Aberdeen Western Peripheral Route

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 A40.2a-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 (EcIA) was undertaken in accordance with the Design Manual for Roads and Bridges (DMRB) Volume 10 and 11 (Highways Agency, 2001) and the Environmental Impact Assessment (Scotland) Regulations 1999, along with cognisance of Institute of Ecology and Environmental Management (IEEM) guidelines (2002).

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 wthin 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).

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.

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 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 Environment Protection Agency (SEPA);
- North East Scotland Biological Records Centre (NESBReC);
- 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 100m2) 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 In localised areas, 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 (2002). 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.

Table 1 – Evaluation of Ecological Receptor

Value/ Importance	Criteria
International (European)	Habitats 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. Species Any regularly occurring population of internationally important species, threatened or rare in the UK, i.e. a UK Red Data Book species categories 1and 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.
National (Scottish)	Habitats A nationally designated site Site of Special Scientific Interest (SSSI), Areas of Special Scientific Interest (ASSI), National Nature Reserve (NNR), Marine Nature Reserve (MNR) 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. Species 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.
Regional (North East Scotland)	Habitats 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. Species 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.
Authority Area (e.g. County or District) (Aberdeenshire/ City of Aberdeen	Habitats 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. Species 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.
Local (immediate local area or village importance)	Habitats 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. Species

Value/ Importance	Criteria
	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.
Less than Local (limited ecological importance)	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 with a Habitat Modification Score indicating that it is Severely Modified.

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 Impact Assessment

2.4.1 In the assessment of significance of impact, consideration has been given both to the magnitude of impact and to the sensitivity of the receiving environment or species. The sensitivity of a feature was determined with reference to its level of importance although other elements have been taken into account where appropriate. Methods of impact prediction used indirect measurements, correlations, expert opinion, and information from previous developments. Impacts include those that are predicted to be direct, indirect, temporary, permanent, cumulative, reversible or irreversible.

Impact Magnitude

2.4.2 The magnitude of an impact has been assessed for each element of the development. A definition of the magnitude impacts is presented in Table 2 and includes positive impact criteria in accordance with IEEM guidance (2002). The magnitude of each impact was assessed independently of value or statutory status.

Table 2 – Impact Magnitude

Magnitude	Criteria
High negative	The change is likely to permanently, adversely affect the integrity of an ecological receptor, in terms of the coherence of its ecological structure and function, across its whole area that enables it to sustain the habitat, complex of habitats and/or the population levels of species of interest.
Medium negative	The change is not likely to permanently, adversely affect the integrity of an ecological receptor, but the effect is likely to be substantial in terms of its ecological structure and function and may be significant in terms of its ecological objectives. Likely to result in changes in the localised or temporary distribution of species assemblage or populations but not affect the population status at a regional scale or permanently.
Low negative	The change may adversely affect the ecological receptor, but there will probably be no permanent effect on its integrity and/or key attributes and is unlikely to be significant in terms of its ecological objectives. Impacts are unlikely to result in changes to the species assemblage or populations, but core species more vulnerable to future impacts
Negligible	The change may slightly adversely affect the receptor but will have no permanent effect on the integrity of the receptor or its key attributes. There are no predicted measurable changes to the species assemblage or population and the effect is unlikely to result in an increased vulnerability of the receptor to future impacts.
Positive	The change is likely to benefit the ecological receptor, and/or enhance the biodiversity resource of the receptor.
High positive	The change is likely to restore an ecological receptor to favourable conservation status, contribute to meeting BAP objectives (local and national) and/or create a feature that is of recognisable value for biodiversity.

Impact Significance

2.4.3 The significance of an impact was determined according to the matrix of importance and magnitude as illustrated in Table 3.

Table 3 – Impact Significance

Magnitude / Importance	High Negative	Medium Negative	Low Negative	Negligible	Positive	High Positive
International	Major	Major	Moderate	Negligible	Moderate	Major
National	Major	Major	Moderate	Negligible	Moderate	Major
Regional	Major	Moderate	Minor	Negligible	Minor	Moderate
County	Moderate	Moderate	Minor	Negligible	Minor	Moderate
Local	Minor	Minor	Minor	Negligible	Minor	Minor
Less than Local	Minor	Negligible	Negligible	Negligible	Negligible	Negligible

2.4.4 The level of significance of impacts predicted on ecological receptors is an important factor in influencing the decision-making process and determining the necessity and/or extent of mitigation measures. Impacts can be beneficial or adverse, either improving or decreasing the ecological status health or viability of a species, population or habitat. In general, an impact significance greater than or equal to Moderate would require specific mitigation to be undertaken to ameliorate the impact significance to acceptable levels.

2.5 Limitations to Assessment

2.5.1 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.

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 The results of the Phase 1 Habitat survey are presented in Figures 40.2a-f. Target note (TN) numbers are presented on Figures 40.2a-f and are detailed in Annex 1. 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 4.

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 monogyna*) 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.

Table 4 – Habitat Areas Found in 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 (*Sorbus aucuparia*) and birch. The woodland near to Coneyhatch Farm (F10) is comprised of similar species but goat willow (*Salix caprea*) is co-dominant with birch in that area.
F6	Megray Wood		Mature conifer plantation dominated by Sitka spruce (*Picea sitchensis*). 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.

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 5.

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 cespitosa*) 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 5 – Habitat Areas Found in Section FL2

Habitat Area	Feature/Asset	Target Note Number	Description
F13	Agricultural fields surrounding Hill of Muchals	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.
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 (*Sorbus aria*), a number of willow species, bird cherry (*Prunus padus*) and wild cherry (*Prunus avium*).
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 in this section are provided in Table 6.

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).

Table 6 – 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 (*Eriophorum vaginatum*) humps with abundant heather and common cotton grass (*Eriophorum angustifolium*) dominant in the bog pools. The moss species in this area are predominantly *Sphagnum spp*. There are also areas of wet and dry heath throughout this habitat consisting of heather, cross leaved heath (*Erica tetralix*), crowberry (*Empetrum nigrum*), bilberry (*Vaccinium myrtillus)* and occasional purple moor grass (*Molinia caerulea*). Here *Sphagnum* 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 (*Juncus effusus*) 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 if 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 7.

Section FL1

4.1.2 In this section, five Habitat Areas are 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, F19, F21, F23, F24) are assessed on the basis that they contain the UK BAP priority habitats of lowland raised bog, lowland heathland or willow carr. However, their modified and fragmented nature lead to these area being 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.

Table 7 – 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

Habitat Area	Feature/Asset	Description	Evaluation
F16	Agricultural fields from north of the Burn of Muchalls to Cookney	Agricultural land with many newly planted hedgerows and rows and groups of standards trees, plus mature Scots pine and beech lining and shelterbelts.	Local
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 Introduction

5.1.1 In general, direct impacts are 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 landtake 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 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 (refer to Table 8):

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

Table 8 – Summary of Impacts During Construction and Operation

Generic Impact	Potential 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	The proposed road would result in the severance of habitats adjacent to the proposed alignment. Fragmentation of habitat is likely to occur where the proposed route severs existing habitat, 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 and spray	During construction of the proposed road, pollution is likely to be predominantly associated with runoff of construction materials onto semi-natural habitats may result in adverse impacts to these habitats. During the operation of the road, pollution resulting form road drainage, runoff and spray is may adversely impact habitats adjacent to the road.	Yes	Yes
Visual and light	Visual and light pollution impacts are likely to occur with the	Possible	Yes

Generic Impact	Potential Impact Description	Construction Phase	Operation Phase
pollution	magnitude dependent on the level of road lighting present in specific areas.		
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 may 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

5.2 Specific Impacts on Individual Habitat Areas

5.2.1 In the following paragraphs for each of the sections, the potential impacts on the habitat areas present within the study area are described, without appropriate mitigation. For each Habitat Area, the magnitude of the combined impacts is assessed using the criteria in Table 2 and the resulting significance of impacts presented using the matrix in Table 3.

5.2.2 The paragraphs below present a brief summary of the main impacts (i.e. of Moderate or above) in each section. Loss of habitat, severance and fragmentation will occur throughout in each of the sections. There is also a potential risk of polluted runoff from construction sites and from the operational scheme along the road corridor, if no mitigation is in place. The full results of the assessment for each Habitat Area are presented in Tables 9 to 11**.**

Section FL1

Construction

5.2.3 Impacts causing fragmentation and the risk of potential pollution of Limpet Burn and Fishermyre Wood have been assessed as being of high magnitude and of Major significance.

Operation

5.2.4 The scheme would result in minor habitat loss throughout this section. Habitat loss and fragmentation of Limpet Burn and Fishermyre Wood is a medium magnitude of Moderate significance. Potential impacts from disturbance, changes to the local hydrological regime and pollution risk for Limpet Burn and Fishermyre have been assessed as high magnitude and of Major significance.

Section FL2

Construction

5.2.5 In addition to severance and fragmentation, polluted runoff from work sites would result in adverse impacts to adjacent habitat ranging from Negligible to Minor. Habitat severance, disturbance causing fragmentation and potential pollution of the Burn of Muchalls and surrounds is predicted to be of medium magnitude and of Moderate significance.

Operation

5.2.6 Habitat Loss of the Burn of Muchalls and surrounds is assessed as being of medium impact magnitude and of Moderate significance. Operational impacts from disturbance, habitat fragmentation and the risk of pollution from road runoff to the Burn of Muchalls have been assessed as being of potentially high magnitude and thus of Major significance.

Section FL3

Construction

5.2.7 Disturbance causing fragmentation, hydrological impacts and pollution of wetland habitats, particularly at Stoneyhill (F19) and East Crossley (F21) has the potential for high magnitude and Moderate significance.

Operation

5.2.8 Minor habitat loss, severance and fragmentation, polluted road runoff would result in adverse impacts to adjacent habitat ranging from Negligible to Minor. Habitat loss, fragmentation, hydrological impacts and pollution from road runoff at Stoneyhill, East Crossley and Wedderhill are assessed as having potential for high magnitude and Moderate significance.

Table 9 – Assessment of Construction Impacts for Section FL1

Habitat Area Number	Feature / Asset Evaluation	Potential Impact Decription (without mitigation)	Magnitude	Significance of Impact
F1	Agricultural fields between the A90 and Stonehaven Local	Severance from farmland on other side of route. Potential pollution and disturbance impacts.	Low negative	Minor
F2	Agricultural fields west of New Mains of Ury Local	No observable impacts are likely to occur.	Negligible	Negligible
F3	Agricultural fields to the north of Megray Farm Local	Severance from farmland on other side of route. Potential pollution and disturbance impacts.	Low negative	Minor
F4	H Ram Wood Local	Severance leading to fragmentation of woodland. Potential pollution and disturbance impacts.	Medium negative	Minor
F5	Slicewells Wood Regional	No observable impacts are likely to occur.	Negligible	Negligible
F6	Megray Wood Regional	Potential pollution and disturbance impacts.	Low negative	Minor
F7	Limpet Burn Regional	Severance and fragmentation of habitats on either side of route. Potential pollution and disturbance to remaining habitats.	High negative	Major
F8	Agricultural fields surrounding Coneyhatch and Wyndford Farm Less than local	Severance from farmland on other side of route. Potential pollution and disturbance impacts.	Low negative	Negligible
F9	Kempstone Hill Local	No observable impacts are likely to occur.	Negligible	Negligible
F10	Fishermyre Wood south Regional	Severance and fragmentation of habitats on either side of route. Potential hydrological impacts on wetland habitats. Potential pollution and disturbance to remaining habitats.	High negative	Major
F11	Fishermyre Wood west. Regional	No observable impacts are likely to occur.	Negligible	Negligible
F12	Fishermyre Wood. Wet habitats to the south of Allochie Croft Regional	Severance and fragmentation on either side of route. Potential hydrological impacts on wetland habitats Potential pollution and disturbance impacts.	High negative	Major

Table 10 – Assessment of Operational Impacts for Section FL1

Habitat Area Number	Feature / Asset Evaluation	Criteria	Magnitude	Significance of Impact
F1	Agricultural fields between the A90 and Stonehaven Local	Direct habitat loss of farmland (0.9ha arable and 0.3ha improved grassland) by access road. Severance from farmland on other side of route. Potential pollution and disturbance impacts.	Low negative	Minor
F2	Agricultural fields west of New Mains of Ury Local	No direct habitat loss. No observable secondary impacts are likely to occur.	Negligible	Negligible
F3	Agricultural fields to the north of Megray Farm Local	Direct loss of farmland habitat (2.8ha) but not affecting arable weed location. Severance from farmland on other side of route. Potential pollution and disturbance impacts.	Low negative	Minor
F4	H Ram Wood Local	Loss of conifer woodland (0.1ha). Potential pollution and disturbance impacts.	Medium negative	Minor
F5	Slicewells Wood Regional	No direct habitat loss. No observable secondary impacts are likely to occur.	Negligible	Negligible
F6	Megray Wood Regional	Direct loss of edge habitat of plantation woodland (0.2ha). Potential pollution and disturbance impacts.	Low negative	Minor
F7	Limpet Burn Regional	Direct loss of UK BAP and other habitats where route crosses (0.3ha fen, 0.3ha semi-natural broadleaved woodland, 0.8ha dense scrub and 0.2ha improved grassland). Severance and fragmentation of habitats on either side of route. Potential pollution and disturbance to remaining habitats.	High negative	Major
F8	Agricultural fields surrounding Coneyhatch and Wyndford Farm Less than local	Direct loss of low value farmland habitat (3.3ha). Severance from farmland on other side of route. Potential pollution and disturbance impacts.	Low negative	Negligible
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.	Negligible	Negligible
F10	Fishermyre Wood south Regional	Direct loss of UK BAP and other habitats where route crosses (0.3ha fen, 0.7ha dry heath/acid grassland, 0.6ha marshy grassland, 0.04ha semi-natural broadleaved woodland and 0.2ha improved grassland) Severance and fragmentation of habitats on either side of route. Potential hydrological impacts on wetland habitats. Potential pollution and disturbance to remaining habitats.	High negative	Major

Habitat Area Number	Feature / Asset Evaluation	Criteria	Magnitude	Significance of Impact
F11	Fishermyre Wood west. Regional	No direct loss. No observable secondary impacts are likely to occur.	Negligible	Negligible
F12	Fishermyre Wood. Wet habitats to the south of Allochie Croft Regional	Direct loss of UK BAP habitats of wet woodland and fen (0.8ha fen, 0.4ha semi-natural broadleaved woodland, 0.9 scattered scrub and 0.2ha improved grassland). Severance and fragmentation on either side of route. Potential hydrological impacts on wetland habitats Potential pollution and disturbance impacts.	High negative	Major

Table 11 – Assessment of Construction Impacts for Section FL2

Habitat Area Number	Feature / Asset Evaluation	Potential Impact Decription (without mitigation)	Impact Magnitude	Impact significance
F13	Agricultural fields surrounding Hill of Muchals Local	Fragmentation of dry stone walls and species-rich native hedge. Severance from farmland on other side of route. Potential pollution and disturbance impacts.	Low negative	Minor
F14	Heath by Allochie Local	No observable impacts are likely to occur.	Negligible	Negligible
F15	Burn of Muchalls Regional	Severance and fragmentation of farmland and stream habitat on either side of route. Potential pollution and disturbance impacts.	High negative	Major
F16	Agricultural fields from north of the Burn of Muchalls to Cookney Local	Severance from farmland on other side of route. Fragmentation of six dry stone walls. Potential pollution and disturbance impacts.	Low negative	Minor

Table 12 – Assessment of Operational Impacts for Section FL2

Habitat Area Number	Feature / Asset Evaluation	Potential Impact Decription (without mitigation)	Impact Magnitude	Impact significance
F13	Agricultural fields surrounding Hill of Muchals Local	Habitat loss of farmland (3.7ha). Loss/fragmentation of dry stone walls and species-rich native hedge. Severance from farmland on other side of route. Potential pollution and disturbance impacts.	Low negative	Minor
F14	Heath by Allochie Local	No direct habitat loss. No observable secondary impacts are likely to occur.	Negligible	Negligible
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.	High negative	Major
F16	Agricultural fields from north of the Burn of Muchalls to Cookney Local	Direct loss of low value farmland (5.5ha). Severance from farmland on other side of route. Fragmentation of six dry stone walls. Potential pollution and disturbance impacts.	Low negative	Minor

Table 13 – Assessment of Construction Impacts for Section FL3

Habitat Area Number	Feature / Asset Evaluation	Potential Impact Decription (without mitigation)	Impact Magnitude	Impact significance
F17	Wet habitats north of Cookney County	Potential secondary impacts including pollution and disturbance.	Low negative	Minor
F18	Agricultural fields from Cookney to East Rothnick Wood Local	Severance from farmland on other side of route. Fragmentation of nine dry stone walls. Potential pollution and disturbance impacts.	Low negative	Minor
F19	Stoneyhill County	Potential hydrological impacts on wetland habitats. Potential pollution and disturbance impacts.	Medium negative	Moderate
F20	Agricultural fields around Berrytop Less than local	Potential pollution and disturbance impacts.	Low negative	Negligible
F21	Wet habitats around East Crossley County	Fragmentation of wetland habitat on either side of route. Potential hydrological impacts on wetland habitats. Potential pollution and disturbance impacts.	High negative	Moderate
F22	Agricultural fields from Quoscies to Strannog Less than local	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).	Low negative	Negligible
F23	Dry heath/acid grassland mosaic to the west of Wedderhill County	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).	Medium negative	Moderate
F24	Bog/heath to the immediate west of Wedderhill County	Severance of hydrological connectivity by the route could result in drying out of wetland habitat.	High negative	Moderate
F25	Plantation woodland south of Strannog Local	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.	Low negative	Minor
F26	Agricultural fields to the south of Polston Farm Local	Severance from farmland on other side of route. Fragmentation of three dry stone walls. No observable secondary impacts are likely to occur.	Low negative	Minor
F27	Floodplain and immediate surrounds of Crynoch Burn (south) County	No observable impacts are likely to occur.	Negligible	Negligible

Table 14 – Assessment of Operational Impacts for Section FL3

Habitat Area Number	Feature / Asset Evaluation	Potential Impact Decription (without mitigation)	Impact Magnitude	Impact significance
F17	Wet habitats north of Cookney County	Direct habitat loss at the extreme southeast edge of habitat (0.1ha dense scrub, <0.1ha improved grassland and <0.1ha marshy grassland). Potential secondary impacts including pollution and disturbance.	Low negative	Minor
F18	Agricultural fields from Cookney to East Rothnick Wood Local	Loss of low value farmland (1.5ha arable and 6.4ha improved grassland). 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.	Low negative	Minor
F19	Stoneyhill County	Loss of marshy grassland and developing UK BAP habitat (0.3ha). Potential hydrological impacts on wetland habitats. Potential pollution and disturbance impacts.	Medium negative	Moderate
F20	Agricultural fields around Berrytop Less than local	Loss of corner habitat of farmland (0.3ha). Potential pollution and disturbance impacts.	Low negative	Negligible
F21	Wet habitats around East Crossley County	Direct loss of acid grassland/dry heath (0.9ha) Direct loss of improved grassland (0.3ha) Fragmentation of wetland habitat on either side of route. Potential hydrological impacts on wetland habitats. Potential pollution and disturbance impacts.	High negative	Moderate
F22	Agricultural fields from Quoscies to Strannog Less than local	Loss of farmland habitat (0.8ha). Loss of species-poor marshy grassland (0.6ha). 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).	Low negative	Negligible
F23	Dry heath/acid grassland mosaic to the west of Wedderhill County	Direct loss of dry heath/acid grassland habitat (0.9ha) and scrub (0.05ha). 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).	Medium negative	Moderate
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.	High negative	Moderate

Habitat Area Number	Feature / Asset Evaluation	Potential Impact Decription (without mitigation)	Impact Magnitude	Impact significance
F25	Plantation woodland south of Strannog Local	Direct loss of plantation woodland (0.7ha). 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.	Low negative	Minor
F26	Agricultural fields to the south of Polston Farm Local	Direct loss of low value farmland (4.3ha). Severance from farmland on other side of route. Fragmentation of three dry stone walls. No observable secondary impacts are likely to occur.	Low negative	Minor
F27	Floodplain and immediate surrounds of Crynoch Burn (south) County	No loss of habitat. No observable secondary impacts are likely to occur.	Negligible	Negligible

5.3 Estimate of Habitat Loss

5.3.1 The total amount of landtake required in order to construct the Fastlink of the proposed scheme is estimated at approximately 1.20km^2 / 120ha. Table 15 shows the estimated total pre-construction and post-construction areas of Phase 1 habitats present within the proposed landtake of the scheme. The post-construction figures take into account both anticipated habitat loss to construction and habitat that would be created or changed as a result of mitigation.

Table 15 – Phase 1 Habitat Areas Pre and Post Construction

Phase 1 Habitat Description	Phase 1 Habitat Categories within proposed scheme landtake	
	Pre-construction (ha)	Post-construction (ha)
Woodland mixed plantation	2.46	13.23
Woodland broadleaved plantation (including standard trees)	0.10	0.78
Woodland broadleaved semi-natural	2.11	0.55
Woodland coniferous plantation	1.28	0.31
Scattered scrub	0.59	1.20
Dense continuous scrub	3.58	7.17
Riparian woodland	0	3.37
Acid grassland semi-improved	0.15	0.13
Acid grassland unimproved	0.40	0.19
Improved grassland	46.29	26.39
Marshy grassland	5.21	2.87
Neutral grassland semi-improved	0.26	0.21
Poor semi-improved grassland	2.96	1.51
Disturbed amenity grassland	0.83	0.37
Arable	49.21	19.64*
Built up areas (buildings)	0.49	0.49
Fen	3.87	1.41
Heath – acid grassland dry mosaic	1.88	1.67
Total	121.67	81.49

**figure assumes all potential return to agriculture is achieved.*

6 Mitigation

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 will be implemented throughout the area affected by the proposed scheme. Additional site specific mitigation measures are proposed where impacts of Moderate or above are predicted.

6.2 General

6.2.1 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).

6.2.2 Legislative guidance regarding mitigation for habitat loss and fragmentation is provided in Table 9.

6.2.3 In order to guide the development of appropriate mitigation for the proposed scheme, a Mitigation Vision Statement (Jacobs, 2007) has been developed in consultation with the statutory consultees for this proposal. 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 is to ensure an integrated approach to mitigation incorporating best practice guidance.

6.2.4 A key factor in the successful implementation of ecological mitigation strategies would be the development of an action plan to take forward the strategies of the Mitigation Vision Statement. The action plan for the proposed scheme will draw together all mitigation, enhancement, offset, management and monitoring proposals into a schedule of commitments.

6.2.5 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 15 – 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."
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. 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. 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. Timing of activities should avoid impacts on protected and rare species and habitats, wherever possible. 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."
NPPG14 Natural Heritage, Paragraph 74: http://www.scotland.gov.uk/Publications/1999/01/nppg14 "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."
Scottish Transport Appraisal Guidance (STAG): http://www.scotland.gov.uk/library5/transport/stag-07.asp 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: • 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; • To avoid development in, or close to, unprotected but valuable and sensitive habitats (e.g. important bird areas); • 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; • To adopt the "no net effect" principle, providing full compensation for lost biodiversity values where loss is unavoidable. "
WebTAG – Biodiversity Sub-Objective: http://www.webtag.org.uk/webdocuments/3_Expert/3_Environment_Objective/3.3.10.htm "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: • design proposals to minimise the impact of the proposal on the site (reducing runoff, for example); • on-site, or near-site, mitigation to help conserve existing biodiversity interest where the impacts can not be

Mitigation References in Legislation
minimised (e.g. dedicated animal crossings, land management regimes); and • off-site proposals (such as habitat replacement) to compensate for biodiversity and earth heritage losses. These categories should be developed sequentially in scheme design: 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. 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.

6.3 Generic Mitigation

6.3.1 The proposed scheme would result in the loss, fragmentation and severance of habitat. 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.

6.3.2 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.

Table 16 – Mitigation Measures for 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 and will be integrated with landscape planting where possible.

Direct Habitat Loss

6.3.3 Offsetting the loss of ecologically important habitats will occur through habitat creation schemes including roadside planting, where appropriate, and will be integrated with landscape planting as per Chapter 42 (Landscape).

6.3.4 During the operation of the proposed road, management and maintenance of roadside verges will be undertaken 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.

6.3.5 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

6.3.6 The proposed scheme would 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.

6.3.7 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. Fencing and planting of the riparian areas 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, provision of culverts with integral mammal ledges and the provision of high span bridges further mitigates such impacts. 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

6.3.8 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 adversely affecting adjacent vegetation. Details regarding the measures that will be implemented to mitigate for adverse water quality and hydrological impacts are provided in Chapter 24 (Water Environment). SEPA pollution prevention guidelines will be strictly adhered to.

Disturbance During Construction

6.3.9 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. An Ecological Clerk of Works will be present on site to monitor vegetation removal and associated activities.

6.4 Specific Mitigation

6.4.1 Mitigation has been specified for areas where impacts of Moderate or above have been identified. Offset mitigation to address the overall cumulative impacts of the scheme is described in Chapter 56 (Mitigation). For each section of the Southern Leg, mitigation for specific impacts is provided below, while Tables 13-15 show individual assessments by Habitat Area.

Section FL1

6.4.2 Habitat loss and fragmentation at Limpet Burn will be mitigated through the creation of riparian woodland along approximately ch1390 to ch1480. Loss of wet woodland in Fishermyre Wood will be mitigated through the creation of willow dominated woodland near ch2950 to ch3480. The loss of high value fen and mire habitats at Fishermyre will require additional wetland habitat creation to offset the loss of UK BAP priority habitats. If this additional habitat creation was attained, impacts would be further reduced. Pollution and disturbance impacts will be reduced through the effective implementation of the mitigation that has been described previously. The section of road through Fishermyre would be constructed in a

manner to minimise hydrological impacts (refer to Chapter 39: Water Environment). With the application of these measures, overall impacts to this section are predicted to reduce to Minor significance.

Section FL2

6.4.3 The creation of riparian woodland (near approximately ch4700) either side of the AWPR will compensate for habitat loss as well as reducing fragmentation and disturbance impacts at the Burn of Muchalls crossing (F15). Impacts from disturbance and pollution would be reduced through the implementation of generic mitigation measures in this area. The treatment of polluted road runoff through SUDS ponds that would be located in the fields immediately to the north of the burn will also be of benefit. Planting riparian woodland around these ponds will have a secondary benefit of offsetting habitat loss and enhancing local biodiversity. With the successful application of mitigation, the residual impacts in this section would be reduced to Negligible significance.

Section FL3

6.4.4 The road would be constructed to ensure that potential hydrological impacts to the wetland habitats of F19, F21 and F23 will be minimised. This will also reduce impacts to the bog/heath to the immediate west of Wedderhill (F24). Maintaining the local hydrological regime will allow succession to take place within the acid grassland/dry heath habitat, promoting habitat of greater nature conservation value. Woodland and scrub planting at ch6500-6930 will reduce fragmentation in F19. Minimising the loss of habitat would reduce potential impacts to these areas to Minor significance.

6.5 Residual Impacts

6.5.1 The long-term predicted residual impacts remaining once mitigation has been successfully implemented are provided in Tables 13-15.

Table 17 – Mitigation Measures and Residual Impacts for Section FL1

Habitat Area Number	Feature / Asset Evaluation	Criteria	Pre-Mitigation Impact Significance	Residual Impact
F1	Agricultural fields between the A90 and Stonehaven Local	No specific mitigation required.	Minor	Minor
F2	Agricultural fields west of New Mains of Ury Local	No specific mitigation required.	Negligible	Negligible
F3	Agricultural fields to the north of Megray Farm Local	No specific mitigation required. Landscape and protected species (2ha) planting (Ch50–600) raises the nature conservation value.	Minor	Minor Positive
F4	H Ram Wood Local	No specific mitigation required. Landscape and protected species planting (see F3) offsets loss of habitat.	Minor	Negligible
F5	Slicewells Wood Regional	No specific mitigation required.	Negligible	Negligible
F6	Megray Wood Regional	No specific mitigation required.	Minor	Minor
F7	Limpet Burn Regional	Generic mitigation reduces potential pollution impacts. Riparian (0.5ha) planting (Ch1390–1480) and protected species (0.1ha) planting (Ch1550) offsets loss of woodland and fragmentation.	Major	Minor
F8	Agricultural fields surrounding Coneyhatch and Wyndford Farm Less than local	No specific mitigation required.	Negligible	Negligible
F9	Kempstone Hill Local	No specific mitigation required.	Negligible	Negligible
F10	Fishermyre Wood south Regional	Generic mitigation reduces potential pollution impacts. Sympathetic landscape (1.45 ha) planting (Ch2500–2940) offsets loss of woodland. Fragmentation is reduced by planting providing wildlife corridors to the high value habitats of FL12. Hydrological impacts are mitigated by road design.	Major	Minor
F11	Fishermyre Wood west. Regional	No specific mitigation required.	Negligible	Negligible
F12	Fishermyre Wood. Wet habitats to the south of Allochie Croft Regional	Generic mitigation reduces potential pollution impacts. Sympathetic tree and scrub planting (2.17ha at Ch2940-3480) offsets loss of woodland. Hydrological impacts are mitigated by road design. Offset mitigation will mitigate for the loss of fen habitat.	Major	Minor

Table 18 –Mitigation Measures and Residual Impacts for Section FL2

Habitat Area Number	Feature / Asset Evaluation	Criteria	Pre-Mitigation Impact Significance	Residual
F13	Agricultural fields surrounding Hill of Muchals Local	No specific mitigation required.	Minor	Minor
F14	Heath by Allochie Local	No specific mitigation required.	Negligible	Negligible
F15	Burn of Muchalls Regional	Sympathetic landscape riparian (0.5ha) planting (Ch4700) mitigates habitat loss and fragmentation, as well as increasing the nature conservation value. Generic mitigation reduces potential pollution impacts.	Major	Negligible
F16	Agricultural fields from north of the Burn of Muchalls to Cookney Local	No specific mitigation required. Roadside (1.5ha Ch4700–5270 and 2.1ha at Ch5960–6340), protected species (0.07ha at Ch5600) and drainage basin (0.5ha at Ch4730-4800) planting will provide wooded habitats in an area dominated by arable and improved fields, thus providing wildlife corridors.	Minor	Minor Positive

Table 19 – Mitigation Measures and Residual Impacts for Section FL3

Habitat Area Number	Feature / Asset Evaluation	Criteria	Pre-Mitigation Impact Significance	Residual
F17	Wet habitats north of Cookney County	No specific mitigation required. Landscape scrub (0.6ha) planting (Ch6400–6600) and mixed woodland/standard tree (0.07ha) planting (Ch6300-6400) for bat mitigation provides additional wildlife refuges	Minor	Minor
F18	Agricultural fields from Cookney to East Rothnick Wood Local	No specific mitigation required. Landscape and protected species planting (1.9ha at Ch6350–7180 and 1.5ha at Ch8250-8550) provides wooded habitat in area dominated by arable and improved fields.	Minor	Minor Positive
F19	Stoneyhill County	Generic mitigation reduces potential pollution impacts. Woodland planting (see F18) reduces fragmentation by connecting marsh to dry stone walls connected to scrub and acid grassland habitats. Hydrological impacts are mitigated by road design. Offset mitigation will mitigate for the loss of wetland habitat.	Moderate	Minor
F20	Agricultural fields around Berrytop Less than local	No specific mitigation required.	Negligible	Negligible
F21	Wet habitats around East Crossley County	Generic mitigation reduces potential pollution impacts. Hydrological impacts are mitigated by road design. Offset mitigation will mitigate for the loss of heathland habitat.	Moderate	Minor

Habitat Area Number	Feature / Asset Evaluation	Criteria	Pre-Mitigation Impact Significance	Residual
F22	Agricultural fields from Quoscies to Strannog Less than local	No specific mitigation required.	Negligible	Negligible
F23	Dry heath/acid grassland mosaic to the west of Wedderhill County	Generic mitigation reduces potential pollution impacts. Hydrological impacts are mitigated by road design. Offset mitigation will mitigate for the loss of heathland habitat.	Moderate	Minor
F24	Bog/heath to the immediate west of Wedderhill County	Generic mitigation reduces potential pollution impacts. Hydrological impacts are mitigated by road design.	Moderate	Negligible
F25	Plantation woodland south of Strannog Local	No specific mitigation required. Landscape (0.7ha) planting (Ch9950–10210) offsets habitat loss.	Minor	Minor
F26	Agricultural fields to the south of Polston Farm Local	No specific mitigation required. Landscape (1.19ha) and protected species (0.7ha) planting (Ch11150–11500) provides wooded habitats in an area dominated by arable and improved fields.	Minor	Minor Positive
F27	Floodplain and immediate surrounds of Crynoch Burn (south) County	No specific mitigation required.	Negligible	Negligible

7 Conclusions

7.1.1 In Section FL1, habitat loss and fragmentation at Limpet Burn and Fishermyre Wood will be mitigated through habitat creation of wet and riparian woodland. Loss of Fishermyre wetland habitats (predominantly fen/mire) will be compensated by habitat creation. Pollution and disturbance impacts will be addressed by generic mitigation measures.

7.1.2 The creation of riparian woodland either side of the AWPR will compensate for habitat loss, as well as reducing fragmentation and disturbance impacts, at the Burn of Muchalls in Section FL2. This, in combination with generic mitigation reducing pollution, disturbance and hydrological impacts, the residual impacts in this section would be reduced to below Moderate significance.

7.1.3 Potential hydrological impacts to the wetland habitats of F19, F21 and F23 in Section FL3 will be minimised by generic mitigation. This will also reduce impacts to the bog/heath to the immediate west of Wedderhill (F24). Minimising the loss of habitat by plantings, combined with offset creation of wetland systems, would reduce potential impacts to these areas to Minor significance.

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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 (*Acer pseudoplatanus*), elder (*Sambucus nigra*), hawthorn (*Crataegus monogyna*), birch (*Betula sp.*) and rowan (*Sorbus aucuparia*). Ground flora contains dominant great woodrush (*Luzula sylvatica*) with frequent bramble (*Rubus fruticosus*) and dog rose (*Rosa canina*). Regenerating alder (*Alnus glutinosa*) 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 (*Ulex europeaus*) and elder, with the grassy ground layer dominated by false oat-grass (*Arrhenatherum elatius*).
3	NO872875	Invasive species. A small stand of Japanese knotweed (*Fallopia japonica*) within a hedge is present.
4	NO873878	Semi-natural broad-leaved woodland Sycamore and beech (*Fagus sylvatica*) dominate with ash (*Fraxinus excelsior*) occasional. hazel (*Corylus avellana*) and rowan are occasional in the shrub layer with hawthorn rare. Great woodrush dominates the ground layer with abundant wood aven (*Geum urbanum*). Bramble and common dog-violet (*Viola riviniana*) are frequent. A single specimen of common twayblade (*Listera ovata*) 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 (*Silene dioica*) 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 *(Heraclium sphondylium)* are abundant. Cocksfoot (*Dactylis glomerata*) and tufted hair-grass (*Deschampsia cespitosa*) 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 (*Holcus lanatus*)/creeping soft grass (*Holcus mollis*) mix. The wood is separated into two sections by a wall, now overgrown with grasses.
9	NO882878	Arable weeds. Oilseed rape (*Brassica napus*) field with a good selection of arable weeds. Dominance is varied but species list includes field pansy (*Viola arvensis*), field forget-me-not (*Myosotis arvensis*), cleavers (*Galium aparine*), lesser stitchwort (*Stellaria graminea*), scentless mayweed (*Tripleurospermum inodorum*), broad-leaved dock (*Rumex obtusifolius*), creeping thistle (*Cirsium arvense*), common nettle (*Urtica dioica*), poppy (*Papaver rhoeas*), wild carrot (*Daucus carota*), sheperd's purse (*Capsella bursa-pastoris*), Yorkshire fog, cocksfoot, red dead-nettle (*Lamium purpureum*), common fumitory (*Fumaria officinalis*) and common groundsel (*Senecio vulgaris*).
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 (*Campanula rotundifolia*) 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 (*Festuca sp.*)) but with common dog-violet and common nettle abundant, wood sorrel *(Oxalis acetosella)* frequent and foxglove (*Digitalis purpurea*), wood speedwell (*Veronica montana*) and common sorrel (*Rumex acetosa*) occasional.
12	NO871887	Gorse dense scrub with scattered birch. The ground flora is dominated by soft rush (*Juncus effusus*) with wavy hair-grass (*Deschampsia flexuosa*) and Yorkshire fog abundant, plus frequent tormentil (*Potentilla erecta*).
13	NO872887	Semi-natural broad-leaved woodland. Birch dominates, with rowan and willow (*Salix sp.*) 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.

Target Note Number	Grid Reference	Description
14	NO874886	Marsh. Soft rush dominated marsh with goat willow (*Salix caprea*)/ birch scattered scrub occasional, plus mature alder to the south. Ground flora contains abundant common sorrel with frequent cleavers, Yorkshire fog, curled dock (*Rumex crispus*) and common marsh bedstraw (*Galium palustre*). Occasional species include common nettle, cuckoo-flower (*Cardamine pratensis*), wavy bitter-cress (*C. flexuosa*), marsh thistle (*Cirsium palustre*) and redcurrant (*Rubus rubrum*). 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 (*Equisetum fluviatile*) and water forget-me-not (*Myosotis scorpioides*).
15	NO874887	Semi-natural broad-leaved woodland. Mature (c.10m) Birch-dominated woodland with no regeneration. Sweet vernal-grass (*Anthoxanthum odoratum*) is dominant in the ground layer with wood sorrel abundant. Mosses include occasional *Scleropodium purum* and *Rhytidiadelphus squarrosus*. The wood is on a gentle slope with frequent drainage channels. Great woodrush and wood anemone (*Anemone nemorosa*) 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 (*Stellaria holostea*) and foxglove frequent. A more acid character is evident by the occasional appearance of wavy hair-grass, tormentil and heath bedstraw (*Galium saxatile*), along with rare heather (*Calluna vulgaris*). 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 (*Poa pratensis*), soft rush and *Carex panicea* are locally frequent as is water horsetail. cleavers, marsh thistle, common nettle, cuckoo-flower, creeping buttercup (*Ranunculus repens*) and marsh marigold (*Caltha palustris*) 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 (*Juncus acutiflorus*) (on the lower slopes). Frequent herbs are lesser stitchwort, common sorrel and bog stitchwort (*Stellaria alsine*) (on the lower slopes), frequent with occasional foxglove, common dog-violet, meadowsweet (*Filipendula ulmaria*), devil's-bit scabious (*Succisa pratensis*) and marsh willowherb (*Epilobium palustre*). At the top of the slopes bracken (*Pteridium aquilinum*) 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 (*Tsuga heterophylla*), Norway fir (*Picea abies*) and Sitka spruce (*Picea abies*) (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.
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 (*Cytisus scoparius*). 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 (*Betula pendula*) and occasional Scots pine (*Pinus sylvestris*).
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 (*Erica cinerea*) 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 (*Corydalis claviculata*) and wood anemone.
26	NO865902	Conifer plantation woodland. Scots pine is dominant (height of around 15m), with rowan and birch

Target Note Number	Grid Reference	Description
		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 (*Dryopteris dilitata*), 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 *Polytrichum sp*. 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 (*Lathyrus pratensis*) and bramble. Soft rush is occasional though compact rush (*Juncus conglomeratus*) 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 *Sphagnum,* bell heather, hare's-tail cotton-grass (*Eriophorum vaginatum*) and crowberry (*Empetrum nigrum*). Deergrass (*Trichophorum cespitosum*), common cotton-grass (*Eriophorum angustifolium*), *Polytrichum commune* and purple moor-grass (*Molinia caerulea*) are frequent, whilst soft rush, wavy hair-grass, bog asphodel (*Narthecium ossifragum*) and tormentil are occasional. Rare species are wood horsetail (*Equisetum sylvaticum*), star sedge (*Carex echinata*) and northern marsh orchid (*Dactylorhiza purpurella*).
31	NO867905	Goat willow and eared willow (*Salix aurita*) 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 (*Potentilla palustris*). Wet runnels through the wood contain active *Sphagnum*.
32	NO864905	Fen with wet grassland. Overall, jointed rush (*Juncus articulatus*) is dominant, though both tufted hair-grass and Yorkshire fog can be locally dominant. Other species present include marsh pennywort (*Hydrocotyle vulgaris*), marsh thistle, soft rush, horsetail, heath bedstraw, wavy bitter-cress, sheep's sorrel (*Hydrocotyle vulgaris*), marsh cinquefoil, common sedge (*Carex nigra*) 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. *Sphagnum* is frequent underfoot, whilst scattered Scots pine can be frequent.
34	NO870906	Soft rush-dominated fen with *Sphagnum* abundant underneath. Hare's-tail cotton-grass is frequent, with heather and willow occasional.
34a	NO8694090357	The area is closest to NVC community M23 *Juncus effusus/acutiflorus-Galium palustre* rush pasture. It is dominated by sharp flowered rush (*Juncus acutiflorus*) with abundant soft rush. At the time of survey this community at Fishermyre was higher plant species poor, with frequent marsh thistle (*Cirsium palustre*), devil's bit scabious (*Succisa pratensis*), occasional cuckoo flower (*Cardamine pratensis*) and occasional tufted hair grass and common sedge. There is a well developed Moss layer with frequent *Eurhynchium praelongum, Aulocomium palustre, Pleurozium schreberi, Polytrichum commune* and *Brachythecium rivulare* in the open water areas. *Sphagnum capillifolium* is occasional. In drier areas this develops into marshy grassland with a greater proportion of tufted hair grass.
34b	NO8690090456	The area is closest to NVC community M19 *Calluna vulgaris*/*Eriophorum vaginatum* blanket mire, *Erica tetralix* sub community. Heather and hare's tail cotton grass are co-dominant and form the familiar hump and hollow physiognomy. There is frequent cross leaved heath (*Erica tetralix*) and crowberry and occasional cotton grass and heath rush (*Juncus squarrosus*). The Moss layer is also well developed with abundant *Sphagnum capillifolium*, *Polytrichum commune*, and occasional *Hylocomium splendens*.
34c	NO8670090300	The wet heath area is dominated by heather with frequent cross leaved heath and occasional crowberry and bell heather. Heath rush increases in abundance and Yorkshire fog grass, mat grass (*Nardus stricta*) and wavy hair grassare occasional. Hypnoid mosses are abundant comprising of *Hypnum jutlandicum*, *Hylocomium splendens* and *Pleurozium schreberi*. *Polytrichum commune* and

Target Note Number	Grid Reference	Description
		Sphagnum capillifolium are 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. 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 (*Acer campestre*). The ground layer is dominated by creeping soft grass with occasional honeysuckle (*Lonicera periclymenum*) 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 (*Erica tetralix*). The moss layer is dominated by *Hypnum cupressiforme*, with locally frequent *Sphagnum capillifolium* and occasional *Plagiothecium undulatum Polytrichum commune* and *Dicranum scoparium*.
39	NO86570 91630	Dry heath. The ground flora is dominated by heather with occasional wavy hair-grass and rare sheep fescue (*Festuca ovina*) and tormentil. The moss layer is well developed dominated with Hypnoid mosses. *Hypnum jutlandicum* is dominant with frequent *Plagiothecium undulatum* and *Pleurozium schreberi* with occasional *Hylocomium splendens*.
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 (*Sorbus aria*) and crab apple (*Malus sylvestris*) with frequent hawthorn in the understorey
43	NO87003 92065	There is a pond in which margins are dominated by bullrush (*Typha latifolia*) with occasional bottle sedge (*Carex rostrata*). It is surrounded by mixed plantation woodland (20 yrs) comprised of crack willow (*Salix fragilis*), grey willow (*S. cinerea*), alder, bird cherry (*Prunus padus*), wild cherry (*Prunus avium*), 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 (*Aegopodium podagraria*).
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 (*Ilex aquifolium*) and sweet briar (*Rosa rubiginosa*).
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 (*Salix alba*), 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 (*Hypericum sp.*). 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.

Target Note Number	Grid Reference	Description
53	NO86903 92582	Scattered trees 10 to 15 years old consisting of Scots pine, beech, field maple, rowan, horse chestnut (*Aesculus hippocastanum*), goat willow with scattered gorse, the ground flora is 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 *Sphagnum capillifolium* 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 (*Vaccinium myrtillus*) with occasional purple moor-grass, heath woodrush (*Luzula multiflora*), heath rush, crowberry and cross-leaved heath. The moss layer is dominated by *Hypnum jutlandicum*, with occasional *Dicranum scoparium*, *Plagiothecium undulatum* and *Polytrichum commune*.
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 (*Agrostis stolonifera*. 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 (*Symphytum officinale*), marsh violet (*Viola palustris*) and marsh horsetail (*Equisetum palustre*). Heath spotted-orchid (*Dactylorhiza maculata*) and northern marsh orchid are rare. The moss layer is well developed with occasional *Polytrichum commune, Brachythecium rutabulum* and *Eurynchium praelongum* and rare *Sphagnum palustre*.
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 *Leylandii* 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 *(Galeobdolon luteum)* with occasional elder, common comfrey*,* raspberry *(Rubus idaeus)* and lesser burdock (*Arctium minus*).
58	NO876946	The composition of the general grassland sward includes, frequent perennial rye-grass, annual meadow-grass (*Poa annua*), Yorkshire fog, with frequent forbs such as creeping buttercup, chickweed (*Stellaria media*), common nettle and white clover (*Trifolium repens*).
59	NO872946	The verges in the area have a sward comprising of frequent creeping bent-grass, Yorkshire fog with frequent, ground elder, cow parsley (*Anthriscus sylvestris*), ribwort plantain (*Plantago lanceolata*), great hairy willowherb (*Epilobium hirsutum*) 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 *Hypnum cupressiforme*.
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 *Calliergon cuspidatum*. 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 (*Arctostaphylos uva-ursi*)*,* 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 *Narcissus 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 *(Chamaecyparis lawsoniana)* 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 *Sphagnum* 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.

Target Note Number	Grid Reference	Description
68	NO877968	Bog. Hare's-tail cotton-grass is dominant, whilst wavy hair-grass, *Sphagnum sp.* 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 *Sphagnum* sp. 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 *Sphagnum* spp. in the wetter areas. Scattered Scots pine and Sitka spruce are frequent, whilst regenerating rowan is occasional in the ground layer. A *Buteo buteo* 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 (*Festuca rubra*) and wavy hair-grass are frequent. Occasional species include the dry heath assemblage of heather, blaeberry, *Sphagnum spp.* 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 *Buteo buteo* 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 significaqntly 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 *Sphagnum* sp. are present. *Vanellus vanellus* and *Buteo buteo* were observed.
74	NO865976	Mesotrophic semi-improved grassland. The composition is very variable. Overall, Yorkshire fog dominates with meadow foxtail (*Alopecurus pratensis*), bent grass and cocksfoot abundant. Frequent species include timothy (*Phleum pratense*), false oat-grass, creeping buttercup, curled dock, soft rush and compact rush, while foxglove, lesser stitchwort, meadow vetchling, red fescue, *Centaurea nigra,* 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.

Species List

Latin Name	Common Name
Acer campestre	Field maple
Acer pseudoplatanus	Sycamore
Aegopodium podagraria	Ground elder
Aesculus hippocastanum	Horse chestnut
Agrostis stolonifera	Creeping bent
Alnus glutinosa	Alder
Alopecurus pratensis	Meadow foxtail
Anemone nemorosa	Wood anemone
Angelica sylvestris	Wild angelica
Anthoxanthum odoratum	Sweet vernal-grass
Anthriscus sylvestris	Cow parsley
Arctium minus	Lesser burdock
Arctostaphylos uva-ursi	Bearberry
Arrhenatherum elatius	False oat-grass
Betula pendula	Silver birch
Betula sp.	Birch
Brachythecium rutabulum	A moss
Brassica napus	Oilseed rape
Calliergon cuspidatum	A moss
Calluna vulgaris	Heather
Caltha palustris	Marsh-marigold
Campanula rotundifolia	Harebell
Capsella bursa-pastoris	Shepard's purse
Cardamine flexuosa	Wavy bitter-cress
Cardamine pratensis	Cuckoo-flower
Carex echinata	Star sedge
Carex nigra	Common sedge
Carex rostrata	Bottle sedge
Centaurea nigra	Common knapweed
Chamaecyparis lawsonia	Lawson cypress
Cirsium arvense	Creeping thistle
Cirsium palustre	Marsh thistle
Corydalis claviculata	Climbing corydalis
Corylus avellana	Hazel
Crataegus monogyna	Hawthorn
Cytisus scoparius	Broom
Dactylis glomerata	Cock's-foot
Dactylorhiza maculata	Heath spotted-orchid
Dactylorhiza purpurella	Northern marsh-orchid
Daucus carota	Wild carrot
Deschampsia cespitosa	Tufted hair-grass
Deschampsia flexuosa	Wavy hair-grass
Dicranum scoparium	A moss
Digitalis purpurea	Foxglove
Dryopteris diltata	Broad buckler-fern
Empetrum nigrum	Crowberry
Epilobium hirsutum	Great willowherb
Epilobium palustre	Marsh willowherb
Equisetum fluviatile	Water horsetail
Equisetum palustre	Marsh horsetail
Equisetum sylvaticum	Wood horsetail
Erica cinerea	Bell heather
Erica tetralix	Cross-leaved heath
Eriophorum angustifolium	Common cotton-grass
Eriophorum vaginatum	Hare's-tail cotton-grass
Fagus sylvatica	Beech
Fallopia japonica	Japanese knotweed
Festuca ovina agg.	Sheep's-fescue
Festuca rubra agg.	Red fescue
Festuca sp.	Fescue
Filipendula ulmaria	Meadowsweet
Fraxinus excelsior	Ash
Fumaria officinalis	Common fumitory
Galeobdolon luteum	Yellow arch-angel
Galium aparine	Cleavers
Galium palustre	Common marsh-bedstraw
Galium saxatilis	Heath bedstraw
Geum urbanum	Wood avens
Holcus lanatus	Yorkshire-fog
Holcus mollis	Creeping soft-grass
Hydrocotyle vulgaris	Marsh pennywort
Hylocomium splendens	A moss
Hypericum sp	St-John's wort
Hypnum cupressiforme	A moss
Hypnum jutlandicum	A moss
Ilex aquifolium	Holly
Juncus acutiflorus	Sharp-flowered rush
Juncus articulatus	Jointed rush
Juncus conglomeratus	Compact rush
Juncus effusus	Soft rush
Juncus squarrosus	Heath rush
Lamium purpureum	Red dead-nettle
Lathyrus pratensis	Meadow vetchling
Listera ovata	Common twayblade
Lolium perenne	Perennial rye-grass
Lonicera periclymenum	Honeysuckle

Latin Name	Common Name
Luzula multiflora	Heath wood-rush
Luzula sylvatica	Great wood-rush
Molinia caerulaea	Purple moor-grass
Myosotis arvensis	Field forget-me-not
Myosotis scorpioides	Water forget-me-not
Narcissus sp.	Daffodil
Narthecium ossifragum	Bog asphodel
Oxalis acetosella	Wood-sorrel
Papaver rhoeas	Common poppy
Phleum pratense	Timothy
Picea abies	Norway spruce
Picea stichensis	Sitka spruce
Pinus sylvestris	Scot's pine
Plagiothecium undulatum	A moss
Plantago lanceolata	Ribwort plantain
Pleurozium schreberi	A moss
Poa annua	Annual meadow-grass
Poa pratensis agg.	Smooth meadow-grass
Polytrichum commune	A moss
Polytrichum sp.	A moss.
Potentilla erecta	Tormentil
Potentilla palustris	Marsh cinquefoil
Prunus avium	Wild cherry
Prunus padus	Bird cherry
Pteridium aquilinum	Bracken
Ranunculus repens	Creeping buttercup
Rhododendron ponticum	Rhododendron
Rosa canina agg..	Dog rose
Rosa rubignosa	Sweet briar
Rubus fruticosus agg.	Bramble
Rubus idaeus	Raspberry
Rubus rubrum	Redcurrant
Rumex acetosa	Common sorrel
Rumex acetosella	Sheep's sorrel
Rumex crispus	Curled dock
Rumex obtusifolius	Broad-leaved dock
Salix alba	White willow
Salix aurita	Eared willow
Salix caprea	Goat willow
Salix cineraea	Grey willow
Salix fragilis	Crack willow
Salix sp.	Willow sp.
Sambuca nigra	Elder
Senecio jacobea	Common ragwort
Senecio vulgaris	Common groundsel
Silene dioica	Red campion
Sorbus aria agg.	Common whitebeam
Sorbus aucuparia	Rowan
Sphagnum capillifolium	A moss
Sphagnum palustre	A moss
Stellaria alsine	Bog stitchwort
Stellaria graminea	Lesser stitchwort
Stellaria holostea	Greater stitchwort
Stellaria media	Common chickweed
Succisa pratensis	Devil's-bit scabious
Symphytum officinale	Common comfrey
Trichophorum cespitosum	Deergrass
Trifolium repens	White clover
Tripleurospermum inodorum	Mayweed
Tsuga heterophylla	Western hemlock
Typha latifolia	Bulrush
Ulex europaeus	Gorse
Urtica dioica	Common nettle
Vaccinium myrtillis	Bilberry
Veronica Montana	Wood speedwell
Viola arvensis	Field pansy
Viola palustris	Marsh violet
Viola riviniana	Common dog-violet
x Cupressocyparis leylandii	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 (drystane 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

- 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;
- 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.

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 of afforested, with the aim of encouraging raised bog vegetation.

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.