



## Appendix A40.1 – Terrestrial Habitats

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## **1 Introduction**

### **1.1 General Background**

- 1.1.1 This report is one of the appendices supporting Chapter 40 (Ecology and Nature Conservation) of the AWPR Environmental Statement. This report considers the potential impacts on terrestrial habitats and flora associated with the Fastlink section of the proposed scheme. The results of the surveys carried out for the purposes of this assessment are also presented and are shown on Figures A40.2 a-f.
- 1.1.2 The three component route sections in this report for the Fastlink study area of the proposed scheme are as follows:
- Section FL1: Stonehaven to Howieshill (ch0-3200);
  - Section FL2: Howieshill to Cookney (ch3200-6300); and
  - Section FL3: Cookney to Cleanhill Junction (ch6300-10200).
- 1.1.3 All tables and figures are structured in this manner.
- 1.1.4 The Ecological Impact Assessment (EclA) was undertaken in accordance with the Design Manual for Roads and Bridges (DMRB) Volume 10 and 11 (Highways Agency 2001) and the Environment Assessment (Scotland) Regulations 1999, along with cognisance of Institute of Ecology and Environmental Management (IEEM) guidelines.
- 1.1.5 These studies included desk-based consultation to collate existing information about terrestrial habitats in the study area for the proposed scheme and field surveys to provide current data about the terrestrial habitats and flora within the study area.
- 1.1.6 Cumulative impacts are assessed in a separate report combining the predicted impacts for all habitats and species over the proposed route (refer to Part E of the Environmental Statement ES).

#### **Aims of Assessment**

- 1.1.7 The purpose of the extended Phase 1 Habitat survey and the assessment of potentially affected terrestrial habitats and flora was to:
- identify and map all areas of semi-natural habitat within the area to be affected by the proposed scheme;
  - provide a botanical description of the semi-natural habitats surveyed;
  - identify areas or habitats within the study area that are of particular ecological interest for nature conservation and which require more detailed investigation; and
  - provide supplementary information from incidental observations of fauna to assist other surveys.

### **1.2 Background to Phase 1 Habitat Survey**

- 1.2.1 An extended Phase 1 habitat survey was conducted using the standard methodology as described in the Handbook for Phase 1 Habitat Survey (JNCC, 1993). This has become a widely accepted method for surveying semi-natural habitats and is regarded as an essential part of the environmental impact assessment (EIA) process whenever ecological receptors are likely to be affected by a development (Institute of Environmental Management and Assessment (IEMA), 1995; IEEM, 2006).

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1.2.2 The Phase 1 Habitat survey methodology was developed for the purpose of mapping terrestrial and freshwater habitats within Special Sites of Scientific Interest (SSSIs), nature reserves and for larger scale strategic surveys. The classification has since been adopted by IEMA and IEEM as one of the standard methods used in EIA and the preparation of Environmental Statements under the Environmental Impact Assessment Regulations 1999.

1.2.3 Phase 1 Habitat Surveys have been further recognised as a standard ecological assessment tool in the DMRB and is recommended as an essential part of the assessment of ecological impacts associated with road construction (DMRB, 2005).

### **1.3 Legal Status**

1.3.1 Semi-natural habitats are conferred legal protection through international and national statutes. These recognise the ecological value of the habitats and provide protection or promote policies that guide their conservation.

1.3.2 The EU Habitats Directive 1992 aims to promote the maintenance of biodiversity by requiring Member States to take measures to maintain or restore natural habitats and wild species at a favourable conservation status. In applying these measures, Member States are required to take account of economic, social and cultural requirements as well as regional and local characteristics.

1.3.3 These habitats and species are to be protected by the creation of a series of 'Special Areas of Conservation' (SACs) (Article 4) and by various other safeguard measures for particular species. Annex 1 of the Habitats Directive lists 189 habitats, 76 of which occur in the UK. In addition, a series of Annex 1 habitats are afforded 'priority' status as these are judged to be in particular danger of loss (Article 1). Twenty-three of these priority habitats occur in the UK.

1.3.4 Nationally important sites are designated as Special Sites of Scientific Interest (SSSIs) in England, Scotland and Wales and conferred protection under various statutes including the Wildlife and Countryside Act 1981 (as amended) and the Nature Conservation (Scotland) Act 2004.

1.3.5 The Nature Conservation (Scotland) Act 2004 requires Scottish Ministers to publish a list of habitats and species considered to be of principal importance for biodiversity. In addition the Act requires that all public bodies have an obligation to further biodiversity in the course of carrying out all their public duties.

### **1.4 Biodiversity Action Plans**

1.4.1 The UK Biodiversity Action Plan (UKBAP) (1994) is the UK government's response to the Convention on Biological Diversity. The UKBAP sets out a programme of action to conserve and enhance biological diversity throughout the UK. Local Biodiversity Action Plans (LBAPs) integrate these measures at the local or regional level (see below).

1.4.2 The UK Biodiversity Steering Group has published individual action plans for 45 priority habitats and 400 of our most threatened and endangered species. These Habitat and Species Action Plans (HAPs and SAPs respectively) have been developed to guide conservation action for the ecological feature concerned. The presence of a HAP or SAP reflects the fact that the habitat or species concerned is in a sub-optimal state and requires conservation action. It does not imply any specific designation or level of importance, but establishes a framework for the conservation of the habitat and identifies current factors causing loss and decline of that feature. The implementation of BAPs, whether at the UK or local level, is perceived as a fundamental requirement for public bodies to meet their obligations under the relevant national legislation.

1.4.3 UKBAP Priority Habitats are distinct from Annex I Habitats listed in the EU Habitat Directive. Priority Habitats include those identified by the UK Steering Group as being particularly important or that are vulnerable to habitat loss and damage and for which conservation action should be targeted.

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- 1.4.4 In order to set priority habitats requiring conservation action in context, a classification of broad habitat types has been developed (UK Steering Group, 1995). In the most recent classification (Jackson, 2000), 37 broad habitat types have been identified, 20 of which occur in Scotland.

**North East Scotland LBAP**

- 1.4.5 The North East Scotland (NES) LBAP is implemented through the North East Scotland Biodiversity Partnership, involving local authorities, environmental, forestry, farming, land and education agencies, businesses and individuals involved in biodiversity across North East Scotland. The NES LBAP includes areas of Aberdeen, Aberdeenshire and Moray and is a locally driven process working towards action to conserve important species and habitats.
- 1.4.6 Most of the North East Action for Biodiversity is addressed through Local Habitat Action Plans (LHAPs), which incorporate action for associated priority species. In addition, a series of Local SAPs have been developed to aid conservation of local priority species. Local SAPs have been implemented for red squirrel (*Sciurus vulgaris*), water vole (*Arvicola terrestris*), Aspen hoverfly (*Hammerschmidtia ferruginea*) wych elm (*Ulmus glabra*) and Daubenton's bat (*Myotis daubentonii*). The LHAPS and SAPs include targets and objectives that incorporate habitat management actions. Further details of impacts on animal species are included in the relevant appendices accompanying Chapter 40 (Ecology and Nature Conservation). Impacts on local wych elm populations are included in this report.
- 1.4.7 Local Habitat Action Plans have been broadly grouped under a series of habitat types that include: Coastal and Marine; Farmland and Grassland; Woodland; Montane, Heath and Bog; Wetland and Freshwater; and Urban Habitats. Local HAPs that have been implemented to date and that are relevant to the current study are listed in Annex 2, which includes a summary of national and local targets and objectives where relevant.

**1.5 Wet Woodland**

- 1.5.1 Willow carr is defined in the Phase 1 Habitat Manual as woodland where the willows are more than 5m tall (although *Salix cinerea* should always be classed as scrub and scrub when all willow carr are less than 5m tall and all *Salix cinerea* carr). This contrasts with National Vegetation Classification, which describes willow carr as woodland, as does the UK BAP Wet Woodland Priority Habitat. For the purposes of mapping, willow carr, where present in abundance with a well developed ground layer, has been categorised as woodland to reflect it being assessed as having higher conservation value. Scrub, therefore, signifies habitats of a lower conservation value such as scattered willow and birch, or dense/scattered gorse/broom.

**2 Approach and Methods**

**2.1 Consultation**

- 2.1.1 Existing survey data was sought as it provides evidence of habitats and species present in the study area and provides a basis for updating records of known populations. In addition, consultation with statutory organisations provided information on the presence of designated sites, such as SACs and SSSIs, as well as the existence of HAPs or SAPs relevant to the study area, as specified in the UK BAP or a Local BAP.
- 2.1.2 Consultation was undertaken with several organisations to identify issues relating to habitats and plant species present in the study area:
- Scottish Natural Heritage (SNH);
  - Scottish Environmental Protection Agency (SEPA);
  - North East Scotland Biological Records Centre (NESBReC);

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- University of Aberdeen;
- Royal Society for the Protection for Birds (RSPB);
- Aberdeenshire and Aberdeen City Councils;
- Scottish Wildlife Trust (SWT);
- Noth East Scotland LBAP Co-ordinator; and
- Forestry Commission

## **2.2 Survey Methods**

- 2.2.1 In May to July 2006, all habitats encountered within 500m either side of the centreline of the proposed scheme were assessed and coded according to the survey methods outlined in the Handbook for Phase 1 Habitat Survey (JNCC, 1993).
- 2.2.2 Additional target notes were made to record key habitat features too small to be mapped (less than 100m<sup>2</sup>) and to provide greater detail on other features of ecological interest. Botanical taxonomic nomenclature follows that of Stace (1997).
- 2.2.3 Hereafter, the area surveyed is referred to as the 'study area'. It should be noted that urban areas dominated by housing were not subject to detailed survey. However, urban areas with public green space such as industrial estates and parkland were surveyed. Existing curtilages and active railway embankments were not surveyed directly although roadside verges of botanical interest were target noted.
- 2.2.4 The study area extended beyond 500m either side of the proposed scheme where the route corridor incorporated several potential alignment options at the time of survey, at junctions where the road layout was not finalised or in areas where ecologically important habitats overlapped the boundary of the study area.
- 2.2.5 To aid description of the semi-natural habitats present in the study area, each section of the route has been sub-divided into Habitat Areas. These were defined *a posteriori*, following analysis of the Phase 1 Habitat Survey data and aerial photographs. This formed the basis for the ecological evaluation of the habitats.

## **2.3 Evaluation of Nature Conservation Value**

- 2.3.1 The value of each site with nature conservation interest was determined by reference to any designations and the results of the consultations, literature review and field surveys. Sites and features were classified according to the criteria identified in Table 1.
- 2.3.2 The criteria used were based on the Ratcliffe Criteria (Ratcliffe, 1977) used in the selection of biological Sites of Special Scientific Interest (SSSI). Habitat areas of interest in terms of their ecology and nature conservation value have been evaluated using criteria suggested by the IEEM Guidelines for Ecological Impact Assessment. These criteria assign a level of importance to the habitat area based on whether the ecological value is important at a range of geographical scales, from being important at a local, parish level to being of international importance. The full details of the general evaluation criteria used are included in Table 1.

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**Table 1 – Evaluation of Ecological Receptor**

Value/ Importance	Criteria
International (European)	<p><b>Habitats</b>  An internationally designated site or candidate site, i.e. Special Protection Area (SPA), provisional SPA (pSPA), Special Areas of Conservation (SAC), candidate SAC (cSAC), Ramsar site, Biogenetic/Biosphere Reserve, World Heritage Site) or an area which would meet the published selection criteria for designation. A viable area of a habitat type listed in Annex I of the Habitats Directive, or smaller areas of such habitat that are essential to maintain the viability of a larger whole. Any river classified as excellent A1 and likely to support a substantial salmonid population. Any river with a Habitat Modification Score indicating that it is Pristine or Semi-Natural or Obviously Modified.</p> <p><b>Species</b>  Any regularly occurring population of internationally important species, threatened or rare in the UK, i.e. a UK Red Data Book species categories 1 and 2 of UK BAP) or of uncertain conservation status or of global conservation concern in the UK BAP. A regularly occurring, nationally significant population/number of an internationally important species.</p>
National (Scottish)	<p><b>Habitats</b>  A nationally designated site Site of Special Scientific Interest (SSSI), Areas of Special Scientific Interest (ASSI), National Nature Reserve (NNR), Marine Nature Reserve) or a discrete area which would meet the published selection criteria for national designation (e.g. SSSI selection guidelines). A viable area of a priority habitat identified in the UK Biodiversity Action Plan (UK BAP), or of smaller areas of such habitat essential to maintain wider viability. Any river classified as excellent A1 and likely to support a substantial salmonid population. Any river with a Habitat Modification Score indicating that it is Pristine or Semi-Natural or Obviously Modified.</p> <p><b>Species</b>  A regularly occurring, regionally or county significant population/number of an internationally/nationally important species. Any regularly occurring population of a nationally important species that is threatened or rare in the region or county (see local BAP). A feature identified as of critical importance in the UK BAP.</p>
Regional (North East Scotland)	<p><b>Habitats</b>  Sites that exceed the County-level designations but fall short of SSSI selection criteria. Viable areas of key habitat identified in the Regional BAP or smaller areas of habitat essential to maintain wider viability. Viable areas of key habitat identified as of Regional value in the appropriate Scottish Natural Heritage SNH Natural Heritage Future area profile. Any river classified as excellent A1 or good A2 and capable of supporting salmonid population. Any river with a Habitat Modification Score indicating that it is significantly modified or above.</p> <p><b>Species</b>  Any regularly occurring, locally significant population of a species listed as being nationally scarce which occurs in 16-100 10km squares in the UK or in a Regional BAP or relevant SNH Natural Heritage Future area on account of its regional rarity or localisation. A regularly occurring, locally significant population/number of a regionally important species. Sites maintaining populations of internationally/nationally important species that are not threatened or rare in the region or county.</p>
Authority Area (e.g. County or District) (Aberdeenshir e/ City of Aberdeen)	<p><b>Habitats</b>  Sites recognised by local authorities, e.g. District Wildlife Sites (DWS) and Sites of Interest for Nature Conservation (SINS). County/District sites that the designating authority has determined meet the published ecological selection criteria for designation, including Local Nature Reserves (LNR). A viable area of habitat identified in County/District BAP or in the relevant SNH Natural Heritage Future area profile. A diverse and/or ecologically valuable hedgerow network. Semi-natural ancient woodland greater than 025 ha. Any river classified as good A2 or fair B and likely to support coarse fishery. Any river with a Habitat Modification Score indicating that it is significantly modified or above.</p> <p><b>Species</b>  Any regularly occurring, locally significant population of a species listed in a County/District BAP due to regional rarity or localisation. A regularly occurring, locally significant population of a County/District important species. Sites supporting populations of internationally/nationally/regionally important species that are not threatened or rare in the region or county and not integral to maintaining those populations. Sites/features scarce in the County/District or which appreciably enrich the County/District habitat resource.</p>

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<b>Value/Importance</b>	<b>Criteria</b>
Local (immediate local area or village importance)	<p><b>Habitats</b>  Areas of habitat that appreciably enrich the local habitat resource (e.g. species-rich hedgerows, ponds). Sites that retain other elements of semi-natural vegetation that due to their size, quality or the wide distribution within the local area are not considered for the above classifications. Semi-natural ancient woodland smaller than 0.25ha. Any river classified as fair B or poor C and unlikely to support coarse fishery. Rivers with a Habitat Modification Score indicating that it is severely modified or above.</p> <p><b>Species</b>  Populations/assemblages of species that appreciable enrich the biodiversity resource within the local context. Sites supporting populations of county/district important species that are not threatened or rare in the region or county and are not integral to maintaining those populations.</p>
Less than Local (limited ecological importance)	<p>Sites that retain habitats and/or species of limited ecological importance due to their size, species composition or other factors. Any river classified as impoverished D and/or and with a Habitat Modification Score indicating that it is severely modified.</p>

2.3.3 Each Habitat Area has been defined based on the habitats present and its geographical location within the study area. In any given part of the study area, several Habitat Areas may occur representing, for example, a network of agricultural fields, areas of woodland and other habitats that may be present.

## **2.4 Limitations to Ecological Impact Assessment**

### **Limitations to Survey**

2.4.1 The survey was undertaken from May to July 2006. This is an optimal time of year to carry out botanical and habitat surveys as flowering plants are in leaf and flower and thus misidentification is minimised. However, surveys of wildlife cannot guarantee that all biological cues are recorded and early or late flowering species may be under represented.

### **Limitations to Assessment**

2.4.2 The assessment of impacts and mitigation development for the Fastlink of the proposed scheme was undertaken in accordance project programme constraints, which afforded limited time for survey and assessment. The assessment of potential impacts has been undertaken in a qualitative manner only. No quantification of impact magnitude or significance has been undertaken as part of this assessment.

2.4.3 However, the general impacts on ecology and nature conservation as a result of new trunk roads are well documented. Therefore in this report, the potential impacts of the proposed scheme are discussed in generic and qualitative terms. This provides an indication of the types of impacts that are likely to result, prior to mitigation. An indication of where significant impacts are anticipated are also provided.

2.4.4 Similarly, mitigation is proposed in general terms only. Site specific mitigation has not been formulated for this assessment. The mitigation section describes a general approach and guiding principles that are established methods used on UK road schemes.

2.4.5 The risk of residual impacts remaining following mitigation is discussed in the main chapter, Chapter 40 (Ecology and Nature Conservation).

### **3 Baseline**

#### **3.1 Consultation Information**

- 3.1.1 SNH provided records of ancient and long-established woodlands from their Semi-natural and Ancient Woodland Inventories, with peatlands listed in the Lowland Raised Bog Inventory (LRBI) (refer to Figures 40.1a-b).
- 3.1.2 Aberdeen City Council provided details of statutory and non-statutory designated sites of ecological importance including SSSI, District Wildlife Sites (DWS) and a list of NES LBAP priority habitats. The NES LBAP Coordinator confirmed locally important species and priority habitats.
- 3.1.3 The North East Scotland Biological Records Centre (NESBReC) provided Phase 1 Habitat Survey results undertaken by the Scottish Wildlife Trust (1992 to 1997 and 2002), a plan showing DWS and the results of the Grampian Natural Habitat Survey (1988).
- 3.1.4 The Forestry Commission provided data about forest/woodland areas and their management.
- 3.1.5 Additional data concerning rare flora was received from the Botanical Society of the British Isles (BSBI) County Recorder for Aberdeen and Kincardine.

#### **Designated Areas**

- 3.1.6 There are no internationally, nationally or locally designated areas of conservation concern within the study area. The internationally important Red Moss of Netherley SAC lies approximately 1km to the west of the proposed scheme.
- 3.1.7 Limpet Wood, Megray Wood and Slicewells Wood are listed in the Ancient Woodland Inventory as being of long-established of plantation origin (Figures 40.1 a-b).
- 3.1.8 Habitat types within the study area include boundary and linear features, arable and horticultural land, improved grassland, fen, marsh, coniferous, broad-leaved and mixed woodlands.
- 3.1.9 Several priority UK BAP habitats are present in the study area including lowland heath, lowland raised bog, cereal field margins, lowland meadows, wood-pasture and parkland and wet woodland. The NES Biodiversity Audit (Alexander et. al. 1998) identified that Aberdeenshire holds 44 listed habitats. The habitats are well represented in North East Scotland in a UK or Scottish context. Those of relevance to the study area are planted coniferous woodlands, acid grassland, lowland raised bogs and fens. In addition, six locally important habitats were identified. Of these, scrub, riparian woodland, birch woodlands and serpentine grassland/heath mosaic are relevant to the study area. Birch woodlands and serpentine grassland/heath mosaic are considered to be of national significance.

#### **3.2 Survey Results**

- 3.2.1 Target note (TN) numbers are presented on Figures and are detailed in Annex 1. The results of the Phase 1 Habitat survey are presented in Figures 40.2a-f. On the basis of these results, further boundaries were drawn around groups of Phase 1 Habitat Areas where they formed an obvious ecological unit. Results have been described on this basis.
- 3.2.2 The following paragraphs briefly describe the main habitats found along the proposed route with Habitat Area numbers provided.

### **Section FL1**

- 3.2.3 This section is dominated by arable farmland with occasional species-rich cereal margins. In general, biodiversity around these farming sites is concentrated in shelterbelts and fragments of plantation woodland. Limpet Burn is bordered in some areas by wet woodland (Limpet Burn Wood), which stretches into the conifer plantation woodland of Megray Wood. A number of wetland habitats are present in Fishermyre Wood including wet woodland, heath, fen and marsh. Details on individual Habitat Areas are provided in Table 2.
- 3.2.4 Within this section, there are fragments of plantation woodlands, shelterbelts and areas of semi-natural habitat:
- Woodland – Plantation: Megray Wood (F6) is the largest block of conifer plantation. A much smaller coniferous plantation is present at H Ram Wood (F4).
  - Woodland – Semi-natural: Many of the shelterbelts can be classed as semi-natural as they contain ancient woodland indicator ground flora. This does not necessarily imply the woods are ancient, but suggests prolonged shading consistent with long-established woodland. Limpet Wood (F7) is a mature mixed plantation woodland (registered on the AWI) that grades into a semi-natural riparian birch (*Betula* sp.) wet woodland along the line of Limpet Burn. Other semi-natural woodland is associated with Slicewells Wood (F5) (registered on the AWI), which appears to be of ancient plantation origin but has since regenerated. To the west, this consists of birch-dominated wet woodland (F11), whilst a more mixed wood containing a variety of broadleaves and Scots pine conifers (*Pinus sylvestris*) is present to the east.
  - Semi-improved grassland: Semi-improved grassland is mostly confined to West Fishermyre Wood (F11). Mesotrophic grassland occurs on a small hill in this section, whilst in the lower areas near conifer plantation woodland and gorse (*Ulex europaeus*) scrub, acid grassland is the dominant semi-improved grassland habitat. Acid grassland is occasional within the drier areas of Fishermyre Wood.
  - Bracken and scrub habitats: Gorse scrub is frequent throughout the area. Dense gorse is particularly notable around Fishermyre Wood (F12), lining both heathland and birch wood. A richer willow carr (*Salix* sp.) occurs across the heathland. Scattered gorse and hawthorn (*Crataegus monygn*) scrub occurs occasionally in field boundaries, roadsides and lining the railway line to the south. Bracken (*Pteridium aquilinum*) is relatively limited within the area. Dense patches are only present at Fishermyre Wood (though this occurs outside the study area) and on the northern slopes of Limpet Burn (F7).
  - Heathland, fen and marsh habitats: Extensive heather (*Calluna vulgaris*)/bell heather (*Erica cinerea*) dry heath is present around Fishermyre Wood (F12). The value of this area is increased through linkages with carr, dense scrub, fen and semi-natural mixed woodland. This grades into acid fen, characterised by rushes overlaying abundant *Sphagnum* moss. Rich marsh developing into wet birch woodland occurs along Limpet Burn.
  - Invasive Species: Japanese knotweed (*Fallopia japonica*) is present at the edge of the wooded roadside border of the agricultural fields of New Mains of Ury (F2).
  - Stream habitat: Limpet Burn (F7) is a heavily vegetated stream. This flows through the valuable habitats of wet woodland and marsh, as well other habitats such as scrub and grassland. A species rich wet woodland is situated near Megray Burn and Limpet Burn, though this eventually degrades into conifer plantation to the north. Fishermyre Burn is largely a field drainage system, though it borders marsh in the northern section. Green Burn supports a fen and wet woodland, as well as a more species poor marsh.

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**Table 2 – Habitat Areas Found Within Section FL1**

Habitat Area	Feature/Asset	Target Note Number	Description
F1	Agricultural fields between the A90 and Stonehaven	1	Series of agricultural fields with scattered scrub. A railway line runs through the area, however this is characterised by scattered scrub, rank grassland and tall ruderals.
F2	Agricultural fields west of New Mains of Ury	2 3 4 5 6 7 8 10	Large expanse of south sloping agricultural fields. Broad-leaved shelterbelts between fields and the road can be relatively species rich and, in some cases, of semi-natural status (though derived from plantation).
F3	Agricultural fields to the north of Megray Farm	9	Very large arable fields with occasional scattered scrub. A species rich arable border is present around some of the fields. Dwelling houses with tree surrounds are present to the south.
F4	H Ram Wood		Small pocket of mature plantation woodland.
F5	Slicewells Wood	11 12 13	Semi-natural broad-leaved woodland co-dominated by rowan ( <i>Sorbus aucuparia</i> ) and birch. The woodland near to Coneyhatch Farm (F10) is comprised of similar species but goat willow ( <i>Salix caprea</i> ) is co-dominant with birch in that area.
F6	Megray Wood		Mature conifer plantation dominated by Sitka spruce ( <i>Picea sitchensis</i> ). The upstream section of the Limpet Burn runs through the upper portion by Coneyhatch Farm, eventually connecting to the richer F7.
F7	Limpet Burn	14 15 16 17 18 19 20	Mosaic of semi-natural communities lining the heavily vegetated Limpet Burn. Habitats include a dense marsh with scattered willow, birch woodland, dense bracken and continuous gorse scrub.
F8	Agricultural fields surrounding Coneyhatch and Wyndford Farm	21 23 41	Series of arable and improved fields, with occasional marshy grassland and scattered scrub.
F9	Kempstone Hill		Gorse and willow scrub is abundant atop an area of heath and acid grassland, grading into more continuous dry heath to the east.
F10	Fishermyre Wood south	22	Series of wetland habitats, including fen, marsh, heath and willow carr, plus some acid grassland in drier areas.
F11	Fishermyre Wood west.	24 25 26 27 28	A mix of semi-natural broad-leaved birch wood towards the edge with road, combined with dense continuous gorse scrub. Behind the birch wood is a mature Scots pine conifer plantation, with acid grassland ground flora. The acid grassland extends westwards beyond the plantation. The hill to the north is composed of semi-improved neutral grassland.
F12	Fishermyre Wood. Wet habitats to the south of Allochie Croft	29 30 31 32 33 34 35 36	The majority of this area is dominated by dry heath. The north and north west is lined with dense gorse scrub. Mixed semi-natural woodland is present towards the south west with scattered pockets of willow dominated wet woodland ranging across the south. Fen is present in the environs of the wet woods.

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**Section FL2**

3.2.5 Improved and arable fields comprise most of the habitat in this section. Most of the fields have dry stone walls along the boundaries, with occasional hedges. Small pockets of scrub are rarely present, as are marsh/marshy grassland habitats. Most of the wooded environment is limited to the riparian zone of the Burn of Muchalls which contains young mixed plantations in the west and semi-natural wet woodland in the east. Details on individual Habitat Areas are provided in Table 3.

3.2.6 Habitats within this section include:

- Woodland – Plantation: Plantation woodland is largely limited to the immediate surrounds of the Burn of Muchalls (F15). This is a young mixed plantation containing Scots pine and a variety of broad-leaved species. Other plantation is to be found at Elrick Wood (TN49 and 50). This is composed of Sitka spruce plantation. The north is mature, whilst the south is relatively recently planted.
- Woodland – Semi-natural: As with the plantation woodland, the semi-natural broad-leaved woodland is a riparian habitat feature comprising of rowan/willow/alder (*Alnus glutinosa*) wet woodland.
- Marsh/marshy grassland: This habitat was found surrounding a pond (F16), along with goat willow scrub.
- Heathland habitats: The area within F14 contains a mix of dry and wet heath combined with acid grassland and peat underneath. Heather is the dominant ericoid, with the moss layer well-developed and containing frequent *Sphagnum spp.*
- Semi-improved grassland: This habitat is limited in this section but does occur as a mesotrophic assemblage in F13 and F16.
- Standing water: A small pond in the eastern section of F16 supports a surround of willow scrub and marshy grassland. There are also several ponds in the F15 area surrounded by marshy grassland and young mixed plantation woodland. The marshy grassland is comprised of frequent tufted hair grass (*Deschampsia caespitose*) and yorkshire fog (*Holcus lanatus*) and marsh thistle (*Cirsium palustre*) with occasional marsh marigold (*Caltha palustris*), wild angelica (*Angelica sylvestris*), marsh valerian (*Valeriana dioica*), meadowsweet (*Spiraea almaria*) and ground elder (*Aegopodium podagraria*).
- Stream habitats: The Burn of Muchalls is lined with semi-natural wet woodland and young mixed plantation (F15), while Back Burn influences a mesotrophic grassland community.
- Hedgerows: The area including and surrounding the Burn of Muchalls (F13, F15 and F16) are planted with young fenced off largely broad-leaved species. These hedgerows are approximately 2-5 years old and are comprised of traditional hedgerow species such as hawthorn, beech (*Fagus sylvatica*), hazel (*Corylus avellana*) and sweet briar (*Rosa rubiginosa*) with the occasional holly (*Ilex aquifolium*).

**Table 3 – Habitat Areas Found Within Section FL2**

Habitat Area	Feature/Asset	Target Note Number	Description
F13	Agricultural fields surrounding Hill of Muchalls	37 42 45 46	This area is comprised of agricultural land that is predominantly improved grassland or grasses cropped for silage. There are small areas of mature mixed plantation woodland and shelterbelts throughout that are co-dominated by beech and Scots pine and occasional patches of dense gorse scrub.
F14	Heath by Allochie		A small area of dry heathland that has not yet been grubbed up for agriculture although this process is still ongoing.

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Habitat Area	Feature/Asset	Target Note Number	Description
F15	Burn of Muchalls	43 47	Riparian habitat surrounding the Burn of Muchalls. This varied riparian zone includes semi-natural wet woodland consisting of rowan, alder and willow in the eastern section with young mixed plantation woodland in the western section that consists of Scots pine, birch, rowan, hazel, whitebeam ( <i>Sorbus aria</i> ), a number of willow species, bird cherry ( <i>Prunus padus</i> ) and wild cherry ( <i>Prunus avium</i> ).
F16	Agricultural fields from north of the Burn of Muchalls to Cookney	44 48 49 50 51 52 53	This Habitat Area is predominantly agricultural land consisting of improved pasture and cropped silage. Recent management has included several measures that benefit biodiversity, such as many newly planted hedgerows plus rows and groups of standard trees. Mature Scots pine and beech line many of the lanes in the area. Shelterbelts comprised of these species are frequent throughout the landscape.

**Section FL3**

3.2.7 Improved grassland is dominant with arable land abundant. Wetter habitats are frequent and include bog, heath, marsh, acid grassland and riparian mesotrophic grassland. Many of the fields are lined with dry stone walls, hedges and/or shrubs/trees. Pockets of dense scrub are frequent within the mid-section particularly. Woodland is limited, being largely confined to a young plantation. Details on individual Habitat Areas are provided in Table 4.

3.2.8 Habitats within this section include:

- Woodland – Plantation. A very young conifer plantation is present within F25. Many of the trees present are still in tubes and the ground flora is indistinguishable from the wet heath/acid grassland to the south (F23).
- Wetland habitats – Habitat Areas F23, F24 and F25 appear to be hydrologically connected. F23 is a wet heath acid grassland mix that continues into the young plantation in F25. These habitats drain to the lower level of F24. Bog has developed along with pools of standing water in the west, while the environment is more modified in the east, with tracks and planted birch and Scots pine drying the ground underneath. The hydrological connection can also be traced to marsh land in the south, leading to an acid grassland/dry heath complex (F21). Aside from the marshy grassland connecting the peatland habitats described above, marsh also occurs in the south of this section (F19 and F17), In the west, the marsh connects to a dry modified bog, merging into acid grassland and dense scrub. The eastern section contains a species-rich marsh with willow carr developing. In the north, marshy grassland is associated with poor field drainage.
- Semi-improved grassland – Mesotrophic semi-improved grassland occurs in the floodplain of the Crynoch Burn (F27). Although variable, the high moisture element can be determined by the presence of Yorkshire fog, rushes and tufted hair-grass. Other semi-improved grassland is of a more acidic nature and is present close to the wet habitats of bog and heath (F17, F23 and F25).
- Bracken and scrub habitat – The presence of bracken is relatively infrequent across the section with only Crynoch Burn (F27) having dense pockets. Many areas of dense scrub are present, the vast majority of which is dominated by gorse.
- Linear habitats – Dry stone walls occur across much of the section but are a particular feature in the south of this section. Hedgerows are limited, however many of the scrub lined fields provide a similar wildlife habitat/corridor.
- Stream habitats – Cookney Ditch and Stoneyhill Burn form the limits of wet willow wood and marshy grassland (F19). Strannog Burn, Cairns Burn, Crossley Burn and Whiteside Burn influence the formation of a number of wet habitats (F21, F23, F24 and F25).

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**Table 4 – Habitat Areas Found in Section FL3**

Habitat Area	Feature/Asset	Target Note Number	Description
F17	Wet habitats north of Cookney	54	This is an area with patches of bog and heath, characterised by hares tail cotton grass ( <i>Eriophorum vaginatum</i> ) humps with abundant heather and common cotton grass ( <i>Eriophorum angustifolium</i> ) dominant in the bog pools. The moss species in this area are predominantly <i>Sphagnum</i> . There are also areas of wet and dry heath throughout this habitat consisting of heather, cross leaved heath ( <i>Erica tetralix</i> ), crowberry ( <i>Empetrum nigrum</i> ), bilberry ( <i>Vaccinium myrtillus</i> ) and occasional purple moor grass ( <i>Molinia caerulea</i> ). Here <i>Sphagnum</i> is not a major constituent.
F18	Agricultural fields from Cookney to East Rothnick Wood	58 59 60 61	Large area of predominantly improved grassland but also with occasional arable fields. Marshy grassland is present though rare. Scrub is present throughout the habitat, usually scattered around field edges and boundaries, however dense pockets of continuous gorse scrub are also present.
F19	Stoneyhill	55 56 57	Marshy grassland dominated by soft rush ( <i>Juncus effusus</i> ) and grasses. Willow and gorse are frequent throughout the area, both as dense patches and scattered scrub.
F20	Agricultural fields around Berry Top		Series of agricultural fields with occasional pockets of scattered scrub, notably within the vicinity of both new and established dwelling houses.
F21	Wet habitats around East Crossley	62	The habitats grade from soft rush dominated sheep grazed fields particularly in the north to a more species-rich dry heath/acid grassland mosaic dominated by wavy-hair grass ericoids and cotton grasses. Scrub is frequent and is particularly invasive within the dry heath habitat.
F22	Agricultural fields from Quoscies to Strannog	64 65	A series of improved fields. Soft rush is prominent in the mid-section, whilst scattered and dense gorse scrub is the distinguishing feature in the north.
F23	Dry heath/acid grassland mosaic to the west of Wedderhill	73	Dry heath/ acid grassland mosaic on level area of ground. Grassland dominates overall with scattered shrub occasional. Patches of wet heath leading onto bog are also present.
F24	Bog/heath to the immediate west of Wedderhill	67 68 69 71	Wet modified bog is the dominant habitat, this being of a higher value in the western section. The eastern section of this area is more modified, containing areas of dry heath, wet birch woods and scattered broadleaves and conifers. A small vegetated burn is present with a pool of standing water. Synthetic tracks are present within this area.
F25	Plantation woodland south of Strannog	72	A young plantation woodland underlain by dry heath/ acid grassland mosaic similar to that of F24. The plantation is fenced from the surrounding areas on uneven but generally north-sloping terrain.
F26	Agricultural fields to the south of Polston Farm		Dominated by improved fields, scrub is rare but marshy grassland is present to the west of Burnhead.
F27	Floodplain and immediate surrounds of Crynoch Burn (south)	74 75	Mesotrophic semi-improved grassland is dominant to the south, giving way to improved fields with abundant gorse scrub.

## 4 Evaluation of Habitat Areas

4.1.1 The evaluation was carried out following the criteria outlined in Table 1. Each Habitat Area has been assessed in terms of its overall ecological value. The paragraphs below give a brief summary of the habitats of value within each section. Individual evaluations of Habitat Areas are presented in Table 5.

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**Section FL1**

- 4.1.2 In this section, there are five Habitat Areas assessed as being of regional importance covering two ecologically and geographically linked areas. Slicewells and Fishermyre Woods (F5, F10, F11 and F12) are noted for their variety of wet habitats, including wet woodland, fen and heath.
- 4.1.3 Megray Wood (F6) is assessed as being of county value due to it containing a viable area of LHAP habitats, which are plantation woodland and burn. However, this Habitat Area has been upgraded to regional value due to its close proximity and connectivity with Limpet Burn (F7), which contains both willow and birch UK BAP wet woodland.

**Section FL2**

- 4.1.4 The Burn of Muchalls fulfils the criteria for the LHAP Burns and Rivers, while the wet woodland located along the flood plain is a UK BAP priority habitat. However, the limited extent of this habitat reduces the value. The burn extends outside of the Habitat Area, with a capacity to affect riparian and wetland habitats outside the study area, making this of county value.

**Section FL3**

- 4.1.5 There are five Habitat Areas of county value in this section. The areas of county level value (F17, F21, F23, F24 and F27) are assessed on the basis that they contain the UK BAP priority habitats of lowland raised bog and lowland heathland. However, their modified and fragmented nature mean that they are downgraded in value.
- 4.1.6 Crynoch Burn (F27) is part of the River Dee SAC. As the designation of the SAC does not relate to terrestrial riparian habitats specifically, this Habitat Area is assigned as being of regional value.

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**Table 5 – Evaluation of Habitat Areas**

Habitat Area	Feature/Asset	Description	Evaluation
F1	Agricultural fields between the A90 and Stonehaven	Series of agricultural fields with scattered scrub. The Aberdeen – Stonehaven railway line contains semi-natural habitats of limited importance, however, this is part of a larger linear habitat.	Local
F2	Agricultural fields west of New Mains of Ury	Extensive area of arable farmland, with shelterbelt woodlands that are features of local ecological value.	Local
F3	Agricultural fields to the north of Megray Farm	Very large arable fields with a small occasional scattered scrub and arable weed borders. The most valuable arable weeds are however outside of the survey boundary.	Local
F4	H Ram Wood	Small pocket of mature LHAP plantation woodland. The small size and isolation reduce the value of the habitat.	Local
F5	Slicewells Wood	Viable area of semi-natural wet birch broad-leaved woodland listed in the AWI. Wet woodland is listed as a UKBAP and LBAP Priority Habitat. This Area also connects to other wetland habitats, including fen (F12).	Regional
F6	Megray Wood	Mature conifer plantation (LHAP priority) with an LHAP small burn which supports and connects to viable area of more species-rich wet woodland (UKBAP priority habitat).	Regional
F7	Limpet Burn	Mosaic of semi-natural communities along the heavily vegetated Limpet Burn. Communities include a dense marsh with scattered willow carr, wet birch woodland (UKBAP priority habitat), dense bracken and continuous gorse scrub. Area included on the AWI.	Regional
F8	Agricultural fields surrounding Coneyhatch and Wyndford Farm	Series of arable and improved fields, with occasional marshy grassland and scattered scrub.	Less than local
F9	Kempstone Hill	Dry heath/acid grassland mosaic with frequent gorse and willow scrub.	Local
F10	Fishermyre Wood south	Wetland habitats, including BAP priority habitats of wet woodland and lowland heathland forms a part of the Fishermyre Wood wetland system.	Regional
F11	Fishermyre Wood west.	Viable area of semi-natural wet birch woodland (UKBAP priority habitat) combined with dense continuous gorse scrub. Behind the birch wood is a Scots pine conifer plantation (LHAP priority), with acid grassland underneath and beyond. The hill to the north is composed of semi-improved neutral grassland.	Regional
F12	Fishermyre Wood. Wet habitats to the south of Allochie Croft	The majority of this area is dominated by dry heath (Lowland Heathland UKBAP). The south contains willow carr (UKBAP Wet Woodland) and Fen (UKBAP Fens).	Regional
F13	Agricultural fields surrounding Hill of Muchals	Extensive area of arable farmland, with shelterbelt woodlands that are features of local ecological value.	Local
F14	Heath by Allochie	Small area of LBAP heathland with ongoing process of grubbing up. The degraded nature reduces the value of this habitat.	Local
F15	Burn of Muchalls	LHAP riparian habitat surrounding the Burn of Muchalls, including small and localised areas of semi-natural UKBAP wet woodland and young mixed plantation woodland.	County
F16	Agricultural fields from north of the Burn of	Agricultural land with many newly planted hedgerows and rows and groups of standards trees, plus mature Scots pine and beech lining and	Local

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Habitat Area	Feature/Asset	Description	Evaluation
	Muchalls to Cookney	shelterbelts.	
F17	Wet habitats north of Cookney	Series of wetland habitats including UK BAP lowland bog and heathland.	County
F18	Agricultural fields from Cookney to East Rothnick Wood	Agricultural fields with scrub.	Local
F19	Stoneyhill	Species-rich marshland with UK BAP willow carr developing.	County
F20	Agricultural fields around Berry Top	Series of agricultural fields with occasional pockets of scattered scrub.	Less than local
F21	Wet habitats around East Crossley	The habitats grade from LHAP soft rush dominated fields to a more ecologically valuable dry heath (UK BAP Lowland Heathland) /acid grassland mosaic. Scrub is frequent.	County
F22	Agricultural fields from Quoscies to Strannog	Improved fields with soft rush and gorse scrub.	Less than local
F23	Dry heath/acid grassland mosaic to the west of Wedderhill	Dry heath with wet heath characteristics (UK BAP Lowland Heathland)/ acid grassland mosaic. Patches of wet heath leading onto bog are also present.	County
F24	Bog/heath to the immediate west of Wedderhill	Wet heavily modified bog with dry heath (UK BAP Lowland Heathland), UK BAP wet birch woods and scattered broadleaves and conifers, plus a small vegetated burn (Rivers and Burns LHAP) is present with a pool of standing water.	County
F25	Plantation woodland south of Strannog	Young plantation woodland underlain by dry heath/ acid grassland mosaic.	Local
F26	Agricultural fields to the south of Polston Farm	Dominated by improved fields with scrub and marsh.	Local
F27	Floodplain and immediate surrounds of Crynoch Burn (south)	Mesotrophic semi-improved grassland (LHAP Species rich grassland) giving way to improved fields with abundant gorse scrub. Also contains the Crynoch Burn – part of the River Dee SAC catchment.	Regional

## 5 Potential Impacts

### 5.1 Impact Assessment

5.1.1 In general, impacts can be referred to as direct impacts, where the impacts of the proposed scheme would result in a direct change to the status of an ecological receptor, during a construction or operational phase. For example, habitat loss due to land-take or loss of animals due to road mortality are referred to as direct impacts. Indirect effects of the proposed scheme generally relate to secondary effects. Fragmentation of habitat, for example, can affect the long-term viability of local populations of species.

5.1.2 In this section of the report, the potential impacts of the proposed scheme are described. Site specific impacts have not been provided at this stage (refer to section 2.4.2). Instead, a summary text has been provided which details the main impacts that are likely to occur as a result of the proposed scheme. It should be noted that the impacts associated with the operational phase of the scheme are considered to be permanent, whereas temporary impacts, which are only apparent while the road is being built, are discussed in association with the construction phase.

5.1.3 Potential impacts associated with the proposed scheme include:

- direct habitat loss through land-take;
- severance or fragmentation of existing areas of habitat;
- hydrological disruption;
- pollution via road drainage, run-off and spray from road traffic;
- physical obstruction caused by road constructions and bridges; and
- disturbance during construction.

**Table 6 – Summary of Impacts During Construction and Operation**

Generic Impact	Impact Description	Construction Phase	Operation Phase
Direct Habitat Loss	The proposed works involve construction of a dual carriageway through undeveloped habitats. Direct habitat loss of these habitats is likely along the whole route corridor, with a minimum width of habitat loss being approximately 50m, where the proposed route is at grade with surrounding land. In areas where a cutting or embankment is required, the width of habitat loss is increased depending on the extent of the required works.	Yes	Yes
Severance or fragmentation of existing Habitat Areas	The proposed road would result in the severance of habitats adjacent to the proposed alignment. Fragmentation of Habitat Areas is likely to occur where the proposed route severs existing Habitat Areas, resulting in smaller, more numerous areas of habitat.	Yes	Yes
Physical obstruction caused by road constructions and bridges	The proposed road would act as a physical obstruction to the natural movement of species. These impacts are more obvious on animal populations resident in the study area and these are discussed in other specialist reports. However, movement of plant species can also be obstructed by physical barriers such as roads.	Yes	Yes
Hydrological disruption	Wetland habitats, including mires, blanket bog and wet heaths are susceptible to impacts from developments that affect the hydrological regimes of those habitats. Wetland Habitat Areas close to the proposed route may be subject to such impacts.	Yes	Yes
Pollution via road drainage, runoff	During construction of the proposed road, pollution is likely to be predominantly associated with runoff of construction	Yes	Yes

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Generic Impact	Impact Description	Construction Phase	Operation Phase
and spray	materials onto semi-natural habitats may result in adverse impacts to these habitats. During the operation of the road, pollution resulting from road drainage, runoff and spray is likely to adversely impact habitats adjacent to the road.		
Visual and light pollution	Visual and light pollution impacts are likely to occur with the magnitude dependent on the level of road lighting present in specific areas.	Possible	Yes
Air pollution	During the construction phase, particulate deposition of material arising from construction materials may result in limited impacts close to the construction site. During operation of the road, air pollution is likely to arise from traffic emissions.	Yes	Yes
Disturbance during construction	Disturbance to habitats within the construction corridor and in adjacent areas is likely during construction and due to the presence of temporary site compounds.	Yes	No

5.1.4 Table 7 summarises the potential impacts of the proposed scheme on the study area.

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**Table 7 – Summary of Potential Impacts**

<b>Habitat Area</b>	<b>Feature / Asset Evaluation</b>	<b>Potential Impacts</b>
F1	Agricultural fields between the A90 and Stonehaven Local	Direct habitat loss of farmland by access road. Severance from farmland on other side of route. Potential pollution and disturbance impacts.
F2	Agricultural fields west of New Mains of Ury Local	No direct habitat loss. No observable secondary impacts are likely to occur.
F3	Agricultural fields to the north of Megray Farm Local	Direct loss of farmland habitat but not affecting arable weed location. Severance from farmland on other side of route. Potential pollution and disturbance impacts.
F4	H Ram Wood Local	Loss of conifer woodland of around 10%. Potential pollution and disturbance impacts.
F5	Slicewells Wood Regional	No direct habitat loss. No observable secondary impacts are likely to occur.
F6	Megray Wood Regional	Direct loss of edge habitat of plantation woodland. Potential pollution and disturbance impacts.
F7	Limpet Burn Regional	Direct loss of UK BAP and other habitats where route crosses. Severance and fragmentation of habitats on either side of route. Potential pollution and disturbance to remaining habitats.
F8	Agricultural fields surrounding Coneyhatch and Wyndford Farm Less than local	Direct loss of low value farmland habitat. Severance from farmland on other side of route. Potential pollution and disturbance impacts.
F9	Kempstone Hill Local	No direct habitat loss as all habitats of ecological value are > 1000m from the route. No observable secondary impacts are likely to occur.
F10	Fishermyre Wood south Regional	Direct loss of UK BAP and other habitats where route crosses. Severance and fragmentation of habitats on either side of route. Potential hydrological impacts on wetland habitats. Potential pollution and disturbance to remaining habitats.
F11	Fishermyre Wood west. Regional	No direct loss. No observable secondary impacts are likely to occur.

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<b>Habitat Area</b>	<b>Feature / Asset Evaluation</b>	<b>Potential Impacts</b>
F12	Fishermyre Wood. Wet habitats to the south of Allochie Croft Regional	Direct loss of UK BAP habitats of wet woodland and fen. Severance and fragmentation on either side of route. Potential hydrological impacts on wetland habitats Potential pollution and disturbance impacts.
F13	Agricultural fields surrounding Hill of Muchals Local	Habitat loss of farmland. Loss/fragmentation of dry stone walls and species-rich native hedge. Severance from farmland on other side of route. Potential pollution and disturbance impacts.
F14	Heath by Allochie Local	No direct habitat loss. No observable secondary impacts are likely to occur.
F15	Burn of Muchalls Regional	Direct loss of stream habitat. Severance and fragmentation of farmland on either side of route. Potential pollution and disturbance impacts.
F16	Agricultural fields from north of the Burn of Muchalls to Cookney Local	Direct loss of low value farmland. Severance from farmland on other side of route. Fragmentation of six dry stone walls. Potential pollution and disturbance impacts.
F17	Wet habitats north of Cookney County	Direct habitat loss at the extreme southeast edge of habitat. Potential secondary impacts including pollution and disturbance.
F18	Agricultural fields from Cookney to East Rothnick Wood Local	Loss of low value farmland. Severance from farmland on other side of route. Fragmentation of nine dry stone walls. Loss of corner of dense gorse scrub. Potential pollution and disturbance impacts.
F19	Stoneyhill County	Loss of marshy grassland and developing UK BAP habitat. Potential hydrological impacts on wetland habitats. Potential pollution and disturbance impacts.
F20	Agricultural fields around Berrytop Less than local	Loss of corner habitat of farmland. Potential pollution and disturbance impacts.

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Habitat Area	Feature / Asset Evaluation	Potential Impacts
F21	Wet habitats around East Crossley County	Direct loss of acid grassland/dry heath Direct loss of marshy grassland Fragmentation of wetland habitat on either side of route. Potential hydrological impacts on wetland habitats. Potential pollution and disturbance impacts.
F22	Agricultural fields from Quoscies to Strannog Less than local	Loss of farmland habitat. Loss of species-poor marshy grassland. Severance of farmland and marshy grassland from other side of route. Potential pollution and disturbance impacts. Drying out of marshy grassland plus impacts to other wetland sites (i.e. F21).
F23	Dry heath/acid grassland mosaic to the west of Wedderhill County	Direct loss of dry heath/acid grassland habitat. Severance and fragmentation of habitat either side of the route. Drying out of wetland areas with impacts to wetlands outside this Habitat Area (e.g. F24).
F24	Bog/heath to the immediate west of Wedderhill County	No direct loss of habitat. Severance of hydrological connectivity by the route could result in drying out of wetland habitat.
F25	Plantation woodland south of Strannog Local	Direct loss of plantation woodland. Severance and fragmentation of young plantation. Drying out of acid grassland/heath below plantation. North-facing slope suggests no impact upon hydrological connectivity to other habitats.
F26	Agricultural fields to the south of Polston Farm Local	Direct loss of low value farmland. Severance from farmland on other side of route. Fragmentation of three dry stone walls. No observable secondary impacts are likely to occur.
F27	Floodplain and immediate surrounds of Crynoch Burn (south) County	No loss of habitat. No observable secondary impacts are likely to occur.

## 5.2 Estimate of Habitat Loss

5.2.1 The estimated areas of Phase 1 Habitats that would be lost to the proposed scheme are provided in Table 8. The amount of land-take required for the Fastlink section of the proposed scheme is currently estimated at approximately 1km<sup>2</sup>. Note that the estimates do not add up to the full 1km<sup>2</sup> and are provisional, as these estimates include only the footprint of the scheme, including detention basins. This estimate does not include areas surrounding ponds that may be removed from agricultural/community use and any subsequent land required for mitigation. Therefore, it is expected that the total land-take for the scheme will increase following finalised design.

**Table 8 – Breakdown of Land-take**

Habitat	Hectares (ha)
Broad-leaved semi-natural woodland	1.46
Broad-leaved plantation woodland	0.03
Coniferous plantation woodland	1.00
Mixed plantation woodland	1.71
Dense continuous Scrub	2.54
Semi-improved acid grassland	0.25
Semi-improved neutral grassland	0.05
Improved grassland	32.75
Marshy grassland	3.81
Poor Semi-improved grassland	4.84
Dry heath scid grassland mosaic	5.63
Fen	2.38
Arable	38.91
Cultivated/disturbed land introduced shrub	2.38
<b>Total</b>	<b>97.74</b>

## 6 Mitigation and Recommendations

### 6.1 Introduction

6.1.1 Mitigation measures are proposed for all ecological impacts on terrestrial habitats identified in the preceding sections. Generic mitigation measures are proposed that will be implemented throughout the study area affected by the proposed scheme. Specific mitigation measures are proposed where impacts of high magnitude are predicted. The development of mitigation is an iterative process, which is integral to the design and planning of a scheme.

6.1.2 Current guidelines highlight the importance of an agreed approach to mitigation with the proponent of a scheme prior to the publication of an ES. For example, the IEEM Guidelines for Ecological Impact Assessment (IEEM, 2006) states that ‘An EclA is effectively meaningless if it provides an assessment of the significance of the residual impacts of a scheme based on the proposed mitigation measures being implemented even though these measures have not been agreed by the developer’. Furthermore, the DMRB (2001) states that ‘The aims and objectives of the mitigation and any post construction monitoring should be agreed before the mitigation design process starts’.

6.1.3 Recommendations for suitable strategies and measures that deliver ecological enhancements are also increasingly being incorporated into planning policies. In addition, the Nature Conservation (Scotland)

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Act 2004 requires public bodies to further biodiversity in the course of their actions. Legislative guidance regarding mitigation for habitat loss and fragmentation is provided in Table 9.

6.1.4 The overall objectives for avoiding and minimising the ecological impacts associated with the proposed scheme are:

- to avoid adverse impacts in the first instance, for example by not pursuing a particular option or by devising alternatives where possible;
- where avoidance is not possible, reduce the adverse impacts with the aim of eliminating impacts and reducing each impact to being of minimal significance;
- where adverse residual impacts are anticipated, additional measures to offset the adverse impacts will be sought. For example, habitat creation to offset the local site specific impacts associated with habitat loss and fragmentation; and
- where localised site-specific mitigation may not be possible through habitat creation, or where such measures would be ineffective, it may be possible with the agreement of statutory consultees, to offset adverse impacts at a wider, regional level. Such measures may include habitat creation and/or restoration at sites remote from the point of impact or contributions to strategies that contribute to meeting the targets and objectives of Biodiversity Action Plans (BAPs).

6.1.5 In order to guide the development of appropriate mitigation for the proposed scheme, a Mitigation Vision Statement is being developed in consultation with the statutory consultees. The purpose of this working document is to provide strategic guidance on the development of site specific, as well as wider scale (i.e. outwith the route corridor) mitigation measures. The aim of this approach is to ensure an integrated approach to mitigation incorporating best practice guidance. A key factor in the successful implementation of ecological mitigation strategies would be the development of an Environmental Action Plan (EAP) to take forward the strategies of the Mitigation Vision Statement. The EAP for the proposed scheme will draw together all mitigation, enhancement, offset, management and monitoring proposals into a schedule of commitments.

6.1.6 An assessment of the cumulative impacts of the proposed scheme and further discussion of wider scale mitigation strategies to address habitat loss and fragmentation is presented in Chapter 54 (Cumulative Impact Assessment).

**Table 9 – Legislative Guidance for Mitigation**

Mitigation References in Legislation
Nature Conservation (Scotland) Act 2004, Part 1, Section 1.1: "It is the duty of every public body and office-holder, in exercising any functions, to further the conservation of biodiversity so far as is consistent with the proper exercise of those functions."
Environmental Impact Regulations (Scotland) 1999: Mitigation measures are intended "to prevent, reduce or where possible, offset any significant adverse impacts on the existing ecology and nature and conservation value of the surrounding area."

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Mitigation References in Legislation
<p>Design Manual for Roads and Bridges 2001, Volume 10 Section 4:            "Avoiding the negative effects of the project should be the first intention of any project. Mitigation should be provided where this is not possible. Mitigation design should be provided on a site-by-site basis, taking account of appropriate survey information.</p> <p>Land-taken or disturbed by project works should be minimised, except where there is a need to acquire more extensive areas of land for environmental mitigation.</p> <p>Where practicable and within the powers and resources of the Overseeing Organisation, opportunities for habitat creation or enhancement and species protection should be taken in addition to providing mitigation.</p> <p>Timing of activities should avoid impacts on protected and rare species and habitats, wherever possible.</p> <p>Mitigation design should retain, or wherever possible create, natural habitat links which may assist wildlife movements. Special engineering features (e.g. tunnels, ledges and bridges) combined with fencing, where appropriate, can be used to assist in maintaining links across roads."</p>
<p>NPPG14 Natural Heritage, Paragraph 74:  <a href="http://www.scotland.gov.uk/Publications/1999/01/nppg14">http://www.scotland.gov.uk/Publications/1999/01/nppg14</a></p> <p>"74. Planning authorities should have full regard to natural heritage considerations in determining individual applications and contributing to the implementation of specific projects. While in some circumstances it will be necessary to refuse planning permission on natural heritage grounds, authorities should always consider whether environmental concerns could be adequately addressed by modifying the development proposal or attaching appropriate planning conditions. In negotiating over development proposals, authorities should first seek to avoid any adverse effects on the natural heritage. Where this is not possible and other material considerations clearly outweigh any potential damage to the natural heritage, they should endeavour to minimise and mitigate the adverse effects and consider the scope for compensating measures. They should always encourage the retention and enhancement of features of natural heritage interest and seek to avoid the fragmentation or isolation of habitats. Where appropriate, they should also consider the scope for concluding an access agreement."</p>
<p>Scottish Transport Appraisal Guidance (STAG):  <a href="http://www.scotland.gov.uk/library5/transport/stag-07.asp">http://www.scotland.gov.uk/library5/transport/stag-07.asp</a></p> <p>Environment Section – Paragraph 6.15:            "6.15.2 The overall objective should be to maintain biodiversity in the study area, including wildlife habitats and species and to improve the status of rare and vulnerable species wherever possible. Transport proposals should therefore be designed:</p> <ul style="list-style-type: none"> <li>• To avoid harmful development affecting protected habitats. All EU member countries have such areas and networks, for example, those established under the Birds Directive (79/409/EEC) and the Habitats Directive (92/43/EEC) — the Natura 2000 sites, National Nature Reserves, Sites of Special Scientific Interest and regionally and locally designated sites;</li> <li>• To avoid development in, or close to, unprotected but valuable and sensitive habitats (e.g. important bird areas);</li> <li>• To avoid fragmentation of wildlife migration routes, e.g. by avoiding migration zones, or by mitigating the barrier effect by providing a tunnel or 'ecoduct' for wildlife;</li> <li>• To adopt the "no net effect" principle, providing full compensation for lost biodiversity values where loss is unavoidable. "</li> </ul>

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Mitigation References in Legislation
<p>WebTAG – Biodiversity Sub-Objective:  <a href="http://www.webtag.org.uk/webdocuments/3_Expert/3_Environment_Objective/3.3.10.htm">http://www.webtag.org.uk/webdocuments/3_Expert/3_Environment_Objective/3.3.10.htm</a></p> <p>“1.2.18 Mitigation - Where scheme options include proposals for mitigation, this should generally be taken account of in the appraisal of impacts. However, an exception to this general rule is described below. There are three categories to consider:</p> <ul style="list-style-type: none"> <li>• design proposals to minimise the impact of the proposal on the site (reducing runoff, for example);</li> <li>• on-site, or near-site, mitigation to help conserve existing biodiversity interest where the impacts can not be minimised (e.g. dedicated animal crossings, land management regimes); and</li> <li>• off-site proposals (such as habitat replacement) to compensate for biodiversity and earth heritage losses.</li> </ul> <p>These categories should be developed sequentially in scheme design:</p> <p>1.2.19 The first two categories are essentially about minimising the effects on or near the site. It is appropriate for these to be considered in appraising impact, provided they have been documented properly in the Environmental Statement. The key is to make an appropriate judgement about net impact. Where there is some risk in the mitigation proposals, it is appropriate to complete separate appraisals, for the 'with' and 'without' mitigation cases.</p> <p>1.2.20 The third category above is about compensation for expected loss, though in Environmental Statements it is often described as 'mitigation'. A precautionary approach needs to be taken here: often it is not appropriate to lower the impact category on the basis of off-site compensation proposals, as these are unlikely to fully recompense for the lost features. This is especially so for the more valuable sites.</p>

**6.2 Generic Mitigation**

6.2.1 The proposed scheme would result in habitat loss, fragmentation and severance. The measures summarised in Table 10 will be implemented to avoid or reduce the potential impacts of the proposed scheme on terrestrial habitats during construction. Impacts will be minimised using measures such as best practice during construction, translocation of vegetation (where practical), restricting work to the route corridor and minimising the size of site work compounds.

**Table 10 – Mitigation Measures for Habitat Impacts During Construction**

Approach	Mitigation
Avoid	Comply with the requirements of the Ecological Clerk of Works who will be employed on behalf of the Scottish Executive; Ensure that work compounds and access tracks, etc. are not located in, or adjacent to, areas that maintain habitat value; Establish site fencing to prevent access to areas outside of working areas, particularly in areas adjacent to features of interest/value; Cover site safety issues including storage of potentially dangerous materials; and Follow SEPA pollution prevention guidelines (PPG1, PPG2, PPG3, PPG5 and PPG6) to prevent pollution of watercourses through siltation or chemicals.
Reduce	Maintenance of connectivity through the use of land bridges, culverts etc.; Effective management of habitats to increase biodiversity; Restrict workforce to working areas through the erection of fencing, to prevent additional damage; and Implementation of best practice methods throughout construction and operation.
Offset	New landscape planting will comprise native species.

6.2.2 The following paragraphs outline the general principles employed for the development of mitigation measures for impacts on habitats and species.

6.2.3 Ecological mitigation measures are often complementary to those needed to reduce or offset impacts on other aspects of the environment. For example, mitigation of landscape and visual impacts can often be combined with ecological measures. Designing for synergistic mitigation measures can result in cost-effective use of resources and net benefits to the local environment.

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###### **Direct Habitat Loss**

- 6.2.4 Offsetting the loss of ecologically important habitats will occur through habitat creation schemes, where appropriate.
- 6.2.5 During the operation of the proposed road, management and maintenance of roadside verges will be undertaken or less to maintain and enhance floral diversity. Habitats that are not managed may become dominated by undesirable species that reduce the nature conservation value of the area.
- 6.2.6 Where areas of habitat creation are agreed, the strategy will be aimed at contributing directly to biodiversity targets identified in local (LBAP) and national (UKBAP) strategies. For example, wych elm (LBAP species) will be widely incorporated into roadside planting schemes; wet and riparian woodland (UK and LBAP habitats respectively) will be created along watercourses and localised woodland planting will be designed to improve landscape connectivity for red squirrels (UK and LBAP species).

###### **Severance or Fragmentation of Existing Areas of Habitat**

- 6.2.7 The proposed scheme is likely to result in increased fragmentation of existing habitats. These impacts will be mitigated through measures that aim to increase the ecological connectivity of habitats following construction. In addition, habitat connectivity will be enhanced through the reinstatement of appropriate linear habitats such as dry stone walls along the boundary of the proposed road. Where stream habitats are severed, compensatory measures will include enhancement of the riparian habitats where possible. For example, fencing and planting of the riparian zone will create important habitat, enhance the connectivity of habitats within the wider landscape and will also protect the stream banks from erosion and poaching from livestock. The creation of underpasses for mammals and ensuring that bridges with mammal passes are installed, where possible, rather than culverts, further mitigates such impacts.
- 6.2.8 During the operational phase, roadside verges and areas of habitat restoration will be managed to maintain and enhance the ecological value of the habitats and to improve the linkages between similar habitats along the route corridor.

###### **Pollution: Air, Runoff and Spray**

- 6.2.9 During construction, particulates such as discharge from machinery, sediments and exposed topsoils may result in direct pollution. An increase in traffic volume may result in increased runoff pollution and spray from traffic. Measures to minimise such pollution impacts will be implemented into the design and construction of the scheme. For example, measures aimed at intercepting runoff pollution, such as filter drains, soak-aways, infiltration trenches and oil separators will be implemented to reduce runoff. All road drainage will be held in attenuation ponds that will also act as a filtering system before discharging into local waterways. SEPA pollution prevention guidelines will be strictly adhered to.

###### **Disturbance During Construction**

- 6.2.10 Habitat clearance required for the proposed scheme will be undertaken outside the bird breeding season and conflicts with other protected species such as bats, badgers and reptiles avoided. A method statement will be prepared in advance for all areas where tree and scrub removal is required and it will be undertaken under the guidance of an Ecological Clerk of Works.

## **6.3 Site-Specific Mitigation**

- 6.3.1 Where the proposed scheme would result in ecological impacts, such as loss of woodland, wetland and other ecologically important habitats, it is strongly recommended that an appropriate programme of habitat creation is developed and implemented. The assessment identified that the following sites in the study area would be significantly affected by habitat loss, fragmentation or severance as a result of the proposed scheme:
- Megray Wood;
  - Fishermyre Wetland; and
  - the mosaic of semi-natural habitats including marshy grassland, dry heath and acid grassland to the east of Stranog Hill.

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**Annex 1 – Target Notes and Species List for the Phase 1 Habitat Survey**

Target Note Number	Grid Reference	Description
1	NO873873	Embankment with a number of ancient woodland species, indicating long-term shading. Trees now present consist of roadside plantings. Species include sycamore ( <i>Acer pseudoplatanus</i> ), elder ( <i>Sambucus nigra</i> ), hawthorn ( <i>Crataegus monogyna</i> ), birch ( <i>Betula sp.</i> ) and rowan ( <i>Sorbus aucuparia</i> ). Ground flora contains dominant great woodrush ( <i>Luzula sylvatica</i> ) with frequent bramble ( <i>Rubus fruticosus</i> ) and dog rose ( <i>Rosa canina</i> ). Regenerating alder ( <i>Alnus glutinosa</i> ) is frequent.
2	NO869876	Well-spaced semi-natural broad-leaved woodland strip. Species are mixed but overall beech is dominant. The shrub layer contains gorse ( <i>Ulex europeus</i> ) and elder, with the grassy ground layer dominated by false oat-grass ( <i>Arrhenatherum elatius</i> ).
3	NO872875	Invasive species. A small stand of Japanese knotweed ( <i>Fallopia japonica</i> ) within a hedge is present.
4	NO873878	Semi-natural broad-leaved woodland. Sycamore and beech ( <i>Fagus sylvatica</i> ) dominate with ash ( <i>Fraxinus excelsior</i> ) occasional. hazel ( <i>Corylus avellana</i> ) and rowan are occasional in the shrub layer with hawthorn rare. Great woodrush dominates the ground layer with abundant wood aven ( <i>Geum urbanum</i> ). Bramble and common dog-violet ( <i>Viola riviniana</i> ) are frequent. A single specimen of common twayblade ( <i>Listera ovata</i> ) was identified. Animal tracks were found throughout the wood.
5	NO873879	Semi-natural broad-leaved woodland. Dark closed canopy where beech dominates and sycamore is abundant. Great woodrush is dominant in the ground layer with wood aven abundant, whilst red campion ( <i>Silene dioica</i> ) is frequent.
7	NO873881	Crossing point for small mammal.
8	NO873882	Semi-natural broad-leaved woodland. Beech becomes more dominant to the south. In the ground layer, great woodrush and hogweed ( <i>Heracleum sphondylium</i> ) are abundant. Cocksfoot ( <i>Dactylis glomerata</i> ) and tufted hair-grass ( <i>Deschampsia cespitosa</i> ) are frequent, while red campion is occasional. Mammal tracks are well-defined.
6	NO872870	Broad-leaved plantation woodland with new plantings still in tubes and conifers occasional. Sycamore is dominant in the canopy, whilst the grassy ground layer is dominated by Yorkshire fog ( <i>Holcus lanatus</i> )/creeping soft grass ( <i>Holcus mollis</i> ) mix. The wood is separated into two sections by a wall, now overgrown with grasses.
9	NO882878	Arable weeds. Oilseed rape ( <i>Brassica napus</i> ) field with a good selection of arable weeds. Dominance is varied but species list includes field pansy ( <i>Viola arvensis</i> ), field forget-me-not ( <i>Myosotis arvensis</i> ), cleavers ( <i>Galium aparine</i> ), lesser stitchwort ( <i>Stellaria graminea</i> ), scentless mayweed ( <i>Tripleurospermum inodorum</i> ), broad-leaved dock ( <i>Rumex obtusifolius</i> ), creeping thistle ( <i>Cirsium arvense</i> ), common nettle ( <i>Urtica dioica</i> ), poppy ( <i>Papaver rhoeas</i> ), wild carrot ( <i>Daucus carota</i> ), shepherd's purse ( <i>Capsella bursa-pastoris</i> ), Yorkshire fog, cocksfoot, red dead-nettle ( <i>Lamium purpureum</i> ), common fumitory ( <i>Fumaria officinalis</i> ) and common groundsel ( <i>Senecio vulgaris</i> ).

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Target Note Number	Grid Reference	Description
10	NO872884	Semi-natural broad-leaved woodland. Similar species mix to TN11 but more spaced. No shrub layer but some regeneration. Bent grass is dominant but similar ground flora to TN11. Harebell ( <i>Campanula rotundifolia</i> ) is rare.
11	NO871884	Semi-natural broad-leaved woodland. Sycamore is dominant with beech occasional. The ground layer is mostly grasses (creeping soft grass, bent grass, cocksfoot and fescue ( <i>Festuca sp.</i> )) but with common dog-violet and common nettle abundant, wood sorrel ( <i>Oxalis acetosella</i> ) frequent and foxglove ( <i>Digitalis purpurea</i> ), wood speedwell ( <i>Veronica montana</i> ) and common sorrel ( <i>Rumex acetosa</i> ) occasional.
12	NO871887	Gorse dense scrub with scattered birch. The ground flora is dominated by soft rush ( <i>Juncus effusus</i> ) with wavy hair-grass ( <i>Deschampsia flexuosa</i> ) and Yorkshire fog abundant, plus frequent tormentil ( <i>Potentilla erecta</i> ).
13	NO872887	Semi-natural broad-leaved woodland. Birch dominates, with rowan and willow ( <i>Salix sp.</i> ) occasional and gorse invading. The ground layer is dominated by creeping soft grass with patches of locally dominant wavy hair-grass. Wood sorrel is frequent, whilst cocksfoot, soft rush, bent grass and great woodrush are occasional.
14	NO874886	Marsh. Soft rush dominated marsh with goat willow ( <i>Salix caprea</i> )/ birch scattered scrub occasional, plus mature alder to the south. Ground flora contains abundant common sorrel with frequent cleavers, Yorkshire fog, curled dock ( <i>Rumex crispus</i> ) and common marsh bedstraw ( <i>Galium palustre</i> ). Occasional species include common nettle, cuckoo-flower ( <i>Cardamine pratensis</i> ), wavy bitter-cress ( <i>C. flexuosa</i> ), marsh thistle ( <i>Cirsium palustre</i> ) and redcurrant ( <i>Rubus rubrum</i> ).  By the burn, the water table is closer to the surface and tufted hair-grass becomes co-dominant with soft rush. The stream itself is heavily vegetated, being dominated by jointed rush with abundant water horsetail ( <i>Equisetum fluviatile</i> ) and water forget-me-not ( <i>Myosotis scorpioides</i> ).
15	NO874887	Semi-natural broad-leaved woodland. Mature (c.10m) Birch-dominated woodland with no regeneration. Sweet vernal-grass ( <i>Anthoxanthum odoratum</i> ) is dominant in the ground layer with wood sorrel abundant. Mosses include occasional <i>Scleropodium purum</i> and <i>Rhytidiadelphus squarrosus</i> . The wood is on a gentle slope with frequent drainage channels. Great woodrush and wood anemone ( <i>Anemone nemorosa</i> ) are present in localised patches.
16	NO875888	Semi-natural broad-leaved woodland. Birch is dominant in the canopy however the ground flora is dominated by Yorkshire fog with greater stitchwort ( <i>Stellaria holostea</i> ) and foxglove frequent. A more acid character is evident by the occasional appearance of wavy hair-grass, tormentil and heath bedstraw ( <i>Galium saxatile</i> ), along with rare heather ( <i>Calluna vulgaris</i> ). Both great woodrush and soft rush are occasional.
17	NO875888	Semi-natural broad-leaved woodland. Birch is dominant in the canopy with great woodrush overwhelmingly dominant in the field layer. A deer was observed.
18	NO87915 88920	Limpet Burn. Marshy grassland/neutral flush. Limpet Burn is almost entirely vegetated but the burn runs freely underground. It has generated an unusual ground flora that would for the absence of moss or dominance by sedges or rushes be classified as a neutral flush. The sward is dominated by Yorkshire fog with occasional cocksfoot and smooth meadow-grass ( <i>Poa pratensis</i> ), soft rush and <i>Carex panicea</i> are locally frequent as is water horsetail. cleavers, marsh thistle, common nettle, cuckoo-flower, creeping buttercup ( <i>Ranunculus repens</i> ) and marsh marigold ( <i>Caltha palustris</i> ) are occasional.
19	NO87905 88945	Slopes of Limpet Burn. The swards on the slopes are comprised of co-dominant Yorkshire fog and creeping soft-grass with frequent great woodrush and occasional sharp-flowered rush ( <i>Juncus acutiflorus</i> ) (on the lower slopes). Frequent herbs are lesser stitchwort, common sorrel and bog stitchwort ( <i>Stellaria alsine</i> ) (on the lower slopes), frequent with occasional foxglove, common dog-violet, meadowsweet ( <i>Filipendula ulmaria</i> ), devil's-bit scabious ( <i>Succisa pratensis</i> ) and marsh willowherb ( <i>Epilobium palustre</i> ). At the top of the slopes bracken ( <i>Pteridium aquilinum</i> ) is scattered to continuous in places.
20	NO88305 88920	Limpet Wood. Mixed-plantation woodland (AWI). This wood is on the AWI inventory and is listed as being plantation of long-established origin. It is on the top and the slopes of a gorge that leads down to Limpet Burn. The canopy is comprised of a mixture of mature coniferous and broad-leaved species. There are occasional coniferous Scots pine, (the non-native) western hemlock ( <i>Tsuga heterophylla</i> ), Norway fir ( <i>Picea abies</i> ) and Sitka spruce ( <i>Picea abies</i> ) (there is a small plantation comprised of these two species along the top of the ridge. Beech is the only mature broad-leaved species in the canopy. The understorey is comprised of semi-natural broad-leaved woodland species rowan, alder and goat willow on the lower slopes near Limpet Burn.

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21	NO86835 89500	Marshy grassland to the west of TN22. This area of marshy grassland is co-dominated by tufted hair-grass and soft rush, with occasional broom ( <i>Cytisus scoparius</i> ). This grades into dry heath in the north
22	NO86890 89510	Semi-natural broad-leaved woodland. Woodland dominated by goat willow with frequent silver birch ( <i>Betula pendula</i> ) and occasional Scots pine ( <i>Pinus sylvestris</i> ).
23	NO87075 89565	Improved grassland covered in small stones, heavily grazed and poached producing a bare ground, grass, tussock mix.
24	NO866899	Acid grassland (90%)/dry heath (10%) mosaic. Wavy hair-grass dominates with frequent heath bedstraw and wood anemone. Heather and bell heather ( <i>Erica cinerea</i> ) are occasional, whilst Scots pine and Bbrch are occasional to frequent.
25	NO862904	Acid grassland (75%)/dry heath (25%) mosaic. Gorse, Scots pine, rowan and willow are occasional. The acid grassland is dominated by wavy hair-grass with frequent Yorkshire fog and soft rush. The dry heath is dominated by bell heather with abundant heather, frequent climbing coydalis ( <i>Corydalis claviculata</i> ) and wood anemone.
26	NO865902	Conifer plantation woodland. Scots pine is dominant (height of around 15m), with rowan and birch occasional in the shrub layer. Creeping soft grass and wavy hair-grass are co-dominant in the ground layer. Frequent species include bent grass, foxglove, broad buckler-fern ( <i>Dryopteris dilatata</i> ), soft rush and wood sorrel.
27	NO866902	Semi-natural broad-leaved woodland. Birch of around 10-12m in height dominates with rowan occasional. Beech and sycamore are occasional, becoming more abundant towards the wood edge at the road. The ground flora is dominated by creeping soft grass with frequent bent grass, wavy hair-grass and broad buckler-fern. Large humps of <i>Polytrichum sp.</i> are frequent. Bracken is abundant by the road edge.
28	NO863904	Small hill of mesotrophic semi-improved grassland/ marshy grassland. Tufted hair-grass is dominant with creeping thistle abundant. Frequent species include common nettle and curled dock, with occasional broad-leaved dock, meadow vetchling ( <i>Lathyrus pratensis</i> ) and bramble. Soft rush is occasional though compact rush ( <i>Juncus conglomeratus</i> ) can be locally dominant. Gorse is frequent and broom rare.
29	NO865903	Mixed Birch/willow /Scots pine/rowan semi-natural woodland. The majority of the ground layer is dominated by grasses (creeping soft grass/bent grass/ tufted hair-grass/ cocksfoot) with bramble and bracken locally dominant. Climbing coydalis and great woodrush are occasional.
30	NO866904	Scattered Scots pine with regenerating rowan, Scots pine and birch. The field layer is a dry heath/ acid grassland mix, becoming more heath to the east. Heath species include dominant heather with abundant <i>Sphagnum</i> , bell heather, hare's-tail cotton-grass ( <i>Eriophorum vaginatum</i> ) and crowberry ( <i>Empetrum nigrum</i> ). Deergrass ( <i>Trichophorum cespitosum</i> ), common cotton-grass ( <i>Eriophorum angustifolium</i> ), <i>Polytrichum commune</i> and purple moor-grass ( <i>Molinia caerulea</i> ) are frequent, whilst soft rush, wavy hair-grass, bog asphodel ( <i>Narthecium ossifragum</i> ) and tormentil are occasional. Rare species are wood horsetail ( <i>Equisetum sylvaticum</i> ), star sedge ( <i>Carex echinata</i> ) and northern marsh orchid ( <i>Dactylorhiza purpurella</i> ).
31	NO867905	Goat willow and eared willow ( <i>Salix aurita</i> ) carr (approx. 4m tall) with occasional birch. The ground flora is similar to TN32 but with frequent compact rush and soft rush and occasional hare's-tail cotton-grass and marsh cinquefoil ( <i>Potentilla palustris</i> ). Wet runnels through the wood contain active <i>Sphagnum</i> .
32	NO864905	Fen with wet grassland. Overall, jointed rush ( <i>Juncus articulatus</i> ) is dominant, though both tufted hair-grass and Yorkshire fog can be locally dominant. Other species present include marsh pennywort ( <i>Hydrocotyle vulgaris</i> ), marsh thistle, soft rush, horsetail, heath bedstraw, wavy bitter-cress, sheep's sorrel ( <i>Hydrocotyle vulgaris</i> ), marsh cinquefoil, common sedge ( <i>Carex nigra</i> ) and lesser stitchwort.
33	NO863908	Dry heath. Heather dominates with bell heather and hare's-tail cotton-grass occasional. Patches of wood horsetail are present. <i>Sphagnum</i> is frequent underfoot, whilst scattered Scots pine can be frequent.
34	NO870906	Soft rush-dominated fen with <i>Sphagnum</i> abundant underneath. Hare's-tail cotton-grass is frequent, with heather and willow occasional.
35	NO869907	Goat willow and eared willow carr with frequent birch and occasional rowan. The ground flora is dominated by a creeping soft grass/ soft rush mix with frequent compact rush and occasional hare's-tail cotton-grass overall, though an acid grassland/dry heath becomes dominant in the east.

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		Gorse is invading.
36	NO869908	Mesotrophic semi-improved grassland. Yorkshire fog dominates with bent grass abundant. Marsh thistle is frequent whilst tufted hair-grass is occasional. A species poor marsh is also present, where soft rush and jointed rush are co-dominant.
37	NO87435 91195	Plantation mixed woodland. This is a small area of mature plantation woodland co-dominated by beech and Scots pine woodland with an understorey dominated by rowan with rare field maple ( <i>Acer campestre</i> ). The ground layer is dominated by creeping soft grass with occasional honeysuckle ( <i>Lonicera periclymenum</i> ) and beech leaf litter.
38	Wet heath NO86902 93723	Wet heath/acid grassland (40:60) This area of wet heath has dry heath margins. The sward is dominated by wavy hair-grass, with frequent common cotton-grass, occasional heath rush, heath woodrush and purple moor-grass and rare common sedge. Heather is the dominant ericoid with frequent blaeberry and heath bedstraw and occasional crowberry and cross-leaved heath ( <i>Erica tetralix</i> ). The moss layer is dominated by <i>Hypnum cupressiforme</i> , with locally frequent <i>Sphagnum capillifolium</i> and occasional <i>Plagiothecium undulatum</i> <i>Polytrichum commune</i> and <i>Dicranum scoparium</i> .
39	NO86570 91630	Dry heath. The ground flora is dominated by heather with occasional wavy hair-grass and rare sheep fescue ( <i>Festuca ovina</i> ) and tormentil. The moss layer is well developed dominated with Hypnoid mosses. <i>Hypnum jutlandicum</i> is dominant with frequent <i>Plagiothecium undulatum</i> and <i>Pleurozium schreberi</i> with occasional <i>Hylocomium splendens</i> .
40	NO86825 91625	Bare ground, this area was recently as described in TN39 but has been grubbed up, the remaining plants sprayed with pesticide and harrowed, Lapwing were breeding in this area.
41	NO87565 90015	Semi-improved acid grassland with abundant sheep fescue and frequent wavy hair-grass, Soft rush is also frequent. Heath bedstraw and tormentil are frequent, common sedge, common sorrel and heath rush are occasional.
42	NO86907 92170	Mixed plantation woodland adjacent to a small burn. Young (20 yrs) Malus sp., Norway fir, Sitka spruce, silver birch, field maple, common whitebeam ( <i>Sorbus aria</i> ) and crab apple ( <i>Malus sylvestris</i> ) with frequent hawthorn in the understorey
43	NO87003 92065	There is a pond in which margins are dominated by bullrush ( <i>Typha latifolia</i> ) with occasional bottle sedge ( <i>Carex rostrata</i> ). It is surrounded by mixed plantation woodland (20 yrs) comprised of crack willow ( <i>Salix fragilis</i> ), grey willow ( <i>S. cinerea</i> ), alder, bird cherry ( <i>Prunus padus</i> ), wild cherry ( <i>Prunus avium</i> ), elder and hazel. The marshy grassland is comprised of frequent tufted hair-grass, Yorkshire fog and marsh thistle with occasional marsh marigold, meadow vetchling, wild angelica, common valerian, meadowsweet and ground elder ( <i>Aegopodium podagraria</i> ).
44	NO87140 92045	Line of mature beech with a line of Scots pine behind
45	NO 87035 92435	Newly planted hedgerow 1m wide comprised of hawthorn, beech, holly ( <i>Ilex aquifolium</i> ) and sweet briar ( <i>Rosa rubiginosa</i> ).
46	NO87675 92280	A line of young trees (10 yrs) planted along the wall comprising of rowan, common whitebeam, silver birch and alder.
47	NO86945 92080	Mixed plantation woodland, Young (20-30 yrs) planted mixed woodland either side of the track, with occasional alder, crack willow, white willow ( <i>Salix alba</i> ), common whitebeam, Scots pine, Norway fir, rowan, Scots pine, bird cherry, wild cherry. The ground flora was dominated by Yorkshire fog with occasional foxglove and St. John's wort ( <i>Hypericum sp.</i> ). There were several other garden escapes in this area. There is a species rich hedge behind this woodland.
48	NO87215 92590	Marshy grassland with goat willow surrounding a pond
49	NO87240 92655	Small area of young planted woodland dominated by Sitka spruce, with occasional sycamore and bird cherry.
50	NO87675 92280	Similar to the composition of TN49 but with a more extensive broad-leaved composition.
51	NO875927	A line of trees comprised of Norway fir, common whitebeam, bird cherry, rowan and beech
52	NO86755 93210	Plantation coniferous woodland. This is a small area of mature plantation shelterbelt dominated by Scots pine with occasional sycamore.
53	NO86903	Scattered trees 10 to 15 years old consisting of Scots pine, beech, field maple, rowan, horse chestnut ( <i>Aesculus hippocastanum</i> ), goat willow with scattered gorse, the ground flora is

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	92582	dominated by cocksfoot.
54	NO868937	Dry/ wet modified bog and wet heath. The bog areas are characterised by hare's-tail cotton-grass humps with abundant heather and occasional to locally frequent <i>Sphagnum capillifolium</i> and rare common sedge. Common cotton-grass is dominant in the bog pools. The drier areas are dominated by wavy hair-grass with frequent heather. Heath bedstraw and blaeberry ( <i>Vaccinium myrtillus</i> ) with occasional purple moor-grass, heath woodrush ( <i>Luzula multiflora</i> ), heath rush, crowberry and cross-leaved heath. The moss layer is dominated by <i>Hypnum jutlandicum</i> , with occasional <i>Dicranum scoparium</i> , <i>Plagiothecium undulatum</i> and <i>Polytrichum commune</i> .
55	NO87586 93588	Large area of marshy grassland with goat willow both scattered and in small copses and scattered gorse. Soft rush is dominant with abundant Yorkshire fog wavy hair-grass, frequent sweet vernal-grass and occasional creeping bent-grass ( <i>Agrostis stolonifera</i> ). Common sedge is rare. Marsh thistle is an abundant herb with frequent common marsh bedstraw, common sorrel, broad-leaved dock and cleavers. Occasional forbs are devil's-bit scabious, marsh willowherb, wavy bitter-cress, marsh cinquefoil, common comfrey ( <i>Symphytum officinale</i> ), marsh violet ( <i>Viola palustris</i> ) and marsh horsetail ( <i>Equisetum palustre</i> ). Heath spotted-orchid ( <i>Dactylorhiza maculata</i> ) and northern marsh orchid are rare. The moss layer is well developed with occasional <i>Polytrichum commune</i> , <i>Brachythecium rutabulum</i> and <i>Eurynchium praelongum</i> and rare <i>Sphagnum palustre</i> .
56	NO875937	Coniferous plantation woodland. Small area of woodland the western edge of which has been logged and is now used for the storage of logs. The canopy is comprised of mature Norway fir and <i>Leylandii</i> sp. with occasional lesser stitchwort.
57	NO876946	Species rich verges on the edge of the semi-natural broad-leaved woodland supporting dominant yellow arch-angel ( <i>Galeobdolon luteum</i> ) with occasional elder, common comfrey, raspberry ( <i>Rubus idaeus</i> ) and lesser burdock ( <i>Arctium minus</i> ).
58	NO876946	The composition of the general grassland sward includes, frequent perennial rye-grass, annual meadow-grass ( <i>Poa annua</i> ), Yorkshire fog, with frequent forbs such as creeping buttercup, chickweed ( <i>Stellaria media</i> ), common nettle and white clover ( <i>Trifolium repens</i> ).
59	NO872946	The verges in the area have a sward comprising of frequent creeping bent-grass, Yorkshire fog with frequent, ground elder, cow parsley ( <i>Anthriscus sylvestris</i> ), ribwort plantain ( <i>Plantago lanceolata</i> ), great hairy willowherb ( <i>Epilobium hirsutum</i> ) and broad-leaved dock.
60	NO864944	Broad-leaved plantation woodland. This small woodland is dominated by silver birch and goat willow with and understorey of hawthorn. There are occasional Norway fir and Scots pine. The ground layer supports abundant wavy hair-grass, occasional sheep's sorrel and <i>Hypnum cupressiforme</i> .
61	NO86425 95388	Marshy grassland with dominant soft rush, abundant common sorrel, frequent tufted hair-grass and marsh thistle and occasional cuckoo-flower, marsh willowherb and curled dock. The moss layer was dominated by <i>Calliergon cuspidatum</i> . In the drier areas, bog stitchwort and Yorkshire fog are frequent. Scattered gorse is frequent.
62	NO873962	Dry heath/acid grassland mosaic, comprising approximately 50% of each habitat. Wavy hair-grass dominates with scattered occasional gorse, heather and hare's-tail cotton-grass. Other species present include heath bedstraw, cocksfoot, bearberry ( <i>Arctostaphylos uva-ursi</i> ), bell heather, tufted hair-grass, Yorkshire fog, marsh violet, bent grass, fescue, common sedge and tormentil.
63	NO86619 96390	Standing water. Angling pond, the south western bank of which is surrounded by semi-mature coniferous plantation woodland comprised of Norway fir. The north side of the bank has occasional mature Scots pine trees but the dominant tree is goat willow. The ground flora on the northern banks supports abundant planted <i>Narcissus</i> sp., frequent raspberry and occasional heather and wavy hair-grass.
64	NO864964	Conifer plantation around 15-20 years old. Sitka spruce is dominant in the canopy, whilst gorse is occasionally present along with rare rowan, lawson cypress ( <i>Chamaecyparis lawsoniana</i> ) and birch. Birch is also seen to be regenerating in the ground layer. The ground flora is dominated by heather with blaeberry and tufted hair-grass also present. Occasional patches are dominated by soft rush.
65	NO866964	Japanese knotweed present in an area approximately 4x4m.
66	NO876967	Standing and running water. Small pond with emergent vegetation surrounds. The channel running from the standing water is filled with <i>Sphagnum</i> sp.
67	NO876967	Scattered trees. Mature conifers (Scots pine and Sitka spruce) and birch with shrubs of birch and rowan. The ground layer is of bog species similar to TN5 and TN12.

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Target Note Number	Grid Reference	Description
68	NO877968	Bog. Hare's-tail cotton-grass is dominant, whilst wavy hair-grass, <i>Sphagnum sp.</i> and deergrass are all abundant. Common sedge and heather are frequent with bell heather, blaeberry and Scots pine all occasional. Paths run through the eastern edge of the bog, possibly leading to an alteration of the hydrology.
69	NO874968	Bog. Deergrass and hare's-tail cotton-grass dominate overall, with <i>Sphagnum sp.</i> abundant within the many pools. Soft rush is locally dominant. Ericoids are sparse across the bog but do exist, primarily as an ecotone with the neighbouring dry heath (TN9).
70	NO875968	Dry heath. Heather is overwhelmingly dominant, with bell heather and blaeberry occasional, as is <i>Sphagnum spp.</i> in the wetter areas. Scattered Scots pine and Sitka spruce are frequent, whilst regenerating rowan is occasional in the ground layer. A <i>Buteo buteo</i> was observed.
71	NO873963	Wet modified bog in transition from/to acid grassland/dry heath. Both deergrass and hare's-tail cotton-grass are abundant, whilst red fescue ( <i>Festuca rubra</i> ) and wavy hair-grass are frequent. Occasional species include the dry heath assemblage of heather, blaeberry, <i>Sphagnum spp.</i> and bell heather. An open canopy of scattered trees includes abundant birch (c.1-5m) and occasional Scots pine. Birch is regenerating in the ground layer. A <i>Buteo buteo</i> was observed.
72	NO877971	A young plantation woodland underlain by dry heath/ acid grassland mosaic similar to that of TN73. Many of the trees are still in tubes, with and are not yet impacting significantly on the underlying vegetation. The plantation is fenced from the surrounding areas on uneven but generally north-sloping terrain.
73	NO874969	Dry heath/acid grassland mosaic, with grassland comprising around 70%. Composition of species is similar to that in TN2, although in wetter areas cross-leaved heath, heath rush and <i>Sphagnum sp.</i> are present. <i>Vanellus vanellus</i> and <i>Buteo buteo</i> were observed.
74	NO865976	Mesotrophic semi-improved grassland. The composition is very variable. Overall, Yorkshire fog dominates with meadow foxtail ( <i>Alopecurus pratensis</i> ), bent grass and cocksfoot abundant. Frequent species include timothy ( <i>Phleum pratense</i> ), false oat-grass, creeping buttercup, curled dock, soft rush and compact rush, while foxglove, lesser stitchwort, meadow vetchling, red fescue, <i>Centaurea nigra</i> , great hairy willowherb, perennial rye-grass, creeping thistle and clover are all occasional. Common ragwort and wild angelica are rare.
75	NO866978	Mesotrophic semi-improved grassland on earth bank. Similar species to TN74 but with harebell.

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**Species List**

Latin Name	Common Name
<i>Acer campestre</i>	Field maple
<i>Acer pseudoplatanus</i>	Sycamore
<i>Aegopodium podagraria</i>	Ground elder
<i>Aesculus hippocastanum</i>	Horse chestnut
<i>Agrostis stolonifera</i>	Creeping bent
<i>Alnus glutinosa</i>	Alder
<i>Alopecurus pratensis</i>	Meadow foxtail
<i>Anemone nemorosa</i>	Wood anemone
<i>Angelica sylvestris</i>	Wild angelica
<i>Anthoxanthum odoratum</i>	Sweet vernal-grass
<i>Anthriscus sylvestris</i>	Cow parsley
<i>Arctium minus</i>	Lesser burdock
<i>Arctostaphylos uva-ursi</i>	Bearberry
<i>Arrhenatherum elatius</i>	False oat-grass
<i>Betula pendula</i>	Silver birch
<i>Betula sp.</i>	Birch
<i>Brachythecium rutabulum</i>	A moss
<i>Brassica napus</i>	Oilseed rape
<i>Calliergon cuspidatum</i>	A moss
<i>Calluna vulgaris</i>	Heather
<i>Caltha palustris</i>	Marsh-marigold
<i>Campanula rotundifolia</i>	Harebell
<i>Capsella bursa-pastoris</i>	Shepard's purse
<i>Cardamine flexuosa</i>	Wavy bitter-cress
<i>Cardamine pratensis</i>	Cuckoo-flower
<i>Carex echinata</i>	Star sedge
<i>Carex nigra</i>	Common sedge
<i>Carex rostrata</i>	Bottle sedge
<i>Centaurea nigra</i>	Common knapweed
<i>Chamaecyparis lawsonia</i>	Lawson cypress
<i>Cirsium arvense</i>	Creeping thistle
<i>Cirsium palustre</i>	Marsh thistle
<i>Corydalis claviculata</i>	Climbing corydalis
<i>Corylus avellana</i>	Hazel
<i>Crataegus monogyna</i>	Hawthorn
<i>Cytisus scoparius</i>	Broom
<i>Dactylis glomerata</i>	Cock's-foot
<i>Dactylorhiza maculata</i>	Heath spotted-orchid
<i>Dactylorhiza purpurella</i>	Northern marsh-orchid
<i>Daucus carota</i>	Wild carrot
<i>Deschampsia cespitosa</i>	Tufted hair-grass

Latin Name	Common Name
<i>Deschampsia flexuosa</i>	Wavy hair-grass
<i>Dicranum scoparium</i>	A moss
<i>Digitalis purpurea</i>	Foxglove
<i>Dryopteris dilatata</i>	Broad buckler-fern
<i>Empetrum nigrum</i>	Crowberry
<i>Epilobium hirsutum</i>	Great willowherb
<i>Epilobium palustre</i>	Marsh willowherb
<i>Equisetum fluviatile</i>	Water horsetail
<i>Equisetum palustre</i>	Marsh horsetail
<i>Equisetum sylvaticum</i>	Wood horsetail
<i>Erica cinerea</i>	Bell heather
<i>Erica tetralix</i>	Cross-leaved heath
<i>Eriophorum angustifolium</i>	Common cotton-grass
<i>Eriophorum vaginatum</i>	Hare's-tail cotton-grass
<i>Fagus sylvatica</i>	Beech
<i>Fallopia japonica</i>	Japanese Knotweed
<i>Festuca ovina agg.</i>	Sheep's-fescue
<i>Festuca rubra agg.</i>	Red fescue
<i>Festuca sp.</i>	Fescue
<i>Filipendula ulmaria</i>	Meadowsweet
<i>Fraxinus excelsior</i>	Ash
<i>Fumaria officinalis</i>	Common fumitory
<i>Galeobdolon luteum</i>	Yellow arch-angel
<i>Galium aparine</i>	Cleavers
<i>Galium palustre</i>	Common marsh-bedstraw
<i>Galium saxatile</i>	Heath bedstraw
<i>Geum urbanum</i>	Wood avens
<i>Holcus lanatus</i>	Yorkshire-fog
<i>Holcus mollis</i>	Creeping soft-grass
<i>Hydrocotyle vulgaris</i>	Marsh pennywort
<i>Hylocomium splendens</i>	A moss
<i>Hypericum sp</i>	St-John's wort
<i>Hypnum cupressiforme</i>	A moss
<i>Hypnum jutlandicum</i>	A moss
<i>Ilex aquifolium</i>	Holly
<i>Juncus acutiflorus</i>	Sharp-flowered rush
<i>Juncus articulatus</i>	Jointed rush
<i>Juncus conglomeratus</i>	Compact rush
<i>Juncus effusus</i>	Soft rush
<i>Juncus squarrosus</i>	Heath rush
<i>Lamium purpureum</i>	Red dead-nettle

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Latin Name	Common Name
<i>Lathyrus pratensis</i>	Meadow vetchling
<i>Listera ovata</i>	Common twayblade
<i>Lolium perenne</i>	Perennial rye-grass
<i>Lonicera periclymenum</i>	Honeysuckle
<i>Luzula multiflora</i>	Heath wood-rush
<i>Luzula sylvatica</i>	Great wood-rush
<i>Molinia caerulea</i>	Purple moor-grass
<i>Myosotis arvensis</i>	Field forget-me-not
<i>Myosotis scorpioides</i>	Water forget-me-not
<i>Narcissus sp.</i>	Daffodil
<i>Narthecium ossifragum</i>	Bog asphodel
<i>Oxalis acetosella</i>	Wood-sorrel
<i>Papaver rhoeas</i>	Common poppy
<i>Phleum pratense</i>	Timothy
<i>Picea abies</i>	Norway spruce
<i>Picea stichensis</i>	Sitka spruce
<i>Pinus sylvestris</i>	Scot's pine
<i>Plagiothecium undulatum</i>	A moss
<i>Plantago lanceolata</i>	Ribwort plantain
<i>Pleurozium schreberi</i>	A moss
<i>Poa annua</i>	Annual meadow-grass
<i>Poa pratensis agg.</i>	Smooth meadow-grass
<i>Polytrichum commune</i>	A moss
<i>Polytrichum sp.</i>	Polytrichum sp.
<i>Potentilla erecta</i>	Tormentil
<i>Potentilla palustris</i>	Marsh cinquefoil
<i>Prunus avium</i>	Wild cherry
<i>Prunus padus</i>	Bird cherry
<i>Pteridium aquilinum</i>	Bracken
<i>Ranunculus repens</i>	Creeping buttercup
<i>Rhododendron ponticum</i>	Rhododendron
<i>Rosa canina agg.</i>	Dog rose
<i>Rosa rubiginosa</i>	Sweet briar
<i>Rubus fruticosus agg.</i>	Bramble
<i>Rubus idaeus</i>	Raspberry
<i>Rubus rubrum</i>	Redcurrant
<i>Rumex acetosa</i>	Common sorrel
<i>Rumex acetosella</i>	Sheep's sorrel
<i>Rumex crispus</i>	Curled dock
<i>Rumex obtusifolius</i>	Broad-leaved dock
<i>Salix alba</i>	White willow
<i>Salix aurita</i>	Eared willow
<i>Salix caprea</i>	Goat willow
<i>Salix cinerea</i>	Grey willow

Latin Name	Common Name
<i>Salix fragilis</i>	Crack willow
<i>Salix sp.</i>	Willow sp.
<i>Sambuca nigra</i>	Elder
<i>Senecio jacobea</i>	Common ragwort
<i>Senecio vulgaris</i>	Common groundsel
<i>Silene dioica</i>	Red campion
<i>Sorbus aria agg.</i>	Common whitebeam
<i>Sorbus aucuparia</i>	Rowan
<i>Sphagnum capillifolium</i>	A moss
<i>Sphagnum palustre</i>	A moss
<i>Stellaria alsine</i>	Bog stitchwort
<i>Stellaria graminea</i>	Lesser stitchwort
<i>Stellaria holostea</i>	Greater stitchwort
<i>Stellaria media</i>	Common chickweed
<i>Succisa pratensis</i>	Devil's-bit scabious
<i>Symphytum officinale</i>	Common comfrey
<i>Trichophorum cespitosum</i>	Deergrass
<i>Trifolium repens</i>	White clover
<i>Tripleurospermum inodorum</i>	Mayweed
<i>Tsuga heterophylla</i>	Western hemlock
<i>Typha latifolia</i>	Bulrush
<i>Ulex europaeus</i>	Gorse
<i>Urtica dioica</i>	Common nettle
<i>Vaccinium myrtillus</i>	Bilberry
<i>Veronica Montana</i>	Wood speedwell
<i>Viola arvensis</i>	Field pansy
<i>Viola palustris</i>	Marsh violet
<i>Viola riviniana</i>	Common dog-violet
<i>x Cupressocyparis leylandii</i>	Leyland cypress

## **Annex 2 – North East Scotland Local Biodiversity Action Plan – Local Priority Species and Habitats**

### **Species Action Plans**

#### Wych Elm (*Ulmus glabra*) LBAP

Wych elm is suffering from Dutch elm disease and an associated lack of planting across the UK. It remains common however in North East Scotland, due to less favourable conditions for the disease than further south. It is an important tree to the landscape, culture and wildlife of North East Scotland. The species is not listed in the UKBAP, but this LBAP reflects the importance of the species in the region.

#### Objectives:

- principal objective is to ensure the survival of the Wych elm population in North East Scotland;
- minimise the impact of Dutch elm disease to achieve a target of at least as many elms being alive in 2050 as in 1998;
- increase knowledge and understanding of Dutch elm disease;
- create a more balanced population structure, by planting at least 50,000 trees;
- improve knowledge of the Wych elm population and their habitat value; and
- raise public awareness of the importance of elms and their conservation.

### **Habitat Action Plans**

Local HAPs are in the process of being developed across 6 broad types of habitat. Of these, 2 relate to habitats that are not relevant to the current study: Coastal and Marine Habitats and Urban Habitats. The key targets and objectives of the Local HAPs that have been implemented to date are summarised below.

#### Habitat Type: Farmland and Grassland

##### *Field Margins and Boundary Habitats LHAP*

This LHAP relates to the UK/NES Priority Habitat, Cereal Field Margins, as well as the UK Broad/ Locally Important Habitat, Boundary and Linear Features. Field margins and boundary habitats include a range of linear features that are important to biodiversity and landscape, including dry stone walls (drystone dykes), hedges, ditches and burns.

The main objectives from this LHAP are to:

- maintain, improve or restore the biodiversity of 15,000ha of margins on appropriate soil types in the UK by 2010. *Pro rata*, this translates to a target for North East Scotland of 765ha of cereal margins created or managed for biodiversity by 2010;
- halt the net loss of hedgerows in the UK by 2000. Halt all loss of ancient and species-rich hedgerow by 2005. Achieve the favourable management of 25% of species-rich and ancient hedges by 2000 and of 50% by 2005. These UK targets are also used directly as goals for North East Scotland; and

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- Protection of all drystone dykes of wildlife or historic importance. Construction of new dykes and renovation of old ones where they connect isolated habitat fragments, or significantly add to the landscape. Similar targets to hedgerows used, i.e. 25% by 2000 and 50% by 2005.

*Farmland LHAP (UK Broad and Locally Important)*

This LHAP relates to the UK Broad/Locally Important Habitat of Arable and Cultivated Land. As the last stronghold of mixed farming landscape in Scotland, the northeast provides a diversity of habitats produced by cropping and livestock production resulting in wildlife still being plentiful. Agricultural activities can also have considerable influence on the biodiversity of other habitats, especially watercourses.

At present, there are no overall UK farmland biodiversity objectives and targets. However, the Northeast Farmland HAP should reflect the objectives and targets of the UK Cereal Field Margins and Improved Grassland HAPs. The main objectives from these HAPs are:

- maintain, improve and restore by management, the biodiversity of 15,000ha of cereal field margins on appropriate soil types in the UK by 2010; and
- enhance areas of improved grassland that are of importance for wildlife and restore semi-natural vegetation on sites where this would enhance their wildlife value.

The principal local objective of the LHAP is to conserve and enhance the biodiversity of farmland in North East Scotland through appropriate farming practices, habitat management and habitat creation. Local targets include:

- no net loss of existing wildlife habitat on farmland;
- existing valuable areas of wildlife habitat on farmland identified and management for biodiversity recommended by 2005; and
- need for higher political and financial support for the Rural Stewardship Scheme and other mechanisms to benefit farm biodiversity highlighted and maintained at the national level.

*Species Rich Grassland LHAP (UK and North East Priority)*

This LHAP covers UK HAP for the priority habitats of Lowland calcareous grassland, Lowland dry acid grassland and Lowland meadow (neutral grassland). It also covers the UK Broad/Locally important habitat of Improved Grassland.

Species-rich grasslands include a range of semi-natural communities that have developed under various combinations of soil types, agricultural practices and climatic conditions. Species-rich grasslands are important wildlife habitats not just for the diversity of plants they comprise, but also for the abundance and variety of invertebrates they support. Agriculturally, species-rich grasslands provide a sustainable method of producing forage, which although low yielding is rich in trace elements and low in gut parasites.

They are also more aesthetically pleasing than improved grasslands, contributing colour and character to the landscape.

At a national level, this broad habitat is broken down into narrower habitat definitions that each contain fewer plant communities. Specific objectives from the UK action plans include:

- arresting the depletion of species-rich grassland;
- encouraging environmentally sensitive management at all surviving sites of more than 0.5 ha;

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- promoting involvement in agri-environment schemes within the farming community, thereby ensuring 30% of all unimproved grassland sites are in favourable condition by 2005;
- review of current management within all grassland SSSIs to ensure the protection and enhancement of all significant stands; and
- promoting greater understanding of restoration techniques with the aim of expanding this habitat type.

At local level objectives include:

- maintain and enhance extent and status of the habitat through appropriate management, data collection, promotion, education, liaison and legislation;
- establish current status of the habitat within the region;
- protect and enhance existing sites;
- increase the number of habitat creation projects and improve their success rate;
- increase understanding and appreciation of the habitat; and
- encourage appropriate policy to support protection and enhancement of this habitat.

Habitat Type: Woodland

*Wet and Riparian Woodland LHAP*

This LHAP covers the UK Priority habitat of Wet woodland and the Locally Important habitat of riparian woodland. Wet woodland occurs on floodplains, flushed slopes and peaty hollows and includes wet birch woodland, alder woodland and willow carr. Riparian woodland is composed predominantly of native species along burns, rivers and lochs and encompasses a wide range of woodland types depending on local site conditions. Both types of woodlands provide important habitat for a number of plant, invertebrate, bird and mammal species. In addition, riparian woodlands contribute to the health and productivity of the adjacent waters.

- The UK BAP for Wet Woodlands has the following objectives:
- maintain current area of ancient semi-natural wet woodlands;
- initiate restoration of 3200ha to native wet woodland; and
- create, by colonisation or planting, 6750ha on unwooded or ex-plantation sites.

At local level objectives include:

- establish/maintain effective conservation management at existing sites;
- enhance and restore degraded and fragmented wet and riparian woodland sites;
- expand the area of wet/riparian woodland through habitat creation and management; and
- ensure no loss in the key biodiversity associated with riparian and wet woodland;
- set up a mechanism to protect the genetic integrity of populations of wet woodland during management and restoration work;
- evaluate status of habitat through survey, monitoring and research;
- promote good management practice for wet and riparian woods; and
- encourage the adoption of appropriate policy to support the protection and enhancement of wet and riparian woodland.

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Wood Pasture, Parkland and Boundary Trees LHAP

This LHAP covers the UK Priority Habitat of Lowland Wood Pastures and Parkland. Wood pastures and parklands are historic, man-made landscapes typically consisting of patches of wooded areas separated by grazed or mown grassland. Veteran boundary trees are remnants of this landscape and provide valuable habitat to other wildlife. In northeast Scotland, parkland covers around 2,200 ha, while wood pasture covers around 100 ha.

Primary native species include Wych elm, Ash, Alder, Oak, Birch, Scot's pine and Yew, but non-native species such as beech and sycamore also provide valuable habitats.

UK BAP for Lowland Wood Pastures and Parkland has the following objectives:

- maintain current extent and distribution of the total resource of wood-pasture and parkland;
- maintain current extent, distribution and condition of wood-pasture and parkland that is in favourable ecological condition;
- initiate in areas of derelict wood-pasture and parkland a programme to restore 2500ha to favourable ecological condition by 2010; and
- initiate the expansion of 500ha of wood-pasture or parkland, in appropriate areas, by 2002 to help reverse fragmentation and reduce the generation between veteran trees.

At local level objectives include:

- maintain and enhance the ancient wood-pasture and parkland habitats and identified important boundary trees of North East Scotland to achieve a target of at least as many veteran open grown trees in 2050 as at present;
- collate all current information on this habitat;
- identify gaps in knowledge and extent of this habitat through surveys and liaison with relevant partners;
- protect and enhance existing habitat; and
- raise awareness of these habitats.

Habitat Type: Montane, Heath and Bog

*Lowland Raised Bog LHAP*

Intact Lowland raised bogs are a UK priority habitat and one of Europe's rarest and most threatened habitats. Raised bogs are peatlands fed exclusively by rainfall rather than groundwater or streams. Growth of *Sphagnum* moss creates a dome shape, thus excluding water from flowing in or collecting. Intact bogs are typically surrounded by a lagg fen or wetland fed by surface water.

UK BAP objectives for this habitat include:

- safeguard and manage for conservation the bogs in the UK that contain the remaining 6000ha of raised bog in a reasonably natural condition;
- safeguard and begin to rehabilitate at least 4000ha of degraded bog; and
- rehabilitate a further 7000ha of severely damaged sites, either cut-over or afforested, with the aim of encouraging raised bog vegetation.

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Local level objectives include:

- maintain and enhance the extent and status, of current resource through appropriate habitat management , data collection , promotion, education, liaison and legislation;
- implement effective conservation management with a target of reducing impact of listed threats and maintaining an appropriate hydrological regime;
- continuous monitoring of habitats;
- increased understanding of raised bogs to aim to promote good management practice; and
- protection through the designation of sites.

Wetland and Freshwater

*Rivers and Burns LHAP (UK)*

This LHAP covers the UK Broad/Locally Important habitat of Rivers and Streams. Running waters of North East Scotland range from large rivers to tiny upland and coastal burns, all draining to the North Sea. Rivers and burns are of great value for wildlife and for human recreation. This HAP covers not only the waters themselves, but also the banks and associated riparian zone.

UK BAP objectives include:

- maintain and improve the quality, state and structure of all UK rivers, streams and their associated floodplains; and
- restore degraded rivers and streams taking account of water quality and quantity, structure and hydraulic connection with the floodplain.

At the local level, objectives include:

- maintain and improve all North East rivers and burns in terms of both water quality and semi-natural assemblages of animals and plants in both the channel and riparian zone. The target is for all North East watercourses to be classified as 'high' or 'good' ecological status and no net loss or reduction of river habitat in the LBAP area by 2015;
- collate existing data on river and burn habitats, identify gaps and initiate surveys as necessary;
- manage the rivers and burns resource to maintain and enhance ecological status;
- sustain/restore habitats and semi-natural assemblages in both the channel and riparian zone in all major North East river systems; and
- increase understanding of local people and public participation in lessening impact on water quality and habitats.

Other LHAPs in development

Other LHAPs relevant to the proposed scheme that are currently in development include the following:

- Broad-leaved Woodland – to cover upland oakwood, birch woodland and scrub;
- Planted coniferous woodland;
- Heathland – to cover lowland heathland, upland heathland and coastal heath and scrub;
- Wetland – to cover reedbeds, fens, coastal and floodplain grazing marsh; fen, carr, marsh, swamp and reedbed; and
- Lochs and Ponds – to cover mesotrophic lochs, standing open water and ponds.