea*, with white willow *Salix alba* and downy birch. The ground flora has frequent tufted hair-grass and Yorkshire-fog with soft-rush, various ferns and mosses, with neutral wetland herbs such as water avens, meadowsweet, valerian, angelica and marsh violet *Viola palustris*. Examples fitting the W7b *Carex remota-Cirsium palustre* sub-community consist of grey willow, eared willow, goat willow *Salix caprea*, hazel, alder and ash, with a herb-rich ground flora of dog's-mercury *Mercurialis perennis*, water avens, hedge woundwort *Stachys sylvatica*, lady-fern *Athyrium filix-femina,* meadowsweet, valerian, angelica, and patches of reed canary-grass *Phalaris arundinacea* and mosses such as *Polytrichastrum formosum* and *Kindbergia praelonga*. On the wettest slopes and flushed areas, other species include soft-rush, hard rush *Juncus inflexus*, brooklime *Veronica beccabunga,* bottle-sedge *Carex rostrata* and *Sphagnum squarrosum*. W7c *Deschampsia cespitosa* sub-community types were relatively species-poor with a ground flora dominated by tufted hair-grass and occasionally showing signs of elevated nutrient enrichment with more frequently occurring nitrophilous species such as common nettle and creeping buttercup. Some W7 / W7c types surveyed are so species poor they are not considered SBL priority habitat;
- Acid Wet Woodland types are represented by the NVC types W4 *Betula pubescens-Molinia caerulea* woodland, W4b-*Juncus effusus* sub-community and W4c-*Sphagnum* spp. sub-community. Woody species include downy birch and rowan with grey willow and oak. The ground flora has purple moor-grass, soft-rush, and tufted hair-grass. The wettest examples (W4c) include species such as *Sphagnum fallax*, common sedge *Carex nigra* and cross-leaved heath *Erica tetralix*. Some parcels show signs of enrichment with an increased abundance of nitrophilous species; and,
- Wet Woodland of the NVC type W1 *Salix cinerea-Galium palustre* woodland, dominated by mature grey willow, with downy birch and a ground flora including soft-rush, neutral grasses, various mosses and little to no wetland herbs. W1 types are also described below under "Scrub – dense / continuous" where less than 5m tall, and are considered to be Wet Woodland. Other scrubby types have a loose association with W1, but possess a poor ground flora and are not considered to be and have not been classed as SBL priority habitat.

The above semi-natural woodlands are of higher ecological note since they are considered to constitute priority SBL woodland types. Of most note is the semi-natural LMDW and Wet Woodland in Luggie Water: Glenhove-Jockey's Well SINC since this coincides with a parcel of ASNW listed in the AWI.

A single block of Mixed woodland is considered to be semi-natural, with self-seeded broadleaved species but a high proportion of Sitka spruce (around 25%), is present within Cameron Burn: Cameron Glen SINC, adjacent to access to WB011. The ground flora includes ruderal species such as rosebay willow-herb *Epilobium angustifolium* with broad buckler-fern, common nettle and bramble. The woodland does not qualify as LWDW because the canopy has a high proportion of non-native conifer and the ground flora does not fit into an NVC type.

Plantation woodland

Broadleaved plantations occur throughout the Study Area, in similar locations to those described above for semi-natural woodland.

In the northern section:

- WB053-WB047, CB036-CB031 and AA002-AA0009CSE – numerous small patches associated with Roughcastle WS and the wider area of the Rowan Tree Burn (in part listed as LEPO);
- WB046-WB043 – strips of woodland off Beam Road (in part listed as LEPO);
- WB040-WB039 – a small strip in South Drum Claypit WS;

In the central section:

- WB037-WB028, CB022-CB012 – several fragmented parcels, mostly associated with conifer plantations, some within Graystone Knowe WS;

In the southern section:

- WB021-WB019 – within Palacerigg Country Park (West) SINC;
- WB021-WB021A – within Glencryan Woods SINC;
- WB017-WB015 – within and adjacent to the Luggie Water: Glenhove-Jockey's Well SINC (in part listed as ASNW);
- WB014-WB013 – within Cleuch SINC;
- WB021-WB008 – several scattered parcels and blocks, some in Cameron Burn: Staylee Glen SINC;
- WB004-WB002 – a patch adjacent to Brackenhirst Road.

This woodland type was found in this case to be generally nutrient-enriched with poor structural diversity. The canopy is most commonly dominated by non-native sycamore or beech. There is little to no shrub layer, and the ground flora is dominated by species such as cock's-foot and common nettle, with frequent cleavers. More rarely-occurring species include red campion *Silene dioica* and herb-robert *Geranium robertianum*. Some areas mimic NVC types W4, W7 (referred to as 'W7 poor') and W7c, but have low levels of naturalness, and are non-notable and clearly of plantation origin.

Blocks of mixed plantation are present in the north and south of the Study Area. In the northern section, these are associated with Roughcastle WS (some listed as LEPO). One small mixed plantation lies within Forest Wood SWT Reserve/Forest Woods SINC/Glencryan Woods SINC (listed as LEPO). There are several large mixed plantations within Palacerigg Country Park (West) SINC. Other blocks and a fragmented parcel occur near Riggend and Glenmavis. These are dominated by larch and pine species *Pinus* spp., with a dense shrub layer of self-seeded birch species; occasional canopy trees include rowan, sycamore, and mature oak. The ground flora is species-poor, comprising scattered bracken, broad buckler-fern, patches of purple moor-grass and carpets of pleurocarpous mosses. Some areas mimic NVC types W7 (referred to as 'W7 poor') and W7c – but have low levels of naturalness, are non-notable and clearly of plantation origin. These mixed plantations are of limited ecological note.

Blocks of coniferous plantation occur throughout the Study Area. The vast majority is dominated by Sitka spruce, with few other species, and a typical very poor ground flora, and locally on edges, broadleaved trees such as downy birch and rowan. Coniferous plantation near Forest Wood SWT Reserve has a canopy of Scots pine over a degraded bog-like ground flora of heather, blaeberry, hair's-tail cotton-grass, *Sphagnum fallax* and *Polytrichum commune*. It has similarities to NVC type W18 *Hylocomium splendens* woodland, but it is even-aged and obviously planted, and Scots pine is not native in this region. Some other stands dominated by Scots pine have a sparse ground flora and a weak affinity to W18. None of these woodlands are natural forms of W18, and were not assigned an NVC type. Felled coniferous woodland with woody debris and scattered patches of grasses were recorded northeast of Riggend – these are likely to be quickly replanted with conifers. A Scots pine plantation near Forest Wood SWT Reserve possesses heathy flora and is of moderate note, but otherwise the conifer plantations are of poor quality.

Scrub, Hedgerows and Tree lines

Dense scrub corresponding to NVC type W1 and notable SBL habitat Wet Woodland is present within South Drum Claypit WS and along the Cameron Burn. Non-notable scrub is scattered throughout the Study Area, variably dominated by hawthorn, willow *Salix* spp. and gorse, with frequent bramble and dog rose *Rosa canina*. The ground flora is often sparse but includes common nettle, tufted hair-grass and occasionally bracken. Scattered scrub is common throughout the Study Area, mostly commonly hawthorn, occasionally birch species and willow.

Hedgerows are a common feature of field boundaries within the northern and southern sections of the Study Area, and range from well-managed and intact to defunct and unmanaged kinds, with varying levels of species-richness and structural integrity. Hedgerows with four native woody shrub species (or more, i.e. species-rich) are priority Hedgerows. Intact native species-rich hedges, which are infrequent, include hawthorn, elder *Sambucus nigra*, rowan, several willow species *Salix spp.*, hazel and gorse; however, many have poor structure as a result of being flailed, and show signs of enrichment from adjacent fields, with a ground layer akin to semi-improved neutral grassland.

Species-poor hedges are the dominant type. Intact forms are dominated by hawthorn, occasionally with dog rose, hazel, or sycamore, and are generally younger or recently planted. Defunct species-poor hedges, often with large gaps, are typically dominated by hawthorn, with a sparse scattering of other species elder, silver birch, oak species *Quercus spp.,* beech and bramble. Some are heavily trampled, with neutral grasses and common nettle as the ground layer. Standard trees within hedges include semi-mature to mature ash, oak, and beech, alongside hawthorn and bramble.

Lines of semi-mature to mature broadleaved and coniferous trees are common within the northern and southern sections of the Study Area. Broadleaved species including beech, silver birch, oak *Quercus* spp., ash, sycamore, rowan and hawthorn, with willow *Salix spp.,* alder and downy birch are associated with riverbanks. Scattered coniferous trees include species such as larch, Scots pine and Sitka spruce. Scattered trees of the species above are most frequent in the north of the Study Area and localised elsewhere.

Bog

Blanket sphagnum bog

Intact Blanket Bog (**H7130**†)[11] of NVC type M17a *Trichophorum germanicum-Eriophorum vaginatum* blanket mire, *Drosera rotundifolia-Sphagnum* spp. sub-community, occurs in an expanse of moorland north of the Walton Burn, within Graystone Knowe WS. It is the best quality bog within the entire Study Area and the only example considered to be priority blanket bog, with little sign of modification and intact hydrological conditions to support active peat formation. It is dominated by hare's-tail cotton-grass *Eriophorum vaginatum*, with frequent heather, cross-leaved heath, purple moor-grass and *Sphagnum papillosum*, and occasional *Sphagnum fallax* and *Sphagnum cuspidatum* (the latter a clear indicator of wetness). Some areas also possess M18a *Erica tetralix-Sphagnum papillosum* blanket mire *Sphagnum medium-Andromeda polifolia* sub-community with *Sphagnum medium*, common cotton-grass *Eriophorum angustifolium*, bog asphodel *Narthecium ossifragum*, round-leaved sundew *Drosera rotundifolia*, bog cranberry *Vaccinium oxycoccos* and star-sedge *Carex echinata*.

Wet modified bog, including degraded raised sphagnum bog

Wet modified bog that is degraded Lowland Raised Bog (**H7120**) occurs within Wester Drum WS and South Drum Claypit WS in the northern section, and in Cullochrigg SINC in the southern section. Degraded Blanket Bog (**H7130**, non-priority) is present in one location in the north of the Study Area - within tower compound CB026). In the central area, it is present as a large expanse in an approximately 5km stretch of moorland within the central section of the Study Area. The latter includes Greystone Knowe WS, East Fannyside Muir WS, West Fannyside Moor WS, Bruntrigg Moor (Palacerigg) SINC, Forest Woods SINC and Forest Wood SWT Reserve. These bogs share species with bog of good quality (see previous section) but have (at best) moderate abundances of bog-building *Sphagna*, and in some cases little to no sphagnum species at all. The sphagnum species are also almost entirely restricted to types associated with drier bogs, such as *Sphagnum capillifolium* and *Sphagnum fallax*. Purple moor-grass is often present and sometimes abundant.

All these bogs have been significantly impacted by drainage, overgrazing and/or burning. They include the NVC community M17 in relatively wet areas, M19 *Calluna vulgaris-Eriophorum vaginatum* blanket mire on relatively dry, gently sloping peat, and M18 *Erica tetralix-Sphagnum papillosum* raised and blanket mire (present in fragments on what were likely to be raised mires, now almost entirely lost to agriculture). Some of these degraded bogs have frequent drainage grips, coupled with moderately-high grazing pressure from sheep and deer. Bogs with the highest grazing pressure appear to have degraded to species-poor M20 *Eriophorum vaginatum* blanket and raised mire, with little to no dwarf shrubs present. A particularly degraded form of M18a *Sphagnum magellanicum-Andromeda polifolia* sub-community was recorded, in an apparent transition to M20 (coded M18a-M20). Some examples resemble heathy acid grassland dominated by purple moor-grass of the NVC type M25a *Molinia caerulea-Potentilla erecta* mire, *Erica tetralix* sub-community, in areas of severe drainage and high grazing pressure. Others appear to have suffered from severe hydrological disturbance, losing bog-building sphagnum species and forming vegetation fitting either wet heath (M15d*[12] *Trichophorum germanicum-Erica tetralix* wet heath, *Vaccinium myrtillus* sub-community) or acid grassland NVC type U6* *Juncus squarrosus-Festuca ovina* grassland. The latter was recorded in an area severely disturbed by drainage

[11] The suffixed dagger † indicates priority H7130, which is intact with sufficient peat-building species. Where bog is degraded and considered to lack sufficient peat-building species it is classed as non-priority H7130, without a dagger†.
[12] The asterisks denote that the NVC community is a non-bog NVC type, but is on deep peat, thus the habitat is degraded bog.

with high grazing pressure, and is a possible remnant of raised blanket mire or lagg fen, now more or less destroyed and dominated by acid grasses and heath-rush *Juncus squarrosus*. Locally (WB028-WB024, CB011-CB007) the ground is bare peat following recent burning.

Heaths (wet dwarf shrub heath, dry dwarf shrub heath and heath/acid grassland mosaic)

Lowland Heathland (all constituting **H4010** and **H4030** according to whether wet or dry respectively) occurs in scattered and localised areas in the Study Area: within and near to Roughcastle WS and within and adjacent to the South Drum Claypit WS in the northern section; within and adjacent to the Graystone Knowe WS and within Forest Woods SINC in the central section; and, north-east of Riggend in the southern section.

Wet heaths include the NVC type M15 *Trichophorum germanicum-Erica tetralix* wet heath with purple moor-grass, heather with *Polytrichum commune*, tormentil *Potentilla erecta*, heath bedstraw *Galium saxatile*, cross-leaved heath and *Sphagnum capillifolium*. The M15d *Vaccinium myrtillus* sub-community includes blaeberry, heath-rush, mat-grass *Nardus stricta* and sheep's-fescue *Festuca ovina*. A damp heath, probably derived from over-grazed / burnt M15 heath, was recorded that fits best into H21 *Vaccinium myrtillus-Sphagnum capillifolium* heath; this is on shallow peat, dominated by heather, with frequent deergrass, occasional purple moor-grass and *Sphagnum tenellum* and *Sphagnum capillifolium*. A flushed form of wet heath was assigned to the M15a *Carex panicea* sub-community, a heathy habitat with much purple moor-grass, other acid grasses and carnation sedge *Carex panicea*, in an area of felled commercial forestry; this was recorded south of Greystone Knowe WS between large swathes of Lowland Fens and in a mosaic with PMRP.
Dry heath of the NVC type H12 *Vaccinium myrtillus* heath is dominated by heather, with abundant crowberry *Empetrum nigrum* and blaeberry with pleurocarpous mosses, such as *Pleurozium schreberi, Hypnum jutlandicum and Hylocomium splendens*. The H12c *Festuca ovina* sub-community includes frequent acid grasses. The community also occurs in a mosaic with acid grassland of the type U4e *Festuca ovina-Agrostis capillaris-Galium saxatile* grassland, *Avenella flexuosa* sub-community, dominated by acid grasses, with frequent blaeberry and pleurocarpous mosses.

Wetlands

Lowland Fen (including valley mire, basin mire, flushes and swamp-like vegetation)
Lowland Fens are scattered and localised. The most common NVC type is M6 *Carex echinata-Sphagnum fallax/auriculatum* mire, found at Roughcastle WS and South Drum Claypit WS in the northern section and Graystone Knowe WS in the central section. These acid flushes are often dominated by soft-rush over a carpet of *Sphagnum fallax*, with *Polytrichum commune* and star-sedge, and rarely bottle sedge, bog asphodel and cuckoo-flower *Cardamine pratensis*. Some examples, within transitions to marsh, include heath spotted-orchid *Dactylorhiza maculata*. The M6b *Carex nigra-Nardus stricta* sub-community includes prominent common sedge as well as common cotton-grass, heath-rush, mat-grass, wavy hair-grass and devil's-bit scabious *Succisa pratensis*. Occurrences of M6c *Juncus effusus* sub-community are relatively species-poor and dominated by soft-rush. M6d *Juncus acutiflorus* sub-community or the non-NVC type 'Ja' (species-poor with insufficient species to class as an NVC mire type), both with abundant sharp-flowered rush *Juncus acutiflorus*, occur in some places in mosaics with M6c.

S9b *Carex rostrata* swamp-*Carex rostrata*, *Menyanthes trifoliata-Equisetum fluviatile* sub-community, was found next to open water at South Drum Claypit WS, and consists primarily of bottle sedge, marsh cinquefoil *Potentilla palustris* and water horsetail *Equisetum fluviatile*,

with lesser spearwort *Ranunculus flammula*. S27 is also present in mosaic with Wet Woodland at Wester Drum WS.

Also within South Drum Claypit WS is Lowland Fen basin mire constituting ***H7140 Transition mires and quaking bogs***, corresponding to the NVC type M5 *Carex rostrata-Sphagnum squarrosum* mire. This is co-dominated by bottle sedge and *Sphagnum squarrosus*, with branched bur-reed *Sparganium erectum*, marsh cinquefoil, marsh thistle *Cirsium palustre*, soft-rush, *Polytrichum commune*, heath woodrush *Luzula multiflora*, bog pondweed *Potamogeton polygonifolius* and seedlings of eared willow. This is a fairly uncommon mire type. The *Sphagnum squarrosum* indicates a slight degree of mineral enrichment. This particular example may have been a body of standing water that has been covered over with sphagnum – aside from the edges, it is quaking and unsafe to walk on, and it is highly likely that water is under the vegetated surface.

Next to South Drum Claypit WS is a small patch of species-poor swamp, in shallow water, of the NVC type S9a *Carex rostrata* swamp-*Carex rostrata* sub-community, a species-poor pure sward of bottle sedge (although still considered part of the Lowland Fen SBL type). An S12 *Typha latifolia* swamp is also present next to open water within this WS, dominated by species-poor bulrush *Typha latifolia*.

Finally, the Luggie Water: Glenhove-Jockey's Well SINC contains a species-poor sward of S28a *Phalaris arundinacea* tall-herb fen, *Phalaris arundinacea* sub-community, associated with the Luggie Water itself, which is species-poor consisting of little more than reed canary-grass with scattered angelica.

Marsh/marshy grassland

Marsh corresponding to Lowland Fens occurs rarely and in highly localised areas. These comprise NVC types M27 *Filipendula ulmaria-Angelica sylvestris* mire near Bonnybridge, and the M27c *Juncus effusus-Holcus lanatus* sub-community within Cameron Burn: Cameron Glen SINC, northeast of Riggend. The M27 is a species-poor sward of meadow-sweet with common nettle and locally abundant reed canary-grass. The M27c is more diverse and includes soft-rush, marsh thistle, angelica, marsh bedstraw *Galium palustre*, valerian, water mint *Mentha aquatica* and grasses and forbs typical of damp grassland.

Neutral small sedge mire (non-NVC type 'Mx'), also considered to be Lowland Fens habitat, occurs east of Cumbernauld. This has developed on disturbed land and resembles an M23 *Juncus acutiflorus-Galium palustre* rush-pasture, but without rushes. Species include common sedge, angelica, valerian, marsh willowherb *Epilobium palustre*, glaucous sedge *Carex flacca*, marsh thistle, yellow rattle *Rhinanthus minor*, tufted hair-grass, meadow vetchling *Lathyrus pratensis*, silverweed *Potentilla anserina* and colt's-foot *Tussilago farfara*.

Marshy grassland of sufficient quality (i.e. not species-poor) to constitute PMRP occurs rarely. Several examples in the northern and southern sections, within the Graystone Knowe WS and Cleuch SINC, are M23a *Juncus acutiflorus-Galium palustre* rush-pasture, *Juncus acutiflorus* sub-community. The sward is dominated by sharp-flowered rush, with grasses such as Yorkshire-fog and tufted hair-grass. Forbs are moderately diverse and include meadow buttercup *Ranunculus acris*, greater bird's-foot trefoil *Lotus pedunculatus*, marsh bedstraw, marsh willowherb, angelica, meadowsweet, bifid hemp-nettle *Galeopsis bifida* and marsh thistle.

Other PMRP marshy grassland is M25c *Molinia caerulea-Potentilla erecta mire*, *Angelica sylvestris* sub-community, in highly localised areas at three locally designated sites: Bruntrigg Moor (Palacerigg) SINC, Glencryan Woods SINC and Palacerigg Country Park (West) SINC. It is moderately diverse with affinities to M23 including neutral wetland herbs, consisting of co-dominant tufted hair-grass and purple moor-grass with sweet vernal-grass *Anthoxanthum odoratum*, mat-grass, tormentil, soft-rush, angelica, valerian, greater bird's-foot trefoil, common knapweed *Centaurea nigra*, sneezewort *Achillea ptarmica* and common sedge.

Non-notable types of marshy grassland occur across the Study Area on neutral to acidic soils, and comprise NVC types M23 J*uncus effusus/acutiflorus-Galium palustre rush-pasture*, M23b *Juncus effusus sub-community*, and two poorer subcommunities of M25 *Molinia caerulea-Potentilla erecta mire,* M25a *Erica tetralix* sub-community and M25b *Anthoxanthum odoratum* sub-community. The forms classed as M23 comprise soft-rush, Yorkshire-fog, tufted hair-grass, creeping buttercup, broad-leaved dock *Rumex obtusifolius*, marsh thistle, greater bird's-foot trefoil, common sorrel *Rumex acetosa* and marsh bedstraw. They have low abundances of some of the wetland herbs listed above for M23a, but are not of high species richness and wetland herbs do not occur more than occasionally. The M25a, formed on peaty soils, are dominated by purple moor-grass with tormentil, with common heather and cross-leaved heath, supplemented by *Sphagnum papillosum, S. palustre* and *S. fallax*. The grassy forms (M25b) include tufted hair-grass, Yorkshire-fog, wavy hair-grass and common bent *Agrostis capillaris*.

Grassland (unimproved / semi-improved)

Acid grassland – unimproved

Unimproved acid grassland occurs in isolated and fragmented patches near Rowan Tree Burn in the north of the Study Area, and extensively within and adjacent to South Drum Claypit WS. It corresponds to NVC type U4-*Festuca ovina-Agrostis capillaris-Galium saxatile* grassland, either the U4a typical sub-community or U4e *Avenella flexuosa* sub-community, and in places to the non-NVC type 'Je' acid grassland (a damper form of U4 with abundant soft-rush). Species in these swards include sheep's-fescue, common bent, sweet vernal-grass, tufted hair-grass, tormentil, heath bedstraw, devil's-bit scabious, yarrow *Achillea millefolium*, meadow buttercup, and ribwort plantain *Plantago lanceolata*. These grasslands are all of relatively low species diversity and are not considered sufficiently diverse to constitute priority SBL habitat.

Acid grassland - semi-improved

Semi-improved acid grassland occurs in a swathe of gently-sloping fields northeast of High Bonnybridge, and in scattered patches in localised areas south of the Skipperton Burn. It is also found in the southern section in two patches northeast of Riggend, one within Cleugh SINC. These dry to damp, nutrient-enriched grasslands correspond to the U4b *Holcus lanatus-Trifolium repens* sub-community of U4. Species include red fescue *Festuca rubra*, common bent, sweet vernal-grass, Yorkshire-fog, tufted hair-grass with heath bedstraw and tormentil. Other semi-improved acid grassland types did not easily fit into an NVC type, within recently-felled coniferous plantation, and include the grasses, wavy hair-grass, purple moor-grass and tufted hair-grass, with tormentil and heath bedstraw. These semi-improved forms of acid grassland are of less note than the unimproved forms, which as noted above were themselves of insufficient diversity to class as priority SBL habitat.

Neutral grassland - semi-improved

Semi-improved neutral grassland is found throughout the Study Area. Damp grasslands of the NVC MG10 *Holcus lanatus-Juncus effusus* rush-pasture, typically MG10a typical sub-community, are common. Species in the MG10 forms include soft-rush, Yorkshire-fog, creeping buttercup, common nettle and creeping thistle *Cirsium arvense*. Other damp neutral grasslands correspond to NVC type MG9-*Holcus lanatus-Deschampsia cespitosa* grassland, sometimes where coarser and less grazed are specified as the MG9b *Arrhenatherum elatius* sub-community, are occasional in the north and south of the Study Area, often in large swathes. Species in the MG9 include tufted hair-grass, Yorkshire-fog, and soft-rush, false oat-grass *Arrhenatherum elatius*, common sorrel, wild angelica, creeping thistle, meadow vetchling, great bird's-foot trefoil *Lotus pedunculatus* and common knapweed. The MG10 in particular and the majority of the MG9 are rather species-poor and ecologically non-notable, despite potential as GWDTE.

Dry semi-improved neutral grasslands are frequent. All are forms of MG1 *Arrhenatherum elatius* grassland, with cock's-foot, Yorkshire-fog, tufted hair-grass, crested dog's-tail *Cynosurus cristatus,* perennial rye-grass *Lolium perenne*, timothy *Phleum pratense*, broad-leaved dock, creeping buttercup, common nettle and creeping thistle. Although this grassland type was occasionally moderately species-rich (with species including meadow vetchling, meadow buttercup and common knapweed), the majority are species-poor and often ruderal with 'weed' species. This is also a very common coarse grassland type on road verges etc., and none was considered to be notable.

Other non-notable habitats

The following other habitats that are species-poor, ruderal or heavily and intensively managed are also present, and of no ecological note:

- Bracken – dense stands of bracken, with neutral grasses, occur in the north of the Study Area and very rarely elsewhere, and are associated with wooded habitats;
- Poor semi-improved grassland – occurs in scattered sheep-grazed fields in the north and south of the Study Area. As the name implies, they are particularly species-poor, although not so poor as improved grassland. They variously comprise coarse, neutral grasses and perennial rye-grass with agricultural weeds such as creeping buttercup, white clover *Trifolium repens*, spear thistle *Cirsium vulgare* and common nettle, sometimes with common mouse-ear *Cerastium fontanum*;
- Improved grassland – common in the north and infrequent and localised in the south of the Study Area. It is agriculturally-improved and very species-poor, intensively sheep- or cattle-grazed, and typically dominated by perennial rye-grass, with a limited range of other species including common grasses, white clover *Trifolium repens* and ruderal 'weed' species;
- Ruderal vegetation comprising dense stands of 'weed' species such as creeping thistle, broad-leaved dock, common nettle and rosebay willow-herb *Chamerion angustifolium* (the latter occurring as large swathes on formerly quarried land north of Glenmavis) are scattered in the northern and southern sections;
- Amenity grassland – associated with urban and semi-rural areas within the Study Area, around Falkirk and Glenmavis. It is highly modified and tightly mown, relatively species-poor and typically contains much perennial rye-grass;

- Arable – north of the Forth and Clyde Canal the Study Area is dominated by arable fields, often of barley *Hordeum vulgare*, with marginal thin strips of degraded semi-improved neutral grassland vegetation and common arable weeds. A single arable field of barley was also recorded in the far east of the Study Area, southeast of High Bonnybridge;
- Introduced scrub – noted in a single location near Beam Road, south of High Bonnybridge, an area of approximately 5x15m dominated by Japanese rose *Rosa rugosa*; and,
- Buildings, hardstanding and bare ground – associated with urban and semi-rural areas and farmsteads.

Watercourses

Details and assessment relating to the importance of watercourses and results of classification by SEPA's Water Classification Hub can be found in the main text of Chapter 8. Some are potentially notable priority Rivers which likely to support notable / migratory fish.

Watercourses within 1km of the Sites comprise the River Carron, Bonny Water, Rowan Tree Burn, Forth and Clyde Canal, Union Canal, Walton Burn, Glencryan Burn, Red Burn, Luggie Water, Cameron Burn and Shank Burn. There are also non-notable small watercourse and ditches.

The largest of the watercourses range from 2m to 4m in width and were up to 1.2m in depth (at the time of survey). Flow is generally moderate with runs, cascades, and occasional glides, with diverse substrates comprising bedrock, boulders, stones and gravel. The water quality is generally clear, with some rivers suffering from iron oxide pollution. The banks show some signs of erosion, but are vegetated, with trees, scrub, grasses and occasionally wetland herbs. Impacts from bank erosion, poaching and straightened channels are common, with occasional concrete weirs.

Other watercourses / rivers are a common feature across the Study Area, that vary in width from 0.5 to 2.5 meters, with depths from 0.05m to 0.6m (at the time of survey). Flow types varied from slow trickles to moderate runs to fast rapids with occasional riffles. The substrates consist of mud, gravel, pebbles, boulders, and bedrock. Generally, the water quality in these watercourses is clear, although some have moderate turbidity and/or iron oxide pollution. The banks are mostly vegetated and often with scattered trees or woodland.

Highly modified watercourses described as ditches are present across the Study Area. These range from 0.4m to 1.5m wide and were 0.1m to 0.5m deep. These ditches had stagnant to slow flows. Some ditches were heavily polluted with iron oxide, while others were with clear water. The substrates were often muddy, with vegetated grassy, rushy or scrubby banks, often associated with hedges or scrub. Impacts from grazing, trampling, or nutrient runoff are common.

Standing Waters

A total of 39 Standing water habitat records lie within the Study Area, of which ten are notable Ponds, rich in aquatic plants and/or they support notable species. These notable ponds are concentrated in three specific locations: eight in South Drum Claypit WS (notable for supporting great crested newt *Triturus cristatus*); and two in Forest Woods SWT reserve.

Other non-notable standing waters include those that are eutrophic (extremely nutrient-rich): three are associated with the Forth and Clyde Canal and the Union Canal; one lochan west of Falkirk; one lochan near the Rowan Tree Burn; a group of five ponds east of Bonnybridge; a lochan and two ponds south of High Bonnybridge (all in the northern section); two lochans and a pond south of Skipperton Burn (in the central section); five ponds within Palace Rigg Country Park; and, one pond north of Greengairs (in the southern section). Other non-notable standing waters include seven ponds without great crested newt that occur in South Drum Claypit WS, that are not eutrophic but are otherwise unremarkable.

The recorded standing waters varied from shallow (less than 0.4m) to deep water (of undetermined depth), with shallow to steep banks. Water quality varies greatly from clear water which is presumably of good quality, to others that are obviously highly nutrient-enriched due to the presence of waterfowl and/or agricultural runoff, with algal blooms and highly turbid conditions in some locations. Vegetation surrounding and within the ponds includes marginal vegetation (including soft-rush and, in acidic situations, bottle sedge). Some include emergent vegetation such as bulrush *Typha latifolia* or spike rush *Eleocharis palustris*. Submerged plants are occasionally present and include common water-crowfoot species *Ranunculus aquatilis*. Floating vegetation includes duckweed *Lemna minor* in several locations. The banks are often vegetated with grasses, scrub and occasionally Lowland Heathland (**H4010 / H4030**) in some acid situations.

Ground Water Dependent Terrestrial Ecosystems

The following NVC types recorded during the habitat surveys are potentially GWDTEs according to SEPA guidance[13]. Shown in **bold** are the NVC types considered to be notable and likely (at least in part and for at least some situations) to be truly dependent on ground water within the Study Area, following a hydrological assessment (see Volume 1, Chapter 9 Water Environment):

- **M5**
- **M6**
- **M15**
- M23 (All non-notable except **M23a** types only)
- M25 (all non-notable, except **M25c** types only)
- **M27**
- MG9
- MG10
- **W1**
- **W4**
- **W7** (some W7c / "W7 poor" are non-notable – see woodland description above)

Some NVC types that can be potentially groundwater dependent were recorded on deep peat within wet modified bog constituting degraded Blanket Bog (**H7130**) or degraded Lowland Raised Bog (**H7120**). These are on deep peat / degraded bog and consequently they are not

[13] SEPA (2024). Scottish Environment Protection Agency – Water Classification Hub https://www.sepa.org.uk/data-visualisation/water-classification-hub/

considered likely to GWDTE, given that peat bog is not GWDTE but primarily fed by rain that is stored in the peat, and the peat forming a barrier to any groundwater below it. They comprise M15*, M15d*, M25*, M25a*, U6*, W4* and W4b*[12].

The locations of potential GWDTE recorded in the surveyed area are shown on Volume 2, Figure 8.5 Potential Ground Water Dependant Terrestrial Ecosystems. Potential GWDTE that occur within the Study Area are predominantly non-notable, non-wetland types (species-poor damp grassland MG9 / MG10 and more common and species-poor types of rush pasture M23b), many of which are likely to be maintained on waterlogged soils over clayey deposits. Priority PMRP (more species-rich M25c and M23a) are moderately base-rich, possess wetland herbs and are therefore more likely to be dependent on ground water where not underlain by till and similar deposits which are likely to form a barrier to groundwater. Modified bog habitats on deep peat (such as M25a*) and marshy grassland types on peaty soils (M25b) are unlikely to be in contact with groundwater due to the barrier posed by superficial peat deposits. Wet Lowland Heathland (**H4010**) of NVC type M15 is more notable, especially in this lowland environment, but most are unlikely to be groundwater dependent where underlain by alluvium or permeable bedrock. Notable Lowland Fen (M5, M6, M27) may be maintained, at least in part, by groundwater. All Wet Woodland types (W1, W4, W7) are potentially maintained by groundwater where underlain by alluvium or permeable bedrock, most likely for W7b which is moderately base-rich with a species-rich ground flora.

Habitats across the Uprated Overhead Lines

Other woodland

Broadleaved semi-natural woodland of appropriate composition to have been classed as Lowland Mixed Deciduous Woodland SBL priority habitat occurs very locally along the Uprated Overhead Lines: north of XX048 (with frequent oak *Quercus* sp. but disturbed and with dumped litter), west of XR023, beside the Auchter Water in the wider buffers for XR033/XR034, in the access/tower buffers from XR039 to XR042, near XX045, near ZG004/ZG005/ZG006 (mostly semi-mature), near ZG010 (here with frequent bluebell *Hyacinthoides non-scripta*), and on the banks of the River Carron and Bonny Water near ZG011/ZG013. These Lowland Mixed Deciduous Woodland parcels commonly exhibit prominent birch and/or ash *Fraxinus excelsior*, along with other native trees such as oak, rowan, goat willow and occasionally aspen *Populus tremula* and wych elm *Ulmus glabra*. Non-native tree species such as beech and sycamore are often also present but not dominant (sycamore is occasionally dominant but with at least frequent oak or wych elm). The ground flora is reasonable and often includes frequent basic indicators such as wood avens, herb-robert and sometimes strawberry (indicating W8/W9 woodland), or lacks these species with a more neutral character (W10). The example beside the River Carron has frequent Himalayan balsam, and some rhododendron is present in the woodland near ZG010.

A small number of woodlands classed as Wet Woodland were also recorded, beside Woodend Loch near XX001B (including damp areas of tufted hair-grass and more marshy vegetation with reed canary-grass and meadowsweet), in the buffers of XX030 (willow/alder with a limited flora tending to W7), in the buffer of XX007 (more neutral rushy W7), within the compound of XR016 (poor example of W4 acidic type that is cut for existing wayleave), near XR020 (closest to W4 type with some sphagnum), near XR025, near and slightly within the

compound for XR031 (poor W7), and fragments at the edge of buffers near XR030 (~W7), XR28 (~W4) and access for XR040 (~W7).

All other recorded semi-natural woodland is of insufficient quality to be considered appropriately classed as a SBL priority woodland type. It variably exhibits a significant non-native canopy component (such as beech or sycamore), or is immature and/or exhibits poor quality and unremarkable flora. A few examples are potential GWDTE but are very poor examples that are not especially wet (the survey found the location to be lacking wetland herbaceous plants indicative of Wet Woodland) with either bare ground beneath or excessive ruderal species.

Plantation woodlands are scattered along the Uprated Overhead Lines. They include broadleaved plantations that are immature or, where mature, clearly planted, and with poor or unremarkable ground floras commonly dominated by neutral grasses, often ruderal and sometimes with abundant bare ground, occasionally with abundant rhododendron. They include birch plantation as well as non-native plantation of beech and sycamore, and occasionally planted alder with a non-wetland flora. Essentially similar plantations with an appreciable conifer component comprise a smaller number of mixed plantations scattered through the corridor. A smaller number of conifer plantations are also scattered through the corridor; these are mostly Sitka spruce, occasionally larch *Larix* sp. or Scots pine *Pinus* sp., all with poor or unremarkable flora.

Bog

Field survey found only limited occurrences of bog habitat in the vicinity of the Uprated Overhead Lines. All are obviously degraded. The main occurrences are:

- Towards the northern end of the ZG section beside Denny Substation. This is degraded and has been interpreted as degraded raised bog. Within 50m, the vegetation is mainly dominated by hare's-tail cottongrass *Eriophorum vaginatum*, with variable amounts of cross-leaved heath *Erica tetralix* and *Sphagnum papillosum* (a key bog species), as well as occasional *Sphagnum medium* and cranberry *Vaccinium oxycoccos* (not confined to but typical of raised bog). Much of this vegetation corresponds to NVC type M18 (commonest on raised bogs). However, degradation is obvious from hydrological disturbance, areas of drying and bare peat, significant encroachment of Sitka spruce (locally dense) and occurrence of unfavourable vegetation (M20 vegetation species-poor hare's-tail cottongrass, and M15 wet heath and species-poor M23 soft-rush on deep peat that should be a bog NVC type).
- Just north of tower XR027, and very slightly within the tower compound, comprising heavily degraded blanket bog (corresponding to NVC type M20 with excessively dominant hare's-tail cottongrass, and in this case also much rush *Juncus spp*.).

There is also a very small amount of degraded blanket bog dominated by purple moor-grass at the edge of the 50m buffer of tower XR017.

The degraded raised bog beside Denny Substation is Lowland Raised Bog SBL priority habitat and Annex I *H7120 Degraded raised bog*, and the degraded blanket bog is Blanket Bog SBL

priority habitat and Annex I *H7130 Blanket bog (non-priority)*, however as discussed these are all significantly degraded examples.

Other wetlands

Acid flush occurs very locally (as E2.1 Acid/neutral flush or sometimes classed as E3 Fen where not flush-like, but essentially the same sort of vegetation). It all corresponds to NVC type M6. By far the largest occurrence is between towers XR017 and XR018, in the path of the access route, however this is extremely degraded (overwhelmingly dominated by soft-rush with small amounts of sphagnum and hare's-tail cottongrass, and drained with some bare substrate). Other occurrences comprise three very small patches towards the edges of 50m buffers (of ZG003 and ZG005, and between XR007 and XR008); other than the latter, which is at the very edge of the buffer, these are also degraded by poaching/bare ground and/or scrub encroachment. All such vegetation in this setting constitutes Lowland Fens SBL priority habitat, and is potential GWDTE, although these are not good examples.

Other recorded wetlands comprise very limited occurrences of common swamp types (listed in decreasing order of frequency):

- S12 bulrush *Typha latifolia* swamp, locally with S9 bottle sedge *Carex rostrata* swamp – four small examples on ZG route (at the degraded Lowland Raised Bog by Denny Substation, species-poor, sometimes with common cottongrass *Eriophorum angustifolium*). Two more diverse small patches by Newarthill Substation between XX048A and XR001A (here with abundant bottle sedge *Carex rostrata* forming minor proportions of pure S9 swamp, and a limited range of common wetland herbs such as lesser spearwort *Ranunculus flammula*). Three other small examples that are species-poor in woodland near XR005 (prone to drying), in the path of access near XR006, in the access buffer near XR034, and in the access buffer near XR045 (where mixed with meadowsweet *Filipendula ulmaria*);
- S28 reed canary-grass *Phalaris arundinacea* swamp – small species-poor and quite dry examples near the compound for tower XR007, and adjacent to the Site Compound south of tower XR-B01;
- S10 water horsetail *Equisetum fluviatile* swamp – four examples, in the access buffer beside a loch near tower XX001B (species-poor), beside and slightly within tower compound XX029 (two patches, with M23 soft-rush), and at the edge of the buffer for XX04 (on opposite side of road, mixed with bulrush).

All the above swamps constitute Lowland Fens SBL priority habitat.

Heath

The only recorded heath for the Uprated Overhead Lines occurs along the ZG route, and is all located between towers ZG002 and ZG003 or adjacent, and includes the existing wayleave here. The majority is dry heath, with a smaller amount of wet heath concentrated around ZG003 (however, under ZG003 itself the vegetation is poor acid grassland). These dry and wet heaths are in this case similar, and not species-rich, with ling heather *Calluna vulgaris* dominant or at least abundant, often with bilberry *Vaccinium myrtillus*. The wet heath differs here by frequent purple moor-grass and in places (not uniformly) cross-leaved heath. There is often scattered encroaching Sitka spruce, birch and/or gorse. Coltsfoot *Tussilago farfara* in

some of the dry heath and tyre tracks in some of the wet heath clearly indicate disturbance. All dry and wet heaths in this setting constitute Lowland heathland SBL priority habitat, and respectively **Annex I 4030 Dry heath** and **Annex I 4010 Wet heath**.

Grasslands

Improved grassland is common through all sections of the Uprated Overhead Lines. It is typical of agriculturally-improved pasture, species-poor and of negligible ecological value.

Occasional fields along the XR Route have been classed as poor semi-improved grassland. These are mostly pastures that are less agricultural in composition than improved grassland, but still species-poor, often cattle-grazed with abundant Yorkshire fog *Holcus lanatus* and nutrient-enriched with scattered ruderal species. A few examples not livestock-grazed and are dominated by neutral grasses, but are particularly ruderal. None of this grassland is of note and as such is of negligible ecological value.

Neutral grassland is also common through all the sections of the Uprated Overhead Lines. It is all considered semi-improved neutral grassland, meaning that none is of special note. Where dry, some is coarse with much false-oat grass *Arrhenatherum elatius* or other large grasses, whilst other examples are dominated by smaller grasses (such as red fescue *Festuca rubra*, common bent *Agrostis capillaris*, Yorkshire fog, crested dog's-tail *Cynosurus cristatus* and sometimes rye-grass *Lolium* sp.), in both cases often with frequent ruderal species. Some occupies verges and some more open spaces. Rare examples include small amounts of meadowsweet or angelica *Angelica sylvestris* in what is still overall species-poor and coarse grassland. Between towers XR006 and XR007 there is more diverse neutral grassland that includes rare orchids (most likely common spotted-orchid *Dactylorhiza fuschii*, which is not uncommon in short disturbed grassland), however this area also contains frequent to abundant coltsfoot and creeping thistle as well as other scattered ruderal species, and is clearly significantly disturbed. Other examples comprise damp soft-rush or tufted hair-grass, typically grazed within pastures, and corresponding to NVC types MG10 and MG9; these are potential GWDTE but species-poor and of little ecological note. All these types of semi-improved neutral grassland are ubiquitous in lowland Scotland including the local area.

Acid grassland occurs very locally along the XX and XR routes. These include typical common acid grassland species such as tormentil *Potentilla erecta* and/or heath bedstraw *Galium saxatile*, typically with much bent *Agrostis* sp., often with some indication of dampness (such as scattered soft-rush) and often bordering neutral conditions with mesotrophic species as well. None are sufficiently species-rich to constitute Lowland Dry Acid Grassland SBL priority habitat, and all are therefore classed as semi-improved acid grassland. Several are disturbed and some exhibit excessive bare ground or scrub encroachment. The most diverse examples comprise an area in the access buffer for XX031 (with frequent to abundant devil's-bit scabious *Succisa pratensis* and tormentil, and a moderate range of other species including black knapweed *Centaurea nigra* and ribwort plantain *Plantago lanceolata*), and a narrow stream-side bank with similar species west of tower XX027. Although none of these acid grasslands constitute priority habitat, they are localised within the Site and will be similarly local beyond it in this lowland and predominantly agricultural environment.

Calcareous grassland was only recorded in small quantity near and very largely beyond the compounds for towers XX048A and XX001A by Newarthill Substation. These are very poor examples in which bird's-foot trefoil *Lotus corniculatus* is the only species suggestive of basic conditions, amongst otherwise neutral species including abundant red fescue and frequent white clover *Trifolium repens*, Yorkshire fog, creeping buttercup and encroaching scrub. The area has likely been disturbed during previous substation or other construction activity and this is probably why this vegetation currently exists, which in the relatively short term is likely to succeed to coarse neutral grassland and/or scrub.

Marshy grassland is occasional to moderately common along the Uprated Overhead Lines. Along the ZG route, it is localised to the access buffer at the northern end, and the buffer between towers ZG004 and ZG005, where it comprises relatively species-poor M23b (dominated by dense soft-rush with limited wetland herbs), typically species-poor M25a (dominated by dense purple moor-grass, occasionally somewhat more diverse with frequent devil's-bit scabious, and occasional heather) and M25b (transitional purple moor-grass swards with other grassland elements such as bent, Yorkshire fog, common sorrel *Rumex acetosa* and soft-rush). Along XX, it comprises widely scattered patches of M23b (dominated by soft-rush, generally with limited wetland species such as greater bird's-foot trefoil *Lotus pedunculatus* or angelica, but locally more diverse with valerian *Valeriana officinalis* north of tower XX032 and at and beyond towers XX004 and XX025). Similar M23b is scattered along the XR route, mainly species-poor but with local more diverse examples with valerian north of tower XR028, widely along and either side of access to XR034, at and beyond XR025, in the access buffer north of XR020, at and north of XR035 (to the north including marsh cinquefoil *Comarum palustre*), and in the access buffer west of XR008 (here with marsh cinquefoil and the wetland moss *Calliergon cordifolium*). Along XR there are also rare occurrences of M27 dominated by meadowsweet but generally with ruderal species, and a few sedge-dominated marshes on disturbed ground. The M23b generally does *not* constitute purple moor-grass and rush pasture except where locally particularly diverse. The M27 patches constitute Lowland Fens but are not good examples, tending to be ruderal.

Standing water

There are no standing waters in the ZG section.

Standing waters along the XX section comprise:

- The edges of two lochs in the access buffers for XX001B and XX007, including reed canary-grass, bottle sedge, amphibious bistort *Persicaria amphibia* and bur-reed *Sparganium erectum*;
- Parts of two turbid ponds near XX003, up to ~1m deep with bulrush, soft-rush, bottle sedge and with several aquatic/marginal species (pondweed *Potamogeton* sp., marestail *Hippurum vulgaris*, water plantain *Alisma plantago-aquatica*, spike-rush *Eleocharis palustris*, marsh marigold *Caltha palustris*);
- Two very small ponds of negligible note in the buffers of XX020(X) and XX029, with inundated soft-rush and/or tufted hair-grass, either very species-poor or with only one recorded aquatic species (sweet-grass *Glyceria* sp.).

Standing waters along the XR section comprise:

- More substantial/natural ponds – in the access buffer north-west of XR034 (larger, with peripheral bulrush), near XR009 (ditch-like but with pondweed, sweet-grass, bottle sedge, bur-reed and brooklime *Veronica beccabunga*) and at the access buffer edge south-west of XR006 (the very edge of a large pond);
- Small shallow ponds on disturbed ground – four between XX048A and XR001A (with club-rush *Schoenoplectus lacustris*, bulrush, jointed rush *Juncus articulatus*, spike-rush, pondweed *Potamogeton* sp. and rarely hornwort (probably *Anthoceros* sp., a pioneer species of disturbed ground)), and four near XR005 (including bulrush, spike-rush, jointed rush, pondweed and occasionally water-plantain);
- Other small, very shallow ponds of limited note – north-west of XR008 (relatively species-poor soft-rush and bur-reed), near XR010 and XR20 (which likely dry out, and with few recorded aquatic species (water horsetail, spike-rush and bur-reed)) and near XR023 (two tiny ponds either highly polluted or full of leaf litter).

None of the above standing waters are of sufficient quality to be classed as priority pond habitat. None are directly within compounds or in the path of access routes, with the exception of one of the four small ponds in disturbed ground at XX048A.

Other habitats

Other habitats are of limited or no ecological note, comprising arable land, heavily-mown amenity grassland, dense bracken, ruderal ('weed') stands, bare ground/ephemeral vegetation, introduced shrub and urban/sub-urban areas.

Linear habitats (cliff, hedge, tree-lines)

Watercourses are considered in the separate watercourse section below.

The most notable linear terrestrial feature is one small occurrence of basic inland cliff, in the wider buffer for XX030 and constituting ***Annex I 8120***. This is a small, short, natural vertical rock exposure with appropriate crevice-dwelling plants indicative of basic conditions (here comprising brittle bladder-fern *Cystopteris fragilis*, supplemented by fairy flax *Linum catharticum*).

Native species-rich hedgerows were recorded only very locally: in the access buffer for ZG012, and adjacent to existing tracks near XX001B and XR009. The woody species composition in these is mainly hawthorn but supplemented by three of blackthorn *Prunus spinosa*, elder *Sambucus nigra*, rowan *Sorbus aucuparia*, rose *Rosa* sp. and sycamore *Acer pseudoplatanus*. The vast majority of recorded hedgerows are species-poor and typically dominated by hawthorn, occasionally beech, and occasionally including trees. The diversity of the very few species-rich hedges is only just sufficient to class as species-rich and hawthorn is still dominant, whilst the species-poor hedgerows naturally exhibit poor diversity. These types of hedgerow are widespread in the region.

Lines of broadleaved trees of variable composition (often non-native beech or sycamore) and variable maturity are scattered along the Uprated Overhead Lines.