

A10.6 Evaluation of Terrestrial and Freshwater Ecological Receptors

This Appendix provides information pertinent to the evaluation of habitats and species, as identified and reported in Appendix A10.4 (Detailed Terrestrial and Freshwater Ecological Baseline Data). The evaluation has been undertaken in accordance with IEEM (2006) guidance, taking cognisance of criteria set out in Chapter 10, Section 10.2 (Approach and Methods), whereby an ecological value category ranging from 'less than local' to 'international' is assigned to ecological receptors.

1 Terrestrial Habitats

1.1 Introduction

1.1.1 Terrestrial habitats within the study area have been evaluated based on the criteria set out in Chapter 10, Table 10.1. The evaluation involves consideration of:

- conservation status or designation of the habitat (if any);
- Local Biodiversity Action Plan (LBAP) or Local Habitat Action Plan (LHAP) status; and
- presence of rare or LBAP species.

1.2 Evaluation of Conservation Sites and Habitats Types

St. Margaret's Marsh Site of Special Scientific Interest (SSSI)

1.2.1 This Site of Special Scientific Interest (SSSI) is designated for its biological interest and contains a mosaic of different habitats including an extensive area of reedbed, saltmarsh, maritime grassland and neutral grassland and is therefore assessed as being of national level ecological value.

Ferry Hills SSSI

1.2.2 This SSSI is designated for its geological and biological interests. It contains scarce and declining habitats of unimproved calcareous and improved grassland, and is therefore assessed as being of national level ecological value.

Category 1 - Ancient Woodland (of semi-natural origin)

1.2.3 East Shore Wood and Lindsay's Craigs are the only woodlands identified in the study area which include an area classified as Category 1 on the Ancient Woodland Inventory (AWI) (SNH, 2008). Due to the woodlands being greater than 0.25ha and having relatively good connectivity with other woodlands and semi-natural habitats to the west and south-west of the study area respectively, the woodlands are assessed as being of authority area level ecological value.

Semi-natural and Plantation Woodland

1.2.4 St Margaret's Hope, Castlandhill Wood and North Cliff Wood are the only woodlands within the northern study area to be included in the AWI and are classified as being Long-established Woodlands of Plantation Origin (Category 2b) (SNH, 2008). Bluebell (*Hyacinthoides non-scripta*) a Local Species Action Plan (LSAP) species for Fife (Fife Council, 2008), is found in these woodlands. Due to their size being greater than 0.25ha and all having relatively good connectivity with other semi-natural habitats, the woodlands are assessed as being of authority area level ecological value.

1.2.5 There are 58 areas that have been recorded (Figure 10.1) as plantation woodland, and eight of these in the southern study area are included in the AWI as set out in Appendix A10.4 (Paragraph 1.2.5 to 1.2.7 Ancient Woodland Inventory) including Ross's Plantation and areas of Dundas Wood,

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which is also designated as a Site of Importance for Nature Conservation (SINC). These woodland habitats are assessed as being of authority area level ecological value.

Agricultural Land

- 1.2.6 The majority of the study area is arable land, comprising areas of farmland containing fields of poor semi-improved and improved grassland. Due to their low species diversity with swards often dominated by grasses, these habitats are assessed as being of less than local level ecological value, however there are some notable exceptions:
- The field adjacent to Castlandhill Wood is an area of LHAP semi-natural, calcareous wet grassland (Appendix A10.4, paragraph 1.2.76, Table 1.2, Target Note 8). Due to its high diversity of grass and wildflower species, and good connectivity with other habitats including plantation woodland and dense scrub, this area is assessed as being of authority area level ecological value.
 - A small area of grassland located at the western end of the cemetery at Inverkeithing (Appendix A10.4, Table 1.2, Target Note 6) is known to contain maiden pink (*Dianthus deltooides*), a LBAP species for Fife (Fife Council, 2008) and is therefore assessed as being of authority area level ecological value.
 - The small area of coastal grassland below St Margaret's Hope wood has many local or uncommon species including the locally rare dropwort (*Filipendula vulgaris*). Though not a designated site, this area is assessed as being of authority area level ecological value.

Open Water

- 1.2.7 There are several areas of open water located within the study area including Back Braes Weir, Humber Reservoir and a number of ponds and other small waterbodies. All watercourses within the study area: Linn Mill Burn, Swine Burn (and associated ditches), Niddry Burn and River Almond, are LHAP rivers and streams. These watercourses and associated riparian habitats provide physical structures that support wildlife. In particular, the River Almond is designated as a SINC and has an Integrated Catchment Management Plan, which aids in the management of land and water in the catchment area. As such, these areas of open water are assessed as being of local level ecological value.

2 Badger

- 2.1.1 Detailed baseline information in respect to badgers is presented in Appendix A10.5 (Confidential Badger Information).
- 2.1.2 Habitat quality found in each social group's territory and the level of activity with each territory was evaluated. In order to contextualise the evaluation, consideration was also given to habitats 500m either side of the proposed scheme which are of known to be of value to badger (*Meles meles*) social groups.
- 2.1.3 To form a social group, badgers require habitat where they can excavate their main sett and successfully forage. The quality of foraging habitat will determine the number of badgers within a social group. The density of social groups is governed by a combination of suitable sett-making habitat and suitable foraging habitat within the landscape as a whole. Good sett-making and good foraging habitat results in densely distributed social groups (consequently with small territories) and a high overall badger population.
- 2.1.4 Suitable sett-making habitat requires areas of well drained, diggable soil, relatively free of human disturbance and with cover for badgers emerging from their sett.

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- 2.1.5 The quality of foraging habitat is likely to be governed by the density of short grassland for foraging, the richness of grassland in terms of its population of earth worms and the availability of alternative food resources when 'worming' conditions are unsuitable.
- 2.1.6 Factors that can affect the mortality rates of badgers, such as deliberate persecution, the presence of roads with high night time traffic flows or other physical barriers to movement, can adversely affect the quality of the landscape for badgers and consequently the distribution of social groups and overall badger population.
- 2.1.7 Table 2.1. provides an overall evaluation of the territories used by each of the six social groups and badger population at Dundas Estate. The evaluation is based upon habitat quality found in each section in relation to badgers, the numbers of badger social groups/population present and the value of the area to badgers. The evaluations have been derived from the criteria set out in Chapter 10, Table 10.1.

Table 2.1: Evaluation of Badger Territories

Social Group	Justification for Evaluation	Evaluation
Social Group A	The territory size is approximately 45ha. Foraging habitat is generally sub-optimal, comprising arable grassland, areas of improved grassland and poor semi-improved grassland and gardens. Only one main sett has been identified along with a disused outlier. The outlier exists within an area of high disturbance.	Local
Social Group B	The territory size is approximately 78ha. Only a very small amount of suitable setting habitat (<1ha) is present on the embankment of a burn, providing few sett expansion opportunities within the current territory. Foraging habitat is generally sub-optimal, comprising arable grassland, small areas of improved grassland and a garden. Although there are numerous signs of badger activity throughout the territory the social group appears to be relatively small comprising one main, one subsidiary and one outlier sett.	Local
Badger Population C	The territory size is approximately 300ha, and holds the largest population of badgers in the study area comprising a number of badger social groups. The territory contains numerous areas of woodland, situated on undulating landscapes with sandy soils and providing optimal setting habitat. The combination of large areas of amenity, poor semi-improved, improved and arable grassland offer a good range of foraging opportunities and the undisturbed nature of the estate has enabled the badger population to flourish. Eight main setts were recorded in this area and, although individual territories could not be defined, it is likely that this population comprises seven different social groups. In addition, to the main setts, five subsidiary, nine annex and thirty-three outlier setts were recorded. There is evidence of abundant badger activity in the area.	Regional
Social Group D	The territory size is approximately 113ha. A single woodland occurs within this territory. Badgers have also exploited setting opportunities in thin shelter belts and along the railway line which forms the southern territorial boundary. The shelter belts facilitate badger commuting between foraging grounds in the territory. The foraging grounds are largely comprised of arable land which is sub-optimal but some areas of improved grassland may support a higher density of earthworms, providing better foraging opportunities. The population appears to be relatively large, comprising one main, four subsidiary, two annex and four outlier setts. This is supported by evidence of abundant badger activity in the area.	Authority area
Social Group E	The territory size is approximately 111ha. Four woodlands, located to the south-west of the study area are included within this territory. These contain numerous wetter areas and, are generally considered to provide sub-optimal setting opportunities. By contrast, the dismantled railway line offers a drier substrate for sett excavation. Foraging habitats within the territory largely comprise arable and improved grassland and are considered to be sub-optimal. The population appears to be smaller than other social groups in the study area with one main, one subsidiary and three outlier setts. This is supported by low levels of badger activity in this area.	Authority area
Social Group F	The territory size for this group is approximately 59ha, which is the smallest social group territory within the study area. The territory contains approximately 8.5ha of optimal woodland setting habitat and some sub-optimal setting habitat which is wet and flat. The foraging habitats lie adjacent to the woodland areas and are considered	Authority area

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Social Group	Justification for Evaluation	Evaluation
	to be sub-optimal due to their arable nature. A major road acts as a barrier feature to this territory, limiting potential for expansion. One main, one subsidiary, one annex and two outlier setts were recorded within this territory. In addition, high levels of badger activity were recorded throughout the area.	

3 Bats

- 3.1.1 Bats were confirmed as present in all suitable habitat areas identified in the study area (Figure 10.4), as outlined in the baseline section (Chapter 10, Section 10.3) and detailed in Appendix A10.4, Section 3. These habitat areas have been evaluated according to the conservation status of the bat species utilising the area, the level of use of these habitats for roosting (R), foraging (F) and commuting (C) and the relative abundance and suitability of similar areas of habitat in the locality. The habitat's suitability to support bat populations has been assessed using potential activity: bat activity that the habitat is considered to be able to support. This is used in conjunction with actual activity: bat activity that was recorded during the baseline surveys.
- 3.1.2 Each area of bat habitat has been evaluated separately. However, bats are highly mobile and may travel many kilometres each night between roosts and foraging areas, and even greater distances to suitable hibernation or summer roosts. Different species and different groups of bats within species groups are likely to overlap geographically and the value of individual areas of habitat was evaluated as lower than the value of all the habitats in the section combined.
- 3.1.3 The presence of Daubenton's bat (*Myotis daubentonii*), which is a species of authority area value, along with the presence of features which are considered to support bats at vulnerable stages of their life cycles e.g. hibernation, have resulted in eleven areas of bat habitat being assessed as being of authority area value within the study area (Table 3.1).
- 3.1.4 St Margaret's Hope was not subject to field survey (Appendix A10.3, Section 3.4, Limitations to Assessment) and the presence of less common species including Daubenton's, Natterer's (*Myotis nattereri*) and brown long-eared bats (*Plecotus auritus*) cannot therefore be discounted. In addition, the presence of scarce mature broad-leaved woodland at St Margaret's Hope, the Forth Road and Rail Bridges (which act as a link between the Lothians and Fife) and the presence of potential bat hibernacula at Fairy Kirk also provide additional resources for bats within the study area.
- 3.1.5 Within the City of Edinburgh and West Lothian Council areas, woodland and water form a network of suitable bat habitat which is scarce and considered vital for maintaining species of authority area level ecological value. Three habitat areas are assessed as being of local level ecological value as they provide roosts and features which enrich the bat habitat.
- 3.1.6 Eleven habitat areas (Fairy Kirk, St Margaret's Hope Wood, North Queensferry, Port Edgar and West of South Queensferry, Dundas (North), Dundas (Central), Dundas (South), Swineburn, Humble, Kirkliston and Ross's Plantation including Lindsay's Craig) are assessed as being of authority area level ecological value as they provide high quality roosting, foraging and commuting habitats for bats. The remaining nine habitat areas (Rosyth, Inverkeithing, Castlandhill Woods, North Cliff Wood, South Queensferry, Dalmeny and North of Dundas, Milton and Dolphington, Carmelhill and Muiriehall) are assessed as being of local level ecological value as they provide habitats which are not scarce in the locality, but which provide roosting, foraging and commuting habitat for bat species.

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Table 3.1: Evaluation of Bat Habitats

Habitat Area	Actual Activity	Potential Activity	Comments	Evaluation
Table Note: =Roost, C= Commuting, F=Foraging				
Rosyth	F, C	R, F,C	Rosyth and its associated urban amenity habitats provide some roosting, foraging and commuting habitat for locally important pipistrelle bats. Trees and streetlamps border roads and paths within the town while amenity grassland areas provide linear features for commuting bats to travel to and from the area with good connectivity to the wilderness in the north of the town, or Castlandhill Woods and St Margaret's Hope to the south.	Local
Inverkeithing	F, C	R, F, C	Inverkeithing and associated urban/amenity habitats provide good roosting habitat and some foraging and commuting habitat suitable for locally important populations of pipistrelle bats. These habitats provide connectivity with other local habitat areas including Fairy Kirk and woodland within proximity of the Dales. The habitats present are not scarce in the locality.	Local
Fairy Kirk	F, C	F, C	An old open cast stone quarry situated to the north of the Forth may serve as a hibernaculum for regularly occurring, locally significant populations of county important species during a critical phase of their life cycle (i.e. hibernation). The woodland areas are considered to provide excellent foraging and commuting habitat between Inverkeithing, Rosyth and other adjoining habitat areas.	Authority area
Castlandhill Woods	F, C	R, F, C	Castlandhill Woods provides high quality commuting, foraging and roosting habitat for bat species including common and soprano pipistrelles. The woodland connects other woodland found within North Queensferry and St Margaret's Hope with Rosyth and Inverkeithing and enriches the available bat habitat resource.	Local
St Margaret's Hope Wood	1R, F, C	R, F, C	St Margaret's Hope Wood provides high quality commuting, foraging and roosting habitat for bat species including common and soprano pipistrelles, which are present in high numbers. A small pipistrelle tree roost was located on an activity survey. The woodland is considered to enrich the bat habitat resource allowing for further connectivity throughout the study area between areas such as North Queensferry and Castlandhill Woods. In the absence of direct survey information brown long-eared and <i>Myotis</i> species could be present.	Authority area
North Cliff Wood	F, C	R, F,C.	Commuting and foraging habitat supports pipistrelle bats which are common and not threatened locally, and forms a vital link between habitat areas at St Margaret's Wood and North Queensferry. The woodland is considered to enrich the available bat habitat resource allowing for further connectivity throughout the study area.	Local
North Queensferry	F, C	R, F,C.	North Queensferry and associated urban/amenity habitats provide excellent potential for roosting, foraging and commuting. The Forth Road Bridge provides a link between habitats in Fife and the Lothians which is scarce in the locality. Although no bats of more than local importance were identified using this structure, the presence of other species cannot be ruled out and, as such, this feature is likely to assist gene flow between bat populations north and south of the Forth.	Authority area
South Queensferry	R, F,C	R, F, C	South Queensferry and associated urban/amenity habitats including Jock's Hole Wood are considered to enrich the available bat habitat resource by acting as a link between high quality bat habitats at Dalmeny and Hopetoun. Urban habitats associated with Dalmeny, Kirkliston, Winchburgh, and Newton Village support populations of pipistrelle bats, a locally important species.	Local
Port Edgar and West of South Queensferry	1R, F,C	R, F,C	The area supports important commuting routes (CRs) for locally important pipistrelle species between South Queensferry, Hopetoun and East Shore Wood. However, the presence of an underground bunker at Port Edgar (roost in the old barracks building), allows for a hibernaculum site in the area, all of which support breeding colonies of bats at a vulnerable stage in their annual cycle.	Authority area
Dalmeny	F, C	R, F, C	Dalmeny and associated urban/amenity habitats to the east of South Queensferry including Cock's Hill Wood are considered to enrich the available bat habitat resource by acting as a link between high quality bat habitats at Dalmeny Estate and Hopetoun. Urban habitats associated with Dalmeny and South Queensferry support populations of pipistrelle bats (locally important species).	Local

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Habitat Area	Actual Activity	Potential Activity	Comments	Evaluation
Table Note: =Roost, C= Commuting, F=Foraging				
North of Dundas	F, C	F, C	Area of arable fields, improved grassland and small woodland areas. Hedgerows and stone walls provide connectivity with other local habitat areas including Swineburn and South Queensferry. The habitats present are not scarce in the locality.	Local
Dundas (North)	4R, F, C	R, F,C.	This area forms part of a wider area of high quality to bats which includes the rest of Dundas Estate, South Queensferry and Duddingston. Commuting and foraging habitat supports locally important numbers of pipistrelle bat. The presence of mature broadleaf woodlands forms a vital link between habitat areas, as well as providing high quality foraging and roosting habitat. Several other buildings and trees have roosting potential, including a dovecot with hibernaculum potential, all of which support bats at a vulnerable stage in their annual cycle.	Authority area
Dundas (Central)	2R, F,C	R, F,C.	This area forms part of a wider area of high quality to bats which includes the rest of Dundas Estate, Duddingston, Milton and Dolphington. It forms a vital link between habitat areas, as well as providing high quality foraging and roosting habitat for the full range of bat species found in the area. The area includes one confirmed roost for pipistrelle bats at Chapel Acre and one anecdotal roost at Greenacre, both of which are likely to maintain maternity colonies. Several other buildings and trees have roosting potential, including an icehouse as a hibernaculum. Taken together these features are considered to support regularly occurring, locally important numbers of bats.	Authority area
Milton and Dolphington	R, F, C	1R, F, C	Within this area small pipistrelle roosts support populations of a locally important species. Excellent foraging habitat and CRs between Dalmeny and Dundas are considered to enrich the available bat habitat resource. Habitat within this area extends that found within Dundas Estate.	Local
Dundas (South)	5R, F,C	R, F,C.	Dundas (South) forms part of a wider area of high quality to bats including the rest of the Dundas Estate, Swineburn, Humbie and Kirkliston. It forms a vital link between habitat areas, as well as providing high quality foraging and roosting habitat due to the presence of mature broadleaf woodlands and large open waterbodies used by Daubenton's bats, which are of authority area importance. The area includes four confirmed roosts, each of which supports populations of locally important species, and one anecdotal tree roost. There is also a quarry with hibernaculum potential.	Authority area
Swineburn	2 R, F, C	R, F, C	Swineburn Wood and the surrounding area provide foraging habitat for pipistrelle and Daubenton's bat and is an important area in terms of its connectivity with other habitats via woodland and the canal.	Authority area
Carmelhill and Muriehall	1R, F,C	R, C, F	Small pipistrelle roosts support populations of a locally important species. The woodland areas provide excellent foraging and commuting habitat for local bat populations. These areas enrich the available bat habitat resource as they are contiguous with the Swineburn Wood area providing further connectivity within the study area.	Local
Humbie	1R, F, C	R, F, C	Within this area small pipistrelle roosts support populations of locally important species. Humbie Farm and the surrounding area includes an ice house, a shaft, a disused quarry and culverts considered suitable to support regularly occurring, locally important populations of an authority area important species during a critical phase of their life cycle (i.e. hibernation). The woodland areas are considered to provide excellent foraging and commuting habitat contiguous with the Swine Burn.	Authority area
Kirkliston	F, C	R, F, C	Kirkliston and associated habitats provide potential bat roosting, foraging, and commuting habitats. Suburban area with trees, hedgerows and streetlamps bordering roads and paths and amenity grassland areas within the town, and local waterbodies provide suitable foraging habitat for bats and connectivity to Dundas Estate and Swineburn Wood. The area supports pipistrelle bats which are of local importance and the River Almond provides foraging and commuting habitat for Daubenton's bats which are of authority area importance.	Authority area
Ross's Plantation and Lindsay's Craigs	F, C	R, F, C	Lindsay's Craigs includes an ice house considered suitable to support regularly occurring, locally important populations of species of authority area importance during a critical phase of their life cycle (i.e. hibernation). The woodland areas are considered to provide foraging and commuting habitat contiguous with the River Almond.	Authority area

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4 Terrestrial Breeding Birds

- 4.1.1 This section presents an evaluation of terrestrial breeding birds. An evaluation of estuarine/marine bird species is presented in Chapter 11 (Estuarine Ecology).
- 4.1.2 The biodiversity value of terrestrial breeding birds was determined through reference to their conservation/legislative status and ecology, taking cognisance of the distribution, population trend and the rarity of each species (Table 4.1).

Table 4.1: Evaluation of Terrestrial Breeding Birds

Species	Estimated Population *	Conservation Status	Local/Regional/National Context	Evaluation
Barn owl (<i>Tyto alba</i>)	-	WCA1i, JNCC Amber List, LBAP	Common throughout Scotland and England where a historical decline in population was recorded until stabilisation in the 1990's.	National
Blackbird (<i>Turdus merula</i>)	138	-	Abundant throughout UK.	Local
Blackcap (<i>Sylvia atricapilla</i>)	23	-	Abundant throughout UK.	Local
Black-headed gull (<i>Larus ridibundus</i>)	52	JNCC Amber List	Commonest UK inland gull, particularly in north England, Scotland and Wales. Relatively small numbers exist within study area.	Local
Blue tit (<i>Parus caeruleus</i>)	185	-	Abundant throughout UK.	Local
Bullfinch (<i>Pyrrhula pyrrhula</i>)	10	JNCC Red List, UKBAP, LBAP	Recent national decline, present throughout Scotland except far north and west.	Authority area
Buzzard (<i>Buteo buteo</i>)	27	-	Commonest UK bird of prey.	Local
Carrion crow (<i>Corvus corone</i>)	54	-	Abundant throughout UK.	Local
Chaffinch (<i>Fringilla coelebs</i>)	239	-	Abundant throughout UK.	Local
Chiffchaff (<i>Phylloscopus collybita</i>)	47	-	Less common in far north, west and east Scotland but widespread in central belt. Summer visitor.	Local
Coal tit (<i>Parus ater</i>)	9	-	Common throughout UK.	Local
Collared dove (<i>Streptopelia decaocto</i>)	8	-	Abundant throughout UK.	Local
Common tern (<i>Sterna hirundo</i>)	6	LBAP	Seabird species (Chapter 11: Estuarine Ecology).	-
Coot (<i>Fulica atra</i>)	13	-	Abundant throughout UK.	Local
Cormorant (<i>Phalacrocorax carbo</i>)	7	JNCC Amber List	Occurs in very large numbers at breeding and wintering sites in the UK. Predominantly marine in this area.	Local
Curlew (<i>Numenius arquata</i>)	1	JNCC Amber List	UK numbers of breeding and wintering birds internationally important, however unlikely to be important in context of the terrestrial areas of this study area and more associated with marine habitats. Is a qualifying species of the Firth of Forth Special Protection Area (SPA).	International
Dipper (<i>Cinclus cinclus</i>)	1	-	National population considered stable however localised declines have occurred.	Local
Dunnock (<i>Prunella modularis</i>)	42	JNCC Amber List	Widespread throughout UK but overall in decline.	Local
Eider (<i>Somateria</i>)	54	JNCC Amber	Seabird species (Chapter 11: Estuarine	-

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Species	Estimated Population *	Conservation Status	Local/Regional/National Context	Evaluation
<i>mollissima</i>)		List	Ecology).	
Feral pigeon (<i>Columba livia domest.</i>)	15	-	Abundant throughout UK.	Local
Fulmar (<i>Fulmarus glacialis</i>)	1	JNCC Amber List	Seabird species (Chapter 11: Estuarine Ecology).	-
Gadwall (<i>Anas strepera</i>)	10	JNCC Amber List	Localised population in eastern central Scotland.	Authority area
Goldcrest (<i>Regulus regulus</i>)	4	JNCC Amber List	Widespread throughout UK although recently in decline.	Authority area
Goldfinch (<i>Carduelis carduelis</i>)	70	-	Abundant throughout UK.	Local
Grasshopper warbler (<i>Locustella naevia</i>)	1	JNCC Red List, UKBAP	Less common in Scotland, recently in dramatic national decline.	Regional
Great black-backed gull (<i>Larus marinus</i>)	4	-	Seabird species (Chapter 11: Estuarine Ecology).	-
Great-spotted woodpecker (<i>Dendrocopos major</i>)	5	LBAP	Most common in England and Wales but still widespread throughout Scotland except in the far north. Target species within Edinburgh LBAP.	Authority area
Great tit (<i>Parus major</i>)	148	-	Abundant throughout UK.	Local
Green woodpecker (<i>Picus viridis</i>)	8	JNCC Amber List	Most common in England and Wales, less widespread in Scotland and generally in decline.	Authority area
Greenfinch (<i>Carduelis chloris</i>)	41	-	Abundant throughout UK.	Local
Grey heron (<i>Ardea cinerea</i>)	5	-	Abundant throughout UK.	Local
Grey partridge (<i>Perdix perdix</i>)	-	JNCC Red List, UKBAP, LBAP	Abundant and widespread species although has suffered a rapid decline in the last 25 years.	Authority area
Greylag goose (<i>Anser anser</i>)	7	Annex 1, WCA1i, JNCC Amber List	Abundant throughout UK.	Local
Herring gull (<i>Larus argentatus</i>)	58	JNCC Amber List, UKBAP	Seabird species (Chapter 11: Estuarine Ecology).	-
House martin (<i>Delichon urbica</i>)	34	JNCC Amber List	Widespread throughout UK but recent moderate population declines.	Authority area
House sparrow (<i>Passer domesticus</i>)	145	JNCC Red List, UKBAP	Generally still common throughout the UK but recently in serious decline.	Authority area
Jackdaw (<i>Corvus monedula</i>)	28	-	Abundant throughout UK.	Local
Jay (<i>Garrulus glandarius</i>)	3	-	Abundant throughout UK.	Local
Kestrel (<i>Falco tinnunculus</i>)	7	JNCC Amber List	Common throughout the UK although recently in decline.	Authority area
Lapwing (<i>Vanellus vanellus</i>)	7	JNCC Amber List, UKBAP, LBAP	Common throughout the UK although recently in decline.	Authority area
Lesser black-backed gull (<i>Larus fuscus</i>)	32	JNCC Amber List	Seabird species (Chapter 11: Estuarine Ecology).	-
Lesser whitethroat	1	-	Only present in southern Scotland as a	Local

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Species	Estimated Population *	Conservation Status	Local/Regional/National Context	Evaluation
(<i>Sylvia curruca</i>)			summer visitor and not in decline across its typical range within the UK.	
Linnet (<i>Carduelis cannabina</i>)	41	JNCC Red List, UKBAP, LBAP	Widespread but increasingly scarce due to population decline. Absent from north and west Scotland.	Regional
Little grebe (<i>Tachybaptus ruficollis</i>)	8	-	Widespread UK species.	Local
Long-tailed tit (<i>Aegithalos caudatus</i>)	24	-	Common UK species except in far north and west Scotland.	Local
Magpie (<i>Pica pica</i>)	35	-	Abundant throughout UK.	Local
Mallard (<i>Anas platyrhynchos</i>)	32	-	Abundant throughout UK.	Local
Meadow pipit (<i>Anthus pratensis</i>)	1	JNCC Amber List	Common UK species especially the breeding population within Scotland in upland areas.	Local
Moorhen (<i>Gallinula chloropus</i>)	13	-	Abundant throughout UK.	Local
Mute swan (<i>Cygnus olor</i>)	12	JNCC Amber List	Widespread throughout UK although absent from upland areas of Scotland. Recent population increases.	Local
Oystercatcher (<i>Haematopus ostralegus</i>)	25	JNCC Amber List	Seabird species (Chapter 11: Estuarine Ecology).	-
Pied wagtail (<i>Motacilla alba</i>)	6	-	Abundant throughout UK.	Local
Raven (<i>Corvus corax</i>)	4	-	Common within Scotland.	Local
Red-breasted merganser (<i>Mergus serrator</i>)	17	-	Seabird species (Chapter 11: Estuarine Ecology).	-
Reed bunting (<i>Emberiza schoeniclus</i>)	5	JNCC Red List, UKBAP, LBAP	Widespread throughout most of UK but has suffered serious population decline.	Regional
Robin (<i>Erithacus rubecula</i>)	108	-	Abundant throughout UK.	Local
Rook (<i>Corvus frugilegus</i>)	2	-	Abundant throughout UK.	Local
Sand martin (<i>Riparia riparia</i>)	69	JNCC Amber List, LBAP	Common summer visitor throughout UK. Population crashes linked to droughts in Africa have resulted in its addition to the JNCC Amber List.	Authority area
Sedge warbler (<i>Acrocephalus schoenobaenus</i>)	2	-	Abundant throughout UK.	Local
Shelduck (<i>Tadorna tadorna</i>)	37	JNCC Amber List	Seabird species (Chapter 11: Estuarine Ecology).	-
Skylark (<i>Alauda arvensis</i>)	77	JNCC Red List, UKBAP, LBAP	Widespread throughout UK but suffered serious recent declines.	Regional
Song thrush (<i>Turdus philomelos</i>)	35	JNCC Red List, UKBAP, LBAP	Widespread throughout UK but suffered serious recent declines.	Regional
Starling (<i>Sturnus vulgaris</i>)	45	JNCC Red List, UKBAP	Widespread throughout UK but suffered serious recent declines.	Regional
Stock dove (<i>Columba oenas</i>)	12	JNCC Amber List	Widespread UK population represents about half of total European population.	Local
Swallow (<i>Hirundo</i>)	48	JNCC Amber	Common summer visitor throughout UK. Population decline linked to reduced habitat	Authority area

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Species	Estimated Population *	Conservation Status	Local/Regional/National Context	Evaluation
<i>rustica</i>)		List	quality in both wintering and breeding areas.	
Swift (<i>Apus apus</i>)	10	LBAP	Abundant throughout UK. Population in Edinburgh area has declined due to loss of nest sites on buildings.	Authority area
Treecreeper (<i>Certhia familiaris</i>)	4	-	Widespread throughout the UK.	Local
Tufted duck (<i>Aythya fuligula</i>)	5	-	Widespread throughout the UK.	Local
Whitethroat (<i>Sylvia communis</i>)	27	-	Widespread summer visitor throughout the UK.	Local
Willow warbler (<i>Phylloscopus trochilus</i>)	42	JNCC Amber List	Common summer visitor throughout the UK but has suffered decline in recent years.	Authority area
Wood pigeon (<i>Columba palumbus</i>)	182	-	Abundant throughout UK.	Local
Wren (<i>Troglodytes troglodytes</i>)	194	-	Abundant throughout UK.	Local
Yellowhammer (<i>Emberiza citrinella</i>)	30	JNCC Red List, UKBAP, LBAP	Widespread throughout UK except for some upland areas in north and west Scotland. Has suffered recent serious decline in population numbers.	Regional

* Estimated population is in quadrats <500m from the alignment.

4.1.3 Based on the context and evaluation provided in Table 4.1, 21 species were selected for the impact assessment (bullfinch, curlew, gadwall, goldcrest, grasshopper warbler, great spotted woodpecker, green woodpecker, house martin, house sparrow, kestrel, lapwing, linnets, reed bunting, sand martin, skylark, song thrush, starling, swallow, swift, willow warbler and yellowhammer). The selection of species was based on an evaluation of authority area level ecological value or higher. For example, dunnock is cited as a JNCC Amber List species owing to a recorded decline and therefore would be of authority area level ecological value. However, the population status of the species remains common and widespread throughout the UK and the study area and on this basis is assessed as being of local level ecological value.

5 Terrestrial Wintering Birds

5.1.1 The terrestrial wintering bird evaluation follows the approach detailed in Appendix A10.4, Section 5.1. Table 5.1 provides an evaluation of each bird species recorded during the field surveys as described in Appendix A10.4, Section 5.1.

Table 5.1: Evaluation of Terrestrial Wintering Birds

Species	Conservation Status	Local/Regional/National Context	Evaluation
Blackbird	-	Abundant throughout UK.	Local
Black-headed gull	JNCC Amber List	Commonest UK inland gull, particularly in north England, Scotland and Wales. Relatively small numbers exist within study area.	Local
Blue tit	-	Abundant throughout UK.	Local
Bullfinch	JNCC Red List, UKBAP, LBAP	Recent rapid national decline, present throughout Scotland except far north and west.	Authority area
Buzzard	-	Commonest UK bird of prey.	Local
Carrion crow	-	Abundant throughout UK.	Local
Chaffinch	-	Abundant throughout UK.	Local
Coal tit	-	Common throughout UK.	Local
Collared dove	-	Abundant throughout UK.	Local

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Species	Conservation Status	Local/Regional/National Context	Evaluation
Common snipe (<i>Gallinago gallinago</i>)	JNCC Amber List, LBAP	An abundant winter visitor and passage migrant, although has suffered a moderate decline in the last 25 years.	Authority area
Coot	-	Abundant throughout UK.	Local
Cormorant	Amber List	Occurs in very large numbers at breeding and wintering sites in the UK. Predominantly estuarine in this area. A qualifying species of the Firth of Forth SPA.	International
Curlew	JNCC Amber List, UKBAP, LBAP	UK numbers of breeding and wintering birds are of international value. A qualifying species of the Firth of Forth SPA.	International
Dunnock	JNCC Amber List, UKBAP	Widespread throughout UK but overall in decline.	Local
Feral pigeon	-	Abundant throughout UK.	Local
Fieldfare (<i>Turdus pilaris</i>)	Schedule 1 LBAP	Common winter visitor.	Authority area
Goldcrest	JNCC Amber List	Widespread throughout UK although recently in decline.	Authority area
Goldfinch	-	Abundant throughout UK.	Local
Great-spotted woodpecker	LBAP	Most common in England and Wales but still widespread throughout Scotland except in the far north. Target species within Edinburgh LBAP.	Authority area
Great tit	-	Abundant throughout UK.	Local
Greenfinch	-	Abundant throughout UK.	Local
Grey partridge	JNCC Red List, UKBAP, LBAP	Abundant and widespread species although has suffered a rapid decline in the last 25 years.	Authority area
Greylag goose	Annex 1, WCA1i, JNCC Amber List	50% of the UK wintering population are in 10 or less sites in Britain.	National
Grey Heron	-	Abundant throughout UK.	Local
Grey wagtail (<i>Motacilla cinerea</i>)	-	Common widespread species in the UK and passage migrant.	Local
Herring gull	JNCC Amber List, UKBAP	Seabird species (Chapter 11: Estuarine Ecology).	-
House sparrow	UKBA, JNCC Red List	Generally still common throughout the UK but recently in serious decline.	Authority area
Jackdaw	-	Abundant throughout UK.	Local
Jay	-	Abundant throughout UK.	Local
Kestrel	JNCC Amber List	Common throughout the UK although recently in decline.	Authority area
Lapwing	JNCC Amber List, UKBAP, LBAP	Important wintering populations of this species reside in the UK. A qualifying species of the Firth of Forth SPA.	International
Lesser black-backed gull	JNCC Amber List	An abundant wintering species. Relatively small numbers exist within study area.	Local
Little grebe	-	Widespread UK species.	Local
Linnet	JNCC Red List, LBAP	Widespread but increasingly scarce due to population decline. Absent from north and west Scotland.	Regional
Long-tailed tit	-	Common UK species except in far north and west Scotland.	Local
Magpie	-	Abundant throughout UK.	Local
Mallard	-	A qualifying species of the Firth of Forth SPA. Although still abundant throughout UK.	International
Meadow pipit	JNCC Amber List	Common UK species.	Local

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Species	Conservation Status	Local/Regional/National Context	Evaluation
Mistle thrush (<i>Turdus viscivorus</i>)	JNCC Amber List	An abundant winter visitor although has suffered a moderate decline in last 25 years.	Local
Moorhen	-	Abundant throughout the UK.	Local
Mute swan	JNCC Amber List	Widespread throughout UK although absent from upland areas of Scotland. Recent population increases.	Local
Oystercatcher	JNCC Amber List, LBAP	Seabird species (Chapter 11: Estuarine Ecology).	-
Pied Wagtail	-	Abundant throughout the UK.	Local
Pink-footed goose (<i>Anser brachyrhynchus</i>)	JNCC Amber List	An abundant winter visitor.	Local
Redshank (<i>Tringa tetanus</i>)	JNCC Amber List, LBAP	Seabird species (Chapter 11: Estuarine Ecology).	-
Redwing (<i>Turdus iliacus</i>)	WCA1i, JNCC Amber List	A common winter visitor.	Authority area
Reed bunting	JNCC Red List, UKBAP, LBAP	Widespread throughout most of UK but has suffered serious population decline.	Regional
Robin	-	Abundant throughout the UK.	Local
Rook	-	Abundant throughout the UK.	Local
Siskin (<i>Carduelis spinus</i>)	-	An abundant winter visitor and passage migrant.	Local
Skylark	JNCC Red List, UKBAP, LBAP	Widespread throughout UK but suffered serious recent declines.	Regional
Song thrush	JNCC Red List, UKBAP, LBAP	Widespread throughout UK but suffered serious recent declines.	Regional
Sparrowhawk (<i>Accipiter nisus</i>)	-	A common and widespread species.	Local
Starling	JNCC Red List, UKBAP	Widespread throughout UK but suffered serious recent declines.	Regional
Stock dove	JNCC Amber List	Widespread UK population represents about half of the total European population.	Local
Teal (<i>Anas crecca</i>)	JNCC Amber List	An abundant winter visitor and 20% of non breeding European population found in the UK.	Local
Tree creeper	-	Widespread throughout the UK.	Local
Tufted duck	-	Widespread throughout the UK.	Local
Water rail (<i>Rallus aquaticus</i>)	JNCC Amber List	Common and widespread species.	Local
Waxwing (<i>Bombycilla garrulous</i>)	-	An uncommon winter visitor.	Local
Wood pigeon	-	Abundant throughout UK.	Local
Wren	-	Abundant throughout UK.	Local
Yellowhammer	JNCC Red List UKBAP	Widespread throughout UK except for some upland areas in north and west Scotland. Has suffered recent serious decline in population numbers.	Regional

5.1.2 Based on the context and evaluation provided in Table 5.1, 20 species were selected for the impact assessment (bullfinch, common snipe, cormorant, curlew, fieldfare, goldcrest, great spotted woodpecker, grey partridge, greylag goose, house sparrow, kestrel, lapwing, linnet, mallard, redwing, reed bunting, skylark, song thrush, starling and yellowhammer). The selection of species was based on an evaluation of authority area level ecological value or higher as described under breeding birds (Section 4).

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6 Otter

6.1.1 Otters are European Protected Species (EPS) through their inclusion in Annex IV of the Habitats Directive (92/43/EC) (Appendix A10.2, Section 2.7.9). However, given that otters are likely to be at low densities even in the most favourable habitats (Kruuk, 2006) and that it is not possible to evaluate the size of the otter population based on the number of signs, the evaluation is based on the size and quality of the habitat and geographical context as detailed in the methods (Appendix A10.3, Section 6.3, Table 6.1).

6.1.2 The following criteria were used to evaluate the sites within the study area for otters:

- Sites (i.e. water courses and waterbodies) are assessed to be of less than local level ecological value to otters if they were not shown to be used by otters; they were considered to be too small to support suitable prey items or serve any other function such as fresh water fur-washing in coastal areas; and water quality is poor. Based on this evaluation, Ferry Loch and Jamestown are assessed to be of less than local level ecological value to otters.
- Sites are considered to be of local level ecological value to otters if no or low otter activity was recorded and they provide features which are not scarce in the locality, but which offered some potential to otters, including movement corridors or seasonal prey resources. These also included areas of habitat considered to appreciably enrich the habitat resource. Brankholm Burn is assessed to be of local level ecological value to otters.
- Sites are assessed to be of authority area level ecological value to otters if they were shown to support otter populations (i.e. regularly occurring, locally significant populations of a species that is listed in the City of Edinburgh (City of Edinburgh Council, 2009), West Lothian (West Lothian Council, 2009) and Fife (Fife Council, 2008) BAP on account of its regional localisation) and provide suitable prey items and opportunities for lying up, and form good connections with other habitat features. These also included sites which are scarce within the county or which appreciably enrich the authority area habitat resource. The coast (north and south) of the Firth of Forth, Linn Mill Burn, Dolphington Burn, Swineburn, Niddry Burn and the River Almond are assessed to be of authority area level ecological value to otters.
- Sites are assessed to be of regional level ecological value to otters if they were large enough to support a number of otters, included a good fish prey resource, movement corridors and several lying up sites. These included sites which exceed the authority area level designations but fall short of national or international designation criteria. No watercourses were considered to be of regional level ecological value.

6.1.3 The evaluation of otter habitats within the study area is shown in Table 6.1.

Table 6.1: Evaluation of Otter Habitats

Water Feature	Habitat Quality	Use by Otters	Reason for Valuation	Evaluation
Brankholm Burn, Rosyth	Low - medium	Foraging and commuting.	Otter spraint was recorded indicating low otter activity along the burn.	Local
Jamestown Pond	Medium	Foraging.	No signs of otter recorded. Pond provides a suitable foraging resource for amphibian prey, and a source of fresh water close to the coast.	Less than local
Ferry Loch	Medium	Foraging.	No signs of otter recorded. Pond provides suitable foraging resource for seasonal amphibian prey.	Less than local
Coast - Rosyth Europarc - North Queensferry	High	Foraging, commuting, lying up.	Prints indicate use by otter. Potential lying up sites present in reinforced sea wall, mature broadleaved woodland at St Margaret's Hope and in saltmarsh reedbeds at St Margaret's Marsh.	Authority area

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Water Feature	Habitat Quality	Use by Otters	Reason for Valuation	Evaluation
Coast - Abercorn Point - Long Craig Pier	High	Foraging, commuting and lying up.	Sprints indicate use by otter. Lying up sites including hover and potential holts present in woodland areas and other features within the section. Coast provides commuting route connecting foraging (including crustacean, mollusc and avian prey items) and lying up habitat east and west along the coast and between freshwater habitats.	Authority area
Linn Mill Burn	Medium	Foraging.	Sprints and prints indicate use by otter. Burn extends foraging and lying up habitat for coastal otter population and provides commuting route between coastal and inland resources.	Authority area
Dolphington Burn	Medium	Foraging, commuting and lying up.	Sprints and potential lying up habitat in woodland areas indicate use by otter. Burn extends foraging and lying up habitat for coastal otter population.	Authority area
Swine Burn	High - Medium	Foraging, commuting and lying up.	Otter spraint, print and runs indicate presence of otter. Several lying up sites present, including potential breeding area at Humble Reservoir. Burn extends foraging and lying up habitat of the River Almond and provides linear feature connecting habitats at the River Almond and the Union Canal, including under culverts at the M9.	Authority area
Niddry Burn	High - Medium	Foraging, commuting and lying up. Potential breeding.	Otter spraint, print and runs indicate presence of otter. Several lying up sites present, including potential breeding area at Ross's Plantation. Burn extends foraging and lying up habitat of the River Almond and provides linear feature connecting habitats at the River Almond and the Union Canal, including under culverts at the M9.	Authority area
River Almond	High	Foraging, commuting and lying up.	Sprints, runs and prints indicate presence of otter. High density of lying up sites and potential lying up sites indicate high habitat quality of cover for lying up. Presence of prey items including eel which are scarce in the region.	Authority area

6.1.4 There are no designated sites within the study area for which otters are the designated or notified species of interest. For this reason no sites within the study area were assessed as being of international or national level ecological value to otters.

7 Water Vole

7.1.1 Water vole (*Arvicola terrestris*) habitat is protected by law and water voles are listed as priority species in the Edinburgh City (City of Edinburgh Council, 2009) and Fife (Fife Council, 2008) Local BAPs. Furthermore, water voles are being considered for inclusion in the West Lothian LBAP (West Lothian Council, 2009) (Appendix A10.2, Section 2.8). Species fulfilling the criteria (as detailed in Chapter 10 (Table 10.1)) would be considered to be of authority area level ecological value. Anecdotal and historical evidence indicates their former presence within the study area (Appendix A10.4, Section 7, Strachan & Jefferies, 1993). However, as no field signs were recorded water vole are considered likely to be absent from the range of sites targeted for survey. It can therefore be reasonably concluded that water vole are likely to be absent from similar habitats affected by the selected route option comprising the study area. Accordingly, the value of water vole is assessed as being of less than local level ecological value and they are not considered further in this assessment.

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8 Red Squirrel

- 8.1.1 No evidence of red squirrels was recorded within the survey area and as such an evaluation of baseline conditions for this species is not provided. This receptor is not considered further in this assessment.

9 Amphibians

- 9.1.1 Amphibians are protected under Section 9(5) of the Wildlife Countryside Act 1981 (as amended). In addition, great crested newts (*Lissotriton cristatus*) are protected under Regulation 39 of the Conservation (Natural Habitats & c.) Regulations 1994 (as amended) and Nature Conservation (Scotland) Act 2004.
- 9.1.2 Table 9.1 provides a summary of the ecology and nature conservation value of ponds surveyed for amphibians. The location of ponds is shown on Figure 10.9.
- 9.1.3 Ponds located within 300m of each other are considered to be a single 'meta-population' (Gent & Gibson, 1998).

Table 9.1: Evaluation of Amphibian Ponds

Pond Name/Number	Terrestrial Habitat Quality	Aquatic Habitat Quality	Species Assemblages	Evaluation
N3 - Ferry Loch	Moderate	Moderate	Great crested newt, palmate newt (<i>Lissotriton helveticus</i>), smooth newt (<i>Lissotriton vulgaris</i>), common toad (<i>Bufo bufo</i>).	National
S1 - Balfour Beattie Factory pond	Low	Moderate	None	Less than Local
S10 - Railway Pond	Moderate	Moderate	Smooth newt, common frog (<i>Rana Temporaria</i>).	Local
S11 - Railway Pond (East)	Moderate	Moderate	Smooth newt, common frog, common toad.	Local
S12 - Railway pond (East)	Moderate	Moderate	Common frog.	Local
S18 - Cherrytree Cottage Dundas Estate.	High	High	Common frog, eft species (either palmate or smooth newt)	Local
S19 - Flight Pond, Dundas Estate	Low	High	None	Local

10 Reptiles

- 10.1.1 No evidence of reptiles was recorded within the survey area and as such an evaluation of baseline conditions for this species is not provided. This receptor is not considered further in this assessment.

11 Terrestrial Invertebrates

- 11.1.1 Eight sites were chosen for survey based on their likelihood of supporting diverse terrestrial invertebrate fauna. The evaluation of each site was based upon the potential of each habitat to provide suitable conditions for terrestrial invertebrates. The potential of each site was based upon the records of species received from consultees, and an assessment of habitats at each site by an experienced ecologist.

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- 11.1.2 Table 11.1 provides a summary evaluation with Table 11.2 providing a detailed evaluation. Table 11.2 presents the ecological value of the terrestrial habitats and populations of local species found in the study area and an evaluation of baseline conditions for each of the nine study sites.

Table 11.1: Summary Evaluation of Terrestrial Invertebrate Sites

Site Number	Site Name/Designation	Habitat Quality	Species Population (from records)	Evaluation
1	St Margaret's Marsh SSSI and Hope	Medium	Local	Local
2	Ferry Hills SSSI	Medium	Local	Local
3	Dundas North and Echline Strip	Low	Local	Local
4	Dolphington Burn Wood	Medium	Local	Local
5	Ross's Plantation	Medium	Local	Local
6	Parkland, West Kirkliston	Low	Local	Local
7	Lindsay's Craigs	Medium	Local	Local
8	River Almond	Low	Local	Local

- 11.1.3 Records from consultees and site evaluations indicated that the habitat requirements of significant terrestrial invertebrate species can be met on all eight sites (Table 11.2) and hence the sites could have been of national level ecological value for terrestrial invertebrates. However, for a site to be evaluated as a site of national level ecological value, conditions need to maintain a regularly occurring regional or authority area significant population/number of an internationally/nationally important species. As there are no records of nationally significant species found within the sites identified, or within the study area of the proposed scheme, the terrestrial invertebrate population in the study area is assessed as being of local level ecological value.

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Table 11.2: Evaluation of Terrestrial Invertebrate Sites

Site	Habitats Likely to be of Value for Terrestrial Invertebrates	Habitat Quality	General Invertebrate Potential	Potential National and Locally Important Terrestrial Invertebrates with Conservation Status (see table footnote)	Justification for Evaluation	Evaluation
Site 1 St Margaret's Hope and Marsh	<p>St Margaret's Hope Wood provides an ancient semi-natural habitat interspersed with open areas of south facing calcareous grassland and rock habitats.</p> <p>To the west of the site is found a species poor saltmarsh, reed bed and mesotrophic grassland.</p>	Medium	Coleoptera, Lepidoptera, Hymenoptera, Odonata, Araneae, Mollusc, Diptera, Hemiptera.	<p><i>Judolia sexmaculata</i> Na <i>Luperus flavipes</i> Nb, <i>Apteropeda globosa</i> Nb, <i>Tropiphorus terricola</i> Nb, <i>Polyommatus icarus</i> LBAP Edinburgh, <i>Sesia bembeciformis</i> Na, <i>Udea prunalis</i> Na, <i>Bombus terrestris</i> LBAP Fife, <i>B. (Thoracombus) pascuorum</i> LBAP Fife, <i>B. (Pyrobombus) pratorum</i> LBAP Fife, <i>B. (Psithyrus) bohemicus</i> LBAP Fife, <i>B. (Melanobombus) lapidarius</i> LBAP Fife, <i>B. lucorum</i> LBAP Fife, <i>Nomada fabriciana</i> SBL S4, <i>N. leucophthalma</i> SBL S4, <i>Ancistrocerus parietum</i> SBL S4, <i>Andrena helvola</i> SBL S4, <i>Ectemnius (Hypocraebro) continuus</i> SBL S4, <i>E. (Metacraebro) cephalotes</i> SBL S4, <i>Osmia (Osmia) rufa</i> SBL S4, <i>Lasioglossum (Evyllaeus) villosulum</i> SBL S4, <i>Evagetes crassicornis</i> SBL S4, <i>Anthophora furcata</i> SBL S4, <i>Pyrrhosoma nymphula</i> LBAP Edinburgh, <i>Melogona scutellare</i> SBL S4, <i>Dicranotropis divergens</i> N, Nb, <i>Stiroma bicarinata</i> N, Nb.</p>	<p>The mosaic of habitats at this site provides potential suitable habitats for 19 species of national importance and seven species of local importance with an associated potential national level ecological value for the site.</p> <p>For a species to be assessed as having an ecological value at a national level, the site must provide conditions which maintain a regularly occurring regional or county significant population/number of an internationally/nationally important species.</p> <p>However, the Take a Pride in Fife Ecological Information Centre (TAPIC EIC) biodiversity recording centre provides records of only three species of importance which have been recorded within the vicinity of the proposed scheme since 1987: <i>Bombus terrestris</i> - LBAP Fife; <i>B. (Pyrobombus) pratorum</i> - LBAP Fife; and <i>B. (Melanobombus) lapidarius</i> - LBAP Fife.</p> <p>These records indicate that this site provides suitable conditions to maintain a regularly occurring locally significant population for the above three species.</p> <p>The site provides elements of semi-natural vegetation that due to their size, quality or the wide distribution of such habitats in the local area are considered to be of local level ecological value for invertebrates.</p>	Local
Site 2 Ferry Hills	The site is bisected by the A90 and comprises lowland calcareous grassland, secondary woodland, scrub, open water, pond, mire, marsh and disused railway cutting.	Medium	Coleoptera, Lepidoptera, Hymenoptera, Odonata, Araneae, Mollusc,	<p><i>Luperus flavipes</i> Nb, <i>Apteropeda globosa</i> Nb, <i>Tropiphorus terricola</i> Nb, <i>Polyommatus icarus</i> LBAP Edinburgh, <i>Sesia bembeciformis</i> Na, <i>Udea prunalis</i> Na,</p>	<p>The mosaic of habitats at this site provides potential suitable habitats for 19 species of national importance and seven species of local importance with an associated potential national level ecological value for the site.</p> <p>For a species to be assessed as having an ecological value at a national level, the site must provide conditions which maintain a regularly occurring regional or county</p>	Local

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Site	Habitats Likely to be of Value for Terrestrial Invertebrates	Habitat Quality	General Invertebrate Potential	Potential National and Locally Important Terrestrial Invertebrates with Conservation Status (see table footnote)	Justification for Evaluation	Evaluation
			Diptera, Hemiptera.	<i>Bombus terrestris</i> LBAP Fife, <i>B. (Thoracombus) pascuorum</i> LBAP Fife, <i>B. (Pyrobombus) pratorum</i> LBAP Fife, <i>B. (Psithyrus) bohemicus</i> LBAP Fife, <i>B. (Melanobombus) lapidarius</i> LBAP Fife, <i>B. lucorum</i> LBAP Fife, <i>Nomada fabriciana</i> SBL S4, <i>N. leucophthalma</i> SBL S4, <i>Ancistrocerus parietum</i> SBL S4, <i>Andrena helvola</i> SBL S4, <i>Ectemnius (Hypocraebro) continuus</i> SBL S4, <i>E. (Metacraebro) cephalotes</i> SBL S4, <i>Osmia (Osmia) rufa</i> SBL S4, <i>Lasioglossum (Evylaeus) villosulum</i> SBL S4, <i>Evagetes crassicornis</i> SBL S4, <i>Anthophora furcata</i> SBL S4, <i>Pyrrhosoma nymphula</i> LBAP Edinburgh, <i>Dicranotropis divergens</i> N, Nb, <i>Stiroma bicarinata</i> N, Nb.	significant population/number of an internationally/nationally important species. However, the TAPIF EIC biodiversity recording centre provides records of only three species of importance which have been recorded within the vicinity of the proposed scheme: <i>Bombus terrestris</i> - LBAP Fife; <i>B. (Pyrobombus) pratorum</i> - LBAP Fife; and <i>B. (Melanobombus) lapidarius</i> - LBAP Fife. These records indicate that this site provides suitable conditions to maintain a regularly occurring locally significant population for the above three species. The site provides elements of semi-natural vegetation that due to their size, quality or the wide distribution of such habitats in the local area are considered to be of local level ecological value for invertebrates.	
Site 3 Dundas North and Echline Strip	Mixed plantation shelter belts and woodland dominate the area. Standing and fallen timber are present in significant quantities. Scrub is present throughout in small patches with a small pond located in the south of the site.	Low	Coleoptera, Lepidoptera, Hymenoptera, Odonata, Aranaea, Mollusc, Diptera, Hemiptera.	<i>Judolia sexmaculata</i> Na <i>Luperus flavipes</i> Nb, <i>Apteropeda globosa</i> Nb, <i>Tropiphorus terricola</i> Nb, <i>Udea prunalis</i> Na, <i>Bombus terrestris</i> LBAP Fife, <i>B. (Thoracombus) pascuorum</i> LBAP Fife, <i>B. (Pyrobombus) pratorum</i> LBAP Fife, <i>B. (Psithyrus) bohemicus</i> LBAP Fife, <i>B. (Melanobombus) lapidarius</i> LBAP Fife, <i>B. lucorum</i> LBAP Fife, <i>Nomada fabriciana</i> SBL S4, <i>N. leucophthalma</i> SBL S4, <i>Ancistrocerus parietum</i> SBL S4, <i>Ectemnius (Hypocraebro) continuus</i> SBL S4,	The mosaic of habitats at this site provides potential suitable habitats for 14 species of national importance and seven species of local importance with an associated potential national level ecological value for the site. For a species to be assessed as having an ecological value at a national level, the site must provide conditions which maintain a regularly occurring regional or county significant population/number of an internationally/nationally important species. However, the LWIC provides records of only seven species of significance which have been recorded within the vicinity of the proposed scheme since 1987. There are no records of these species within the proposed scheme. The recorded species and their distances from the proposed scheme are as follows: <i>Judolia sexmaculata</i> 3.4km; <i>Luperus flavipes</i> 3.4km;	Local

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Site	Habitats Likely to be of Value for Terrestrial Invertebrates	Habitat Quality	General Invertebrate Potential	Potential National and Locally Important Terrestrial Invertebrates with Conservation Status (see table footnote)	Justification for Evaluation	Evaluation
				<i>E. (Metacrabro) cephalotes</i> SBL S4, <i>Evagetes crassicornis</i> SBL S4, <i>Osmia (Osmia) rufa</i> SBL S4, <i>Lasioglossum (Evylaeus) villosulum</i> SBL S4, <i>Pyrrhosoma nymphula</i> LBAP Edinburgh, <i>Stiroma bicarinata</i> N, Nb.	<i>Apteropeda globosa</i> 3.4km; <i>Tropiphorus terricola</i> 2.6km; <i>Sesia bembeciformis</i> 6.0km; <i>Udea prunalis</i> 6.0km; and <i>Stiroma bicarinata</i> 4.9km. These records indicate that this site provides suitable conditions to maintain a regularly occurring locally significant population for the above seven species. The site provides elements of semi-natural vegetation that due to their size, quality or the wide distribution of such habitats in the local area are considered to be of local level ecological value for invertebrates.	
Site 4 Dolphington Burn Wood	To the north of the site a small old plantation of broadleaved mature trees provide standing and dead timber habitats. Open tree canopy allows large areas of tall ruderal and short ephemeral vegetation. The majority of the area is dominated by a mixed plantation woodland of varied age and structure. Mature trees provide standing and fallen dead timber habitats. A small section of wet woodland fringes a single pond, while marsh and scrub habitats border the Dolphington Burn. The east of the site consists of a large poor semi-improved grassland area containing large sections of tall ruderals and short ephemeral species.	Medium	Coleoptera, Lepidoptera, Hymenoptera, Odonata, Araneae, Mollusc, Diptera, Hemiptera.	<i>Judolia sexmaculata</i> Na <i>Luperus flavipes</i> Nb, <i>Apteropeda globosa</i> Nb, <i>Tropiphorus terricola</i> Nb, <i>Polyommatus icarus</i> LBAP Edinburgh, <i>Sesia bembeciformis</i> Na, <i>Udea prunalis</i> Na, <i>Bombus terrestris</i> LBAP Fife, <i>B. (Thoracombus) pascuorum</i> LBAP Fife, <i>B. (Pyrobombus) pratorum</i> LBAP Fife, <i>B. (Psithyrus) bohemicus</i> LBAP Fife, <i>B. (Melanobombus) lapidarius</i> LBAP Fife, <i>B. lucorum</i> LBAP Fife, <i>Nomada fabriciana</i> SBL S4, <i>N. leucophthalma</i> SBL S4, <i>Ancistrocerus parietum</i> SBL S4, <i>Ectemnius (Hypocrabro) continuus</i> SBL S4, <i>E. (Metacrabro) cephalotes</i> SBL S4, <i>Osmia (Osmia) rufa</i> SBL S4, <i>Lasioglossum (Evylaeus) villosulum</i> SBL S4, <i>Pyrrhosoma nymphula</i> LBAP Edinburgh, <i>Oxychilus helveticus</i> SBL S4,	The mosaic of habitats at this site provides potential suitable habitats for 17 species of national significance and eight species of local significance with an associated potential national value for the site. For a species to be assessed as having a value at a national level, the site must provide conditions which maintain a regularly occurring regional or county significant population/number of an internationally/nationally important species. However, the LWIC provides records of only nine species of importance which have been recorded within the vicinity of the proposed scheme since 1987. There are no records of these species within the proposed scheme. The recorded species and their distances from the proposed scheme are as follows: <i>Judolia sexmaculata</i> 5.1km; <i>Luperus flavipes</i> 5.1km; <i>Apteropeda globosa</i> 5.1km; <i>Tropiphorus terricola</i> 4.3km; <i>Sesia bembeciformis</i> 7.4km; <i>Udea prunalis</i> 7.4km; <i>Limonia trivittata</i> 5.8km; <i>Dicranotropis divergens</i> 5.8km; and <i>Stiroma bicarinata</i> 5.8km.	Local

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Site	Habitats Likely to be of Value for Terrestrial Invertebrates	Habitat Quality	General Invertebrate Potential	Potential National and Locally Important Terrestrial Invertebrates with Conservation Status (see table footnote)	Justification for Evaluation	Evaluation
				<i>Limonia trivittata</i> N, <i>Dicranotropis divergens</i> N, Nb, <i>Stiroma bicarinata</i> NN, Nb.	These records indicate that this site provides suitable conditions to maintain a regularly occurring locally significant population for the above nine species. The site provides elements of semi-natural vegetation that due to their size, quality or the wide distribution of such habitats in the local area are considered to be of local level ecological value for invertebrates.	
Site 5 Ross's Plantation	Mixed plantation woodland with a mainly young structure with sections of scrub including gorse, hawthorn and honeysuckle. The Niddy Burn passes through site and forms a small section of marsh dominated by meadow sweet and tall ruderals, which is bordered by a narrow section of wet woodland scrub.	Medium	Coleoptera, Lepidoptera, Hymenoptera, Odonata, Aranaea, Mollusca, Diptera, Hemiptera.	<i>Luperus flavipes</i> Nb, <i>Apteropeda globosa</i> Nb, <i>Sesia bembeciformis</i> Na, <i>Udea prunalis</i> Na, <i>Bombus terrestris</i> LBAP Fife, <i>B. (Thoracombus) pascuorum</i> LBAP Fife, <i>B. (Pyrobombus) pratorum</i> LBAP Fife, <i>B. (Psithyrus) bohemicus</i> LBAP Fife, <i>B. (Melanobombus) lapidarius</i> LBAP Fife, <i>B. lucorum</i> LBAP Fife, <i>Nomada fabriciana</i> SBL S4, <i>N. leucophthalma</i> SBL S4, <i>Ancistrocerus parietum</i> SBL S4, <i>Ectemnius (Hypocraebro) continuus</i> SBL S4, <i>E. (Metacraebro) cephalotes</i> SBL S4, <i>Osmia (Osmia) rufa</i> SBL S4, <i>Lasioglossum (Evyllaeus) villosulum</i> SBL S4, <i>Pyrrhosoma nymphula</i> LBAP Edinburgh, <i>Pirata piraticus</i> LBAP Edinburgh, <i>Oxychilus helveticus</i> SBL S4, <i>Limonia trivittata</i> N, <i>Dicranotropis divergens</i> N, Nb, <i>Stiroma bicarinata</i> N, Nb.	The mosaic of habitats at this site provides potential suitable habitats for 15 species of national importance and seven species of local importance with an associated potential national level ecological value for the site. For a species to be assessed as having an ecological value at a national level, the site must provide conditions which maintain a regularly occurring regional or county significant population/number of an internationally/nationally important species. However, the LWIC provides records of only seven species of importance which have been recorded within the vicinity of the proposed scheme since 1987. There are no records of these species within the proposed scheme. The recorded species and their distances from the proposed scheme are as follows: <i>Luperus flavipes</i> 4.6km; <i>Apteropeda globosa</i> 4.6km; <i>Sesia bembeciformis</i> 4.7km; <i>Udea prunalis</i> 4.7km; <i>Limonia trivittata</i> 2.5km; <i>Dicranotropis divergens</i> 2.5km; and <i>Stiroma bicarinata</i> 2.5km. These records indicate that this site provides suitable conditions to maintain a regularly occurring locally significant population for the above seven species. The site provides elements of semi-natural vegetation that due to their size, quality or the wide distribution of such habitats in the local area are considered to be of local level ecological value for invertebrates.	Local

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Site	Habitats Likely to be of Value for Terrestrial Invertebrates	Habitat Quality	General Invertebrate Potential	Potential National and Locally Important Terrestrial Invertebrates with Conservation Status (see table footnote)	Justification for Evaluation	Evaluation
Site 6 Parkland, West Kirkliston	<p>Parkland provides sections of amenity woodland of varying age, with some sections containing mature trees with standing dead timber habitats.</p> <p>Amenity grassland contains patches of tall ruderals.</p> <p>The impounded Swine Burn forms a small lake, marsh, wet grassland and wet woodland with scrub.</p>	Low	<p>Coleoptera, Lepidoptera, Hymenoptera, Odonata, Aranaea, Mollusc, Diptera, Hemiptera.</p>	<p><i>Judolia sexmaculata</i> Na <i>Luperus flavipes</i> Nb, <i>Apteropeda globosa</i> Nb, <i>Polyommatus icarus</i> LBAP Edinburgh, <i>Sesia bembeciformis</i> Na, <i>Udea prunalis</i> Na, <i>Bombus terrestris</i> LBAP Fife, <i>B. (Thoracombus) pascuorum</i> LBAP Fife, <i>B. (Pyrobombus) pratorum</i> LBAP Fife, <i>B. (Psithyrus) bohemicus</i> LBAP Fife, <i>B. (Melanobombus) lapidarius</i> LBAP Fife, <i>B. lucorum</i> LBAP Fife, <i>Nomada fabriciana</i> SBL S4, <i>N. leucophthalma</i> SBL S4, <i>Ancistrocerus parietum</i> SBL S4, <i>Ectemnius (Hypocrabro) continuus</i> SBL S4, <i>E. (Metacrabro) cephalotes</i> SBL S4, <i>Anthophora (Clisodon) furcata</i> SBL S4, <i>Osmia (Osmia) rufa</i> SBL S4, <i>Lasioglossum (Evylaeus) villosulum</i> SBL S4, <i>Pyrrhosoma nymphula</i> LBAP Edinburgh, <i>Oxychilus helveticus</i> SBL S4, <i>Limonia trivittata</i> NN, <i>Dicranotropis divergens</i> N, Nb.</p>	<p>The mosaic of habitats at this site provides potential suitable habitats for 16 species of national importance and eight species of local importance with an associated potential national level ecological value for the site.</p> <p>For a species to be assessed as having an ecological value at a national level, the site must provide conditions which maintain a regularly occurring regional or county significant population/number of an internationally/nationally important species.</p> <p>However, the LWIC provides records of only six species of importance which have been recorded within the vicinity of the proposed scheme since 1987. There are no records of these species within the proposed scheme. The recorded species and their distances from the proposed scheme are as follows: <i>Judolia sexmaculata</i> Na 5.3km; <i>Luperus flavipes</i> 5.3km; <i>Apteropeda globosa</i> 5.3km; <i>Sesia bembeciformis</i> 5.9km; <i>Udea prunalis</i> 5.9km; <i>Limonia trivittata</i> 3.6km; and <i>Dicranotropis divergens</i> 3.6km.</p> <p>These records indicate that this site provides suitable conditions to maintain a regularly occurring locally significant population for the above seven species.</p> <p>The site provides elements of semi-natural vegetation that due to their size, quality or the wide distribution of such habitats in the local area are considered to be of local level ecological value for invertebrates.</p>	Local
Site 7 Lindsay's Craigs	<p>Poor semi-improved grassland with small sections of rocky outcrops (north facing), with patches of tall ruderals on field margins. Central section of field contains scrub including gorse.</p>	Medium	<p>Coleoptera, Lepidoptera, Hymenoptera, Odonata, Aranaea, Mollusca, Diptera,</p>	<p><i>Judolia sexmaculata</i> Na <i>Luperus flavipes</i> Nb, <i>Apteropeda globosa</i> Nb, <i>Sesia bembeciformis</i> Na, <i>Udea prunalis</i> Na, <i>Bombus terrestris</i> LBAP Fife, <i>B. (Thoracombus) pascuorum</i> LBAP Fife,</p>	<p>The mosaic of habitats at this site provides potential suitable habitats for 17 species of national importance and eight species of local importance with an associated potential national level ecological value for the site.</p> <p>For a species to be assessed as having an ecological value at a national level, the site must provide conditions which maintain a regularly occurring regional or county significant population/number of an</p>	Local

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Site	Habitats Likely to be of Value for Terrestrial Invertebrates	Habitat Quality	General Invertebrate Potential	Potential National and Locally Important Terrestrial Invertebrates with Conservation Status (see table footnote)	Justification for Evaluation	Evaluation
	<p>Mixed plantation woodland dominates the southern section of site containing several mature trees with examples of standing dead timber habitats.</p> <p>The Niddry Burn passes through the woodland and provides small patches of marginal vegetation including rosebay willow herb.</p>		Hemiptera.	<p><i>B. (Pyrobombus) pratorum</i> LBAP Fife, <i>B. (Psithyrus) bohemicus</i> LBAP Fife, <i>B. (Melanobombus) lapidarius</i> LBAP Fife, <i>B. lucorum</i> LBAP Fife, <i>Nomada fabriciana</i> SBL S4, <i>N. leucophthalma</i> SBL S4, <i>Ancistrocerus parietum</i> SBL S4, <i>Andrena (Micrandrena) alfenella</i> RDB3, <i>Ectemnius (Hypocrabro) continuus</i> SBL S4 <i>E. (Metacrabro) cephalotes</i> SBL S4 <i>Anthophora (Clisodon) furcata</i> SBL S4, <i>Osmia (Osmia) rufa</i> SBL S4, <i>Lasioglossum (Evylaeus) villosulum</i> SBL S4 <i>Pyrrhosoma nymphula</i> LBAP Edinburgh <i>Pirata piraticus</i> LBAP Edinburgh, <i>Oxychilus helveticus</i> SBL S4, <i>Dicranotropis divergens</i> N, Nb, <i>Stiroma bicarinata</i> N, Nb.</p>	<p>internationally/nationally important species.</p> <p>However, the LWIC provides records of only five species of local importance which have been recorded within the vicinity of the site since 1987. There are no records of these species within the site. The recorded species and their distances from the proposed scheme are as follows: <i>Judolia sexmaculata</i> 5.4km; <i>Luperus flavipes</i> 5.4km ; <i>Apteropeda globosa</i> 5.4km; <i>Sesia bembeciformis</i> 6.0km; <i>Udea prunalis</i> 6.0km; and <i>Stiroma bicarinata</i> 3.5km.</p> <p>These records indicate that this site has the potential to provide suitable conditions to maintain a regularly occurring locally significant population for the above six species.</p> <p>The site provides elements of semi-natural vegetation that due to their size, quality or the wide distribution of such habitats in the local area are considered to be of local level ecological value for invertebrates.</p>	
Site 8 River Almond	The River Almond provides south facing riparian habitats which are dominated by tall herbs, with small sections of scrub, sandy banks and fragmented marginal vegetation.	Low	Coleoptera, Lepidoptera, Hymenoptera, Odonata, Aranaea, Mollusc, Diptera, Hemiptera.	<p><i>Luperus flavipes</i> Nb, <i>Apteropeda globosa</i> Nb, <i>Sesia bembeciformis</i> Na, <i>Bombus terrestris</i> LBAP Fife, <i>B. (Thoracombus) pascuorum</i> LBAP Fife, <i>B. (Pyrobombus) pratorum</i> LBAP Fife, <i>B. (Psithyrus) bohemicus</i> LBAP Fife, <i>B. (Melanobombus) lapidarius</i> LBAP Fife, <i>B. lucorum</i> LBAP Fife, <i>Nomada fabriciana</i> SBL S4, <i>N. leucophthalma</i> SBL S4, <i>Ancistrocerus parietum</i> SBL S4, <i>Ectemnius (Hypocrabro) continuus</i> SBL S4, <i>E. (Metacrabro) cephalotes</i> SBL S4, <i>Osmia (Osmia) rufa</i> SBL S4,</p>	<p>The mosaic of riparian habitats at this site provides potential suitable habitats for ten species of national importance and six species of local importance with an associated potential national value for the site.</p> <p>For a species to be assessed as having an ecological value at a national level, the site must provide conditions which maintain a regularly occurring regional or county significant population/number of an internationally/nationally important species.</p> <p>However, the LWIC provides records of only three species of national importance which have been recorded within the vicinity of the proposed scheme since 1987. There are no records of these species within the proposed scheme. The recorded species and their distances from the proposed scheme are as follows: <i>Luperus flavipes</i> 6.2km; <i>Apteropeda globosa</i> 6.2km; and</p>	Local

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Site	Habitats Likely to be of Value for Terrestrial Invertebrates	Habitat Quality	General Invertebrate Potential	Potential National and Locally Important Terrestrial Invertebrates with Conservation Status (see table footnote)	Justification for Evaluation	Evaluation
				<i>Lasioglossum (Evylaeus) villosulum</i> SBL S4.	<p><i>Sesia bembeciformis</i> 6.7km.</p> <p>These records indicate that this site has the potential to provide suitable conditions to maintain a regularly occurring locally significant population for the above three species.</p> <p>The site provides elements of semi-natural vegetation that due to their size, quality or the wide distribution of such habitats in the local area are considered to be of local level ecological value for invertebrates.</p>	

Note: Habitats likely to be of importance for terrestrial invertebrates: see Appendix A10.3 (Section 10.3.11, Table A10.3.16) for Habitat Assessment Criteria.

* Table A10.6.8: Key to Conservation Status (for further information refer to Appendix A10.2 (Section A10.2.12))

N: Notable taxa (Nationally Scarce)

Na: Notable taxa (Nationally Scarce Category A)

Nb: Notable taxa (Nationally Scarce Category B)

SBL S4: Scottish Biodiversity List Section 4 species (Scottish Biodiversity List, 2009)

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12 River Habitat

12.1.1 Table 12.1 presents an evaluation of watercourse stretches recorded within the survey area in terms of their ecological quality together with a summary description of habitats. The evaluation of habitats for each river habitat site was derived from an assessment of 'habitat modification score' (HMS), with reference to designations, SEPA water quality classification and overall status within the Water Framework Directive (WFD) (2000/60/EC).

Table 12.1: Evaluation of River Habitat Survey Sites

Site No.	Site Name	Habitat Quality	Habitat Modification	Summary River Habitat Description	Evaluation
JA08	Swine Burn (downstream of Humber Reservoir)	Low	Significantly Modified System	Whilst flow regulation and culverting exist, the reach displayed varied flow types, channel deposition creating a low flow sinuous channel and a range of submerged and marginal vegetation. There was a simple habitat structure along the burn and otter spraints were evident.	Authority area
JA09	Swine Burn (adjacent to M9 Jct. 1A)	Low	Severely Modified System	The straightened and partly over-deepened watercourse shows limited geomorphological diversity although the flow is varied and there are occasional unvegetated side bars. The bed substrate is consolidated and there is no in-channel vegetation evident except for mosses and filamentous algae. Habitat complexity is high and extensive broad-leaf woodland occurs along both banks. This results in extensive shading of the channel. Otter appear to use the watercourse.	Local
JA12	Niddy Burn (south of Lindsay's Craigs)	Medium	Obviously Modified System	Adjacent land use is managed intensively and there is limited riparian vegetation. Shading, overhanging boughs, exposed bankside roots and fallen trees are present and otter signs are evident.	Authority area
JA14	River Almond	Low	Significantly Modified System	A range of habitats occur along the morphologically diverse River Almond. Stretches with vegetated mid channel bars and large exposed boulders are present. The substrate was consolidated however and the banks, although renaturalising, were resectioned and result in a trapezoidal channel. The vegetation was predominantly of a complex structure but alien species are present. Otter spraints were present suggesting that the River Almond is a valuable wildlife corridor.	Authority area

Swine Burn (JA08)

12.1.2 The habitat within the surveyed reach of Swine Burn downstream of the Humber Reservoir has been assessed, based purely on river habitat survey findings, to be of low ecological quality. This evaluation is based on the habitat assessment criteria set out in the baseline methods (Appendix A10.3). However, overall, Swine Burn is assessed as being of authority area level ecological value, based on the addition of a good (A2) (SEPA, 2006) water quality classification (Appendix A10.4, Section 11.3, Table 11.9) and a HMS indicative of a significantly modified river reach.

12.1.3 Swine Burn has been provisionally designated a 'heavily modified waterbody' by SEPA which suggests that achieving good ecological status (GES) is not possible with the existing level of

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modifications as listed in Appendix A10.4 (Section 11.3, Table 11.10) and that good ecological potential (GEP) will be the likely objective.

Swine Burn (JA09)

- 12.1.4 The reach of Swine Burn realigned alongside the M9 motorway is assessed as offering low quality habitat and is of local level ecological value. This assessment is based on a water quality classification of good (A2) (SEPA, 2006) and a HMS indicative of a severely modified site.
- 12.1.5 The provisional designation of Swine Burn as a 'heavily modified waterbody' by SEPA sets an objective for the watercourse of GEP by 2015.

Niddry Burn (JA12)

- 12.1.6 The surveyed reach of Niddry Burn offers habitat of medium quality as the watercourse is relatively unmodified in terms of in-channel structures and bank protection works. The HMS score is indicative of an obviously modified system.
- 12.1.7 Niddry Burn is assessed to be of authority area level ecological value, as the surveyed reach exhibited a varied morphology and good connectivity. The most up to date information suggests the Niddry burn was not classified for water quality in 2006, but information from the Forth Area Advisory Group (FAAG) suggests the Niddry Burn was classified as likely to achieve a poor surface water status in 2015 (FAAG, 2008).

River Almond (JA14)

- 12.1.8 The River Almond is assessed as having low quality habitat based on an HMS score suggesting it is 'significantly modified'.
- 12.1.9 River Almond is therefore assessed to be of authority area level ecological value based on its HMS score and moderate (B) water quality classification (rated C in 2005) (SEPA, 2006).

13 Aquatic Macroinvertebrates

- 13.1.1 All surveyed watercourses within the study area have been assigned a level of ecological value within this assessment (Table 13.1) using information on habitat and freshwater macroinvertebrate communities and criteria described in Appendix A10.3. This information was developed from survey results, consultation and following guidelines established in Chapter 10 (Table 10.1) and Appendix A10.3. Macroinvertebrate community composition and the quality of their habitat has been assessed using the presence of species of conservation concern, river health class (from Biological Monitoring Working Party (BMWP) and Average Score Per Taxon (ASPT) scores) and the classification from the Community Conservation Index (CCI) (Chadd & Extence, 2004).

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Table 13.1: Evaluation of Aquatic Macroinvertebrates Sites

Waterbody	Species of Conservation Concern	River Health Class	Site	CCI		Evaluation
				Spring	Autumn	
Brankholm Burn	None	Fair	JA01	7.0	5.0	Local
Unnamed tributary (NT 12258 81337)	None	n/a	JA02	8.0	16.3	Authority area
Unnamed pond (NT 12259 81314)	None	n/a	JA03	n/a	23.3	Authority area
Linn Mill Burn	None	Fair	JA04	8.2	4.5	Local
Dolphington Burn	None	Poor to fair	JA05	1.1	3.8	Local
			JA06	4.0	10.8	
Swine Burn	None	Poor to fair	JA08	4.4	12.4	Authority area
			JA09	13.3	11.7	
Niddry Burn	Nationally scarce Dipteran (<i>Dixa maculata</i>)	Fair to good	JA10	3.8	1.3	Regional
			JA11	8.8	4.2	
			JA13	12.0	13.3	
River Almond	None	Fair	JA14	9.2	3.3	Authority area

Brankholm Burn

- 13.1.2 Brankholm Burn is of fair biological water quality (SEPA, 2006) and although 19 taxa were identified, none were of conservation concern. The sampled point on the burn was of moderate conservation value using CCI assessment (Chadd & Extence, 2004). Habitat diversity and flow features are limited resulting in an assessment of local level ecological value for aquatic invertebrates.

Unnamed Waterbodies

- 13.1.3 Both water bodies were located on the northern shore of the Firth of Forth, on the inland edge of St Margaret's Marsh within the SSSI boundary. The unnamed tributary (Site JA02), running into an unnamed pond (JA03) which is exposed to saline intrusion, exhibits a species assemblage expected of such brackish conditions. Site JA02 supports a seasonally variable taxon richness of up to 10 taxa including *Corophium volutator* and *Hediste diversicolor* (species known to be valuable to feeding waders and wildfowl). Using CCI (Chadd & Extence, 2004), the sampled invertebrate community within the tributary ranged from moderate conservation value in the spring to high conservation value in the autumn and the tributary is therefore assessed as being of ecological value at the authority area level for aquatic invertebrates.
- 13.1.4 The unnamed pond (Site JA03) supports a limited macroinvertebrate fauna, indicative of a brackish environment. No invertebrate samples were collected in spring from this pond but the autumn sample identified a community of very high conservation value through the assessment of CCI scores as the majority of these few species present are of conservation value (including *Corophium volutator*, *Corophium arenarium* and *Gammarus duebeni*). This waterbody may therefore contribute to the feeding habitat for coastal waterfowl and waders and is therefore assessed to be of ecological value at the authority area level for aquatic invertebrates.

Linn Mill Burn

- 13.1.5 Linn Mill Burn is of fair biological water quality (SEPA, 2006) and although 19 taxa were identified, none were of conservation concern. The CCI scores for the burn ranged from moderate conservation value in spring to low conservation value in autumn. It is therefore assessed as being of local level ecological value for aquatic invertebrates.

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Dolphington Burn

- 13.1.6 Dolphington Burn is of poor to fair biological water quality (SEPA, 2006) and although 16 taxa were identified, none were of conservation concern. The CCI scores for the lower burn (Site JA05 just upstream of the oil storage depot) showed it to be of low conservation value, whereas the CCI scores for the upper burn (Site JA06 by the existing A8000) ranged from low conservation value in spring to moderate - fairly high conservation value in autumn. Habitat diversity and flow features are limited and resulting in an assessment of local level ecological value for aquatic invertebrates.

Swine Burn

- 13.1.7 Swine Burn is of poor to fair biological water quality based on the calculation of river health categories from surveyed results (SEPA, 2006). Although it supports up to 20 taxa, no species of conservation concern were collected from the burn. CCI scores indicates the upper burn ranged from low to fairly high conservation value between spring and autumn respectively (Site JA08) and Site JA09 (where the proposed scheme is located) had a fairly high conservation value. It is therefore assessed as being of authority area level ecological value for aquatic invertebrates.

Niddry Burn

- 13.1.8 Niddry Burn was found to support the only notable species from all the sampled sites within the buffer zone, the nationally scarce true fly (*Dixa maculata*), also known as a meniscus midge. This species is usually found at the surface water film of slow-flowing, shallow stony streams, often against emergent plants or rocks where they filter-feed. The watercourse offers a range of habitat features suitable to maintain taxon rich communities and monitoring suggests water of fair to good biological quality. The upper burn (Site JA10) is of low conservation value (according to CCI scores), the mid-region (Site JA11) ranged from moderate conservation value in spring to low conservation value in autumn, but the downstream region (Site JA13) before the confluence with the River Almond consistently supported a community of fairly high conservation value. Although Niddry Burn supports species of national value, the water quality along the reach does not fall within national evaluation conditions (Chapter 10: Table 10. and Appendix A10.4: Table 12.3) and therefore Niddry Burn is assessed of regional level ecological value for aquatic invertebrates.

River Almond

- 13.1.9 River Almond is of fair to good biological water quality (SEPA, 2006) and although 16 taxa were identified at the site surveyed, none were of conservation concern. The CCI scores from the community at the sample point (Site JA14) ranged from moderate conservation value in spring to low conservation value in autumn. River Almond is therefore assessed as being of authority area level ecological value for aquatic invertebrates.

13.2 Freshwater Macrophytes

- 13.2.1 A combination of a literature review, habitat assessment and species survey was used to evaluate the habitat and communities of freshwater macrophytes with reference to the geographical framework detailed in Chapter 10 (Table 10.1). The evaluation of macrophyte sites is summarised in Table 13.2. Of the 44 species identified, 32 species are classified as being lower risk - least concern on the JNCC Taxon Designation List (based on IUCN Red List of Threatened Species, (1997) and other international guidelines) and are not considered to be under threat. The remaining 12 species are not included in the Red List due to limited data being available about them, and hence their conservation status has not been evaluated.
- 13.2.2 Each site was evaluated in terms of macrophytes present and assessed through a combination of MTR values, general habitat quality and consultation information.
- 13.2.3 Based on these considerations, the freshwater macrophyte population in the study area is assessed as being of local level ecological value.

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Table 13.2: Evaluation of Freshwater Macrophytes Sites

Site	General Habitat	Habitat Quality	Potential National and Locally Important Freshwater Macrophytes with Conservation Status*	Justification for Evaluation	Evaluation
JA01 Brankholm Burn	A reach of watercourse, with the predominant flow type characterised as a run. The channel is between 1m and 5m wide and 0.25m and 0.5m deep. The site is fairly shaded. Water quality appeared good.	Medium	Lower risk - least concern (Red List based on 2001 IUCN guidelines): Water forget-me not (<i>Myosotis scorpioides</i>). Amphibious bistort (<i>Persicaria amphibia</i>). Reed canary-grass (<i>Phalaris arundinacea</i>). Curled pondweed (<i>Potamogeton crispus</i>). Broad-leaved pondweed (<i>Potamogeton natans</i>). Celery-leaved buttercup (<i>Ranunculus sceleratus</i>). Water-cress (<i>Rorippa nasturtium-aquaticum</i> agg). Branched bur-reed (<i>Sparganium erectum</i>). Brooklime (<i>Veronica beccabunga</i>).	None of the species recorded are of conservation significance. MTR score of 39 suggesting a medium habitat value. The site provides elements of semi-natural vegetation that due to their size, quality or the wide distribution of such habitats in the local area are considered to be of local value.	Local
JA04 Linn Mill Burn	A reach of watercourse, with the predominant flow type characterised as a run. The channel is between 1m and 5m wide and 0.25m and 0.5m deep. The site is fairly shaded. Water quality appeared good.	Low	Lower risk - least concern (Red List based on 2001 IUCN guidelines): Yellow Iris (<i>Iris pseudacorus</i>). Hard rush (<i>Juncus inflexus</i>).	None of the species recorded are of conservation significance. MTR score of 43 suggesting a medium habitat value. Justification for evaluation as above.	Local
JA06 Dolphington Burn	A reach of watercourse, with the predominant flow type characterised as a run. The channel is between 1m and 5m wide and 0.25m and 0.5m deep. The site is distinctly shaded. Water quality appeared good.	Medium	Species that were recorded at this site are not listed on the JNCC website and as such their conservation value is unknown.	None of the species recorded are of conservation significance. MTR score of 36 suggesting a medium habitat value. Justification for evaluation as above.	Local
JA07 Humbie Reservoir	A large, still waterbody. Broken shading around the margins. Approximately 60mx600m and depth.	Medium	Lower risk - least concern (Red List based on 2001 IUCN guidelines): Creeping bent (<i>Agrostis stolonifera</i>). Great willowherb (<i>Epilobium hirsutum</i>). Reed sweet-grass (<i>Glyceria maxima</i>). Mare's-tail (<i>Hippuris vulgaris</i>). Yellow iris. Hard rush. Water mint (<i>Mentha aquatica</i>).	None of the species recorded are of conservation significance. Justification for evaluation as above.	Local

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Site	General Habitat	Habitat Quality	Potential National and Locally Important Freshwater Macrophytes with Conservation Status*	Justification for Evaluation	Evaluation
			Water-cress. Brooklime.		
JA08 Swine Burn.	A reach of watercourse, with the Swine Burn, upstream of any proposed works	Medium	Species that were recorded at this site are not listed on the JNCC website and as such their conservation value is unknown.	None of the species recorded are of conservation significance. MTR score of 34.62 suggesting low to medium habitat value. Justification for evaluation as above.	Local
JA09 Swine Burn.	A reach of watercourse, with the predominant flow type characterised as a run. The channel is between 1m and 5m wide and 0.25m and 0.5m deep. The site is predominantly densely shaded. Water quality appeared good with only marginal turbidity probably as a result of recent heavy rainfall.	Medium	As above.	None of the species recorded are of conservation significance. MTR score of 42.73 suggesting a medium habitat value. Justification for evaluation as above.	Local
JA10 Niddry Burn. Ross's Plantation.	A reach of watercourse, with the predominant flow type characterised as a run. The channel is predominantly less than 1m wide and 0.25m deep. The site is distinctly shaded. Water quality appeared good.	Medium	As above.	None of the species recorded are of conservation significance. MTR score of 32.50 suggesting a low to medium habitat value. Justification for evaluation as above.	Local
JA12 Niddry Burn	A reach of watercourse, with the predominant flow type characterised as a run. It is bounded by patches of marginal vegetation. The channel is predominantly less than 1m wide and 0.25m deep. The site is distinctly shaded. Water quality appeared good.	Low	Lower risk - least concern species (Red List based on 2001 IUCN guidelines): Lesser pond-sedge (<i>Carex acutiformis</i>). Reed sweet-grass. Yellow iris. Water-pepper (<i>Persicaria hydropiper</i>). Curled pondweed. Branched bur-reed.	None of the species recorded are of conservation significance. MTR score of 25.71 suggesting a low habitat value. Justification for evaluation as above.	Local
JA13 Niddry Burn	A reach of watercourse, with the predominant flow type characterised as a run. It is bounded by patches of marginal vegetation. The channel is between 1m and 5m wide	Medium	Species that were recorded at this site are not listed on the JNCC website and as such their conservation value is unknown.	None of the species recorded are of conservation significance. MTR score of 42.22 suggesting a medium habitat value. Justification for evaluation as above.	Local

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Site	General Habitat	Habitat Quality	Potential National and Locally Important Freshwater Macrophytes with Conservation Status*	Justification for Evaluation	Evaluation
	and 0.25m and 0.5m deep. The site is distinctly shaded. Water quality appeared good.				
JA14 River Almond	A reach of watercourse, with the predominant flow type characterised as a run. It is bounded by patches of marginal vegetation. The channel is between 10m and 25m wide and 0.25m and 1m deep. The site is lightly shaded. Water quality appeared good with distinct turbidity probably as a result of recent heavy rainfall.	Medium	Lower risk - least concern (Red List based on 2001 IUCN guidelines): <i>Water-plantain (Alisma plantago-aquatica).</i> Lesser pond-sedge. Marsh horsetail (<i>Equisetum palustre</i>). Common spike-rush (<i>Eleocharis palustris</i>). Reed canary-grass. Curled pondweed. Bog pondweed (<i>Potamogeton polygonifolius</i>). Celery-leaved buttercup. Great yellow-cress (<i>Rorippa amphibia</i>). Branched bur-reed.	Nine of the species recorded are of some conservation significance, cited as of lower risk (least concern) within the Red List following the 2001 IUCN guidelines. MTR score of 35.00 suggesting a low habitat value. Justification for evaluation as above.	Local

* IUCN (2001), JNCC (2008)

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13.3 Freshwater Fish

Swine Burn (Site JA08)

- 13.3.1 Bullhead (*Cottus gobio*) and minnow (*Phoxinus phoxinus*) were recorded at this site which is situated downstream of Humber Reservoir. Both of these species have historically been recorded in the Forth catchment (Davies et al., 2004), the former are non-indigenous to Scotland. The presence of obstacles to fish migration further downstream on Swine Burn (e.g. where water is culverted underground, an existing culvert at M9 Junction 1A (~150m in length) and a waterfall (NT 11900 74400)), may reduce the potential salmonid population through the study area. In-stream obstructions are potentially a limiting barrier to fish migration (specific to certain species).
- 13.3.2 The habitat present within Swine Burn (Site JA08) is considered to be of moderate ecological value (Appendix A10.4, Section 14.2, Table 14.4) based on the criteria listed in Appendix A10.3 (Section 15.4, Table 15.1). The fish species recorded, suggest that this site is of local level ecological value for freshwater fish as the species present enrich the biodiversity resource within the local context. However, a SEPA water quality classification of A2 (SEPA, 2006) influences the habitat and therefore the combined ecological receptor is assessed as being of authority area level ecological value (Table 13.3).

Swine Burn (Site JA09)

- 13.3.3 Brown trout (*Salmo trutta*), bullhead (in abundance), minnow, and three-spined stickleback (*Gasterosteus aculeatus*) were recorded at this site which is adjacent to M9 Junction 1A. All of these species have historically been recorded in the Forth catchment (Davies et al., 2004). The low numbers of brown trout recorded and the absence of migratory salmonids may be a result of obstacles to fish migration downstream on Swine Burn such as a number of underground culverts, an existing culvert at M9 Junction 1A (~150m in length), and a waterfall at NT 11900 74400.
- 13.3.4 The habitat present at Swine Burn (Site JA09) is considered to be of good ecological value (Appendix A10.4, Table 14.4) and based on the criteria listed in Appendix A10.3. The diverse habitat and more notably, diversity in flow features, appears to support an increased fish species community relative to Swine Burn (downstream of Humber Reservoir). This site is evaluated as being of regional level ecological value for freshwater fish as the burn supports a population of nationally important species (brown trout) that are not rare in the region (Table 13.3).

Niddry Burn (Site JA12)

- 13.3.5 Brown trout, bullhead, stone loach (*Barbatula barbatula*), minnow, and three-spined stickleback were recorded at this site which is south of Lindsay's Craigs. All of these species have historically been recorded in the Forth catchment (Davies et al., 2004). Bullhead, stone loach and minnow are considered to be non-indigenous to Scotland. Due to the Niddry Burn's connectivity with the River Almond, it is likely that bullhead have colonised via this route. The low numbers of brown trout and three-spined stickleback present can potentially be attributed to unsuitable habitat e.g. lack of available cover. The most recent information for the Niddry Burn provides an overall status of moderate (SEPA, 2008) (Appendix A10.4, Table 11.9).
- 13.3.6 The habitat present within the Niddry Burn (Site JA12) is classified as good quality (Appendix A10.4, Table 14.4). The habitat exhibited high substrate diversity (predominantly cobble) and bankside cover (predominantly vegetation rooted in the stream bed). Habitat conditions within this burn are assessed as being of regional level ecological value for freshwater fish (Table 13.3), as the site supports a population of nationally important species (brown trout) that are not rare in the region.

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River Almond (Site JA14)

- 13.3.7 Brown trout, bullhead, stone loach, minnow, three-spined stickleback and European eel (*Anguilla anguilla*) were recorded at the River Almond survey site. All of these species have historically been recorded in the Forth catchment (Davies et al., 2004). The River Almond supported the highest number of species of all the sites surveyed (6 species), which is typical of large river systems and the qualitative data collected for this site. Catch return information (2007 and 2008) for Atlantic salmon (*Salmo salar*), sea trout, finnock and brown trout has been provided by the Cramond Angling Club (Appendix A10.4, Table 14.7). Catch returns have been consistent during this period however the data for 2008 shows a slight increase in species size over the preceding year.
- 13.3.8 The habitat present within the River Almond is classified as good quality (Appendix A10.4, Table 14.4) and based on the criteria listed in Appendix A10.3. The habitat exhibited high substrate diversity (predominantly cobble) and a significant range of depths incorporating a number of flow features throughout. This site is evaluated as being of regional level ecological value for freshwater fish, due to the River Almond maintaining populations of nationally important species that are not threatened in the region. The most recent assessment by SEPA under the WFD monitoring and classification programme for the River Almond provides an overall status of poor (SEPA, 2008), (Appendix A10.4, Table 11.9).

Table 13.3: Evaluation of Freshwater Fish Sites

Watercourse	Habitat Quality	Evaluation of Ecological Receptor
Swine Burn (Site JA08)	Moderate	Authority area
Swine Burn (Site JA09)	Good	Regional
Niddry Burn	Good	Regional
River Almond	Good	Regional

- 13.3.9 The four study sites surveyed supported a number of fish species and diverse habitats. The species recorded are among those that would be expected from the watercourses of the character of those surveyed within the study area, although a further four species have historically been recorded across the River Almond catchment (Appendix A10.4). Suitable lamprey habitat (marginal silt beds) was not identified at any of the study sites and no lamprey species were recorded during the 2008 surveys, but brook (*Lampetra planeri*), river (*Lampetra fluviatilis*) and sea lamprey (*Petromyzon marinus*) are present within the Forth catchment and are designated species within the River Teith Special Area of Conservation (SAC). No current distribution data exist for lamprey within the River Almond.
- 13.3.10 As such, Swine Burn (adjacent to M9 Junction 1A), Niddry Burn and River Almond are each considered to be of regional level ecological value whereas Swine Burn (downstream of Humble Reservoir) is of authority area level ecological value for fish.

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