



Appendix A25.7 – Water Vole Survey

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1 Introduction

1.1 General Background

- 1.1.1 This report is one of the appendices supporting Chapter 25 (Ecology and Nature Conservation) of the AWPR Environmental Statement. It considers the potential impacts on water vole populations associated with the Southern Leg of the proposed scheme. The results of the surveys carried out for the purpose of this assessment are also presented and are shown on Figures A25.9a-h.
- 1.1.2 The six component route sections in this report for the Southern Leg of the proposed scheme are as follows:
- Section SL1: Charleston to Bishopston (ch207200 - 203150);
 - Section SL2: Bishopston to Burnhead (ch203150 - 200600);
 - Section SL3: Burnhead to the A93 (ch200600 - 102870);
 - Section SL4: A93 to Beanshill (ch102870 - 105900);
 - Section SL5: Beanshill to South Kingswells Junction (ch105900 - 108500); and
 - Section SL6: South Kingswells Junction to Derbeth Overhills (ch108500 - 111200).
- 1.1.3 All tables and figures are structured in this manner.
- 1.1.4 The Ecological Impact Assessment (EclA) was undertaken in accordance with the Design Manual for Roads and Bridges (DMRB) Volume 10 and 11 (Highways Agency 2005) and the Environmental Impact Assessment (Scotland) Regulations 1999 (as amended), along with cognisance of Institute of Ecology and Environmental Management (IEEM) guidelines (IEEM 2002).
- 1.1.5 These studies included desk-based consultation to collate existing information about water vole populations in the study area for the proposed scheme and field surveys to provide current data about the status of water vole populations and the habitats that support them.
- 1.1.6 Cumulative impacts are assessed in a separate report combining the predicted impacts for all habitats and species over the proposed route (refer to Part E: Cumulative Assessment, of the Environmental Statement [ES]).

Aims

- 1.1.7 The purpose of the assessment is to:
- assess the presence and status of water vole populations and their habitats in the study area;
 - assess the quality of riparian habitat present and evaluate the importance of the area for water vole;
 - assess any potential impacts that the proposed scheme may have upon the local water vole population; and
 - identify appropriate mitigation measures.

1.2 Background to Assessment

Biology

- 1.2.1 Water voles (*Arvicola terrestris*) are the largest of the British voles. Most water vole populations are associated with water features including rivers, ponds, land drains and marshland. They show a preference for permanent slow-flowing water features with densely vegetated banks. They feed upon the aerial stems and leaves of waterside plants. During winter roots, bark and rhizomes represent an important part of the water vole's diet.
- 1.2.2 Water voles are usually found within 2m of the water's edge where they dig burrows into soft banks. Female water voles are territorial and defend their resources from other females. In contrast, male water voles do not defend territories. Territorial ownership is marked by discrete latrine sites consisting of flattened piles of droppings topped with fresh ones. The length of home ranges can vary from 30m to 150m for females and 60m to 300m for males (Strachan, 1998). A series of abutting water vole territories is called a colony.
- 1.2.3 Water voles are patchily distributed across the UK. They are found throughout England, Wales and Scotland, including northeast Scotland (Jefferies, 2003; Telfer et al., 2001), but are absent from Ireland (Harris et al., 1995). Most UK populations are found below an altitude of 50m (Harris et al., 1995). However, in some river catchments water voles are restricted to tributaries in the upper reaches of the river system where mink are relatively scarce. Such populations of voles have been recorded in the Scottish Highlands at altitudes above 900m (Raynor, 2002).
- 1.2.4 Studies have shown that water vole populations in North Scotland survive as 'metapopulations' (Stewart et al., 1999; Aars et al., 2001; 2006; Telfer et al., 2001). A metapopulation comprises a network of colonies, often with low numbers of individuals, with a fragmented distribution. Water vole metapopulations exist as the result of a balance between colony extinctions and dispersal (Stewart et al., 1999). Water vole populations are able to retain high levels of genetic variability through dispersal and interaction between these fragmented colonies and an ability to found new colonies in areas of suitable habitat (Aars et al., 2006).
- 1.2.5 The British water vole population suffered a steady decline throughout the 20th century owing to habitat destruction and agricultural intensification. This decline has been rapidly accelerated in recent years through predation by feral American mink (*Mustela vison*). Abundant mink can wipe out a water vole colony, therefore mink presence will render areas of potentially suitable water vole habitat unsuitable.
- 1.2.6 Two national surveys by the Vincent Wildlife Trust in 1989-1990 and 1996-1998 have highlighted a serious population crash with the loss of 88% of the remaining water vole population in only seven years. The 1990 population of Scottish water voles was estimated at 2,374,000 whilst the 1998 population was estimated at only 354,000 water voles (Jefferies, 2003).

Legal Status

- 1.2.7 The water vole was afforded partial protection under the Wildlife and Countryside Act (1981) (as amended) when, in 1998, it was added to Schedule 5 in respect of Section 9 (4) only. Further protection was afforded when the Nature Conservation (Scotland) Act 2004 revised Part 1 of the Wildlife and Countryside Act (1981) (as amended). These acts make it an offence to intentionally or recklessly damage, destroy or obstruct access to any structure or place that water voles use for shelter or protection, or to disturb water voles while they are using such a place.

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- 1.2.8 In January 2005 the Department for Environment, Food and Rural Affairs (DEFRA) released a consultation paper that recommended the water vole should have its protection status increased to full protection under Schedule 5 of the Wildlife and Countryside Act (1981) (as amended). However, as yet there has been no date set for these changes. The changes will mean that, as for red squirrel (see Appendix A25.6: Red Squirrel, paragraph 1.2.11), it will be illegal to intentionally or recklessly kill, injure or capture water voles or to possess or transport water voles or any part of a water vole unless acquired legally, or to kill or capture water voles by indiscriminate methods such as snaring or poisoning.
- 1.2.9 National Planning Policy Guidance 14 (NPPG 14) refers to natural heritage and how this should relate to Scotland's land use planning process. NPPG 14 makes the presence of a protected species (e.g. water vole) a material consideration in the assessment of development proposals.
- 1.2.10 The water vole is identified for priority action by the Biodiversity Steering Group (United Kingdom Biodiversity Partnership 2005) and has a national Species Action Plan. In addition it is a North East Scotland Local Biodiversity Action Plan species.

2 Approach and Methods

2.1 Consultation

- 2.1.1 Sections of the River Dee and River Don catchments were surveyed in 1990 and 1996 as part of the National Water Vole Survey (Jefferies, 2003). In addition this survey looked at the River Ythan catchment (approximately 15km north of the study corridor) and coastal burns in the Buchan area (approximately 15km north of the study corridor). The results of the surveys were checked for information relevant to this assessment.
- 2.1.2 A water vole survey was carried out by Jacobs in 2004 and 2005 (as part a previous AWPR route alignment, refer to Chapter 6: Scoping and Consultations). The survey corridor overlapped with the Southern Leg and Northern Leg survey corridor in places (see Appendix A10.8: Water Vole, Northern Leg). This survey found no evidence of water voles.

2.2 Survey Methods

- 2.2.1 The DMRB does not give specific guidance on water vole survey techniques therefore the survey methodology followed that described in the Water Vole Conservation Handbook (Strachan, 1998). This involved searching for evidence of water voles and making an assessment of habitat suitability.
- 2.2.2 All riparian zones, watercourses and wetlands within 250m either side of the alignment were surveyed for water voles. The survey was extended beyond 250m where appropriate. All water features were initially identified from Ordnance Survey maps, aerial photographs and then through a preliminary walkover survey. Survey locations are detailed in Table 1 and presented in Figures 25.9a-h.
- 2.2.3 All watercourses and ponds were surveyed from the channel/pond where possible, to give the best view of bank habitat.
- 2.2.4 The survey was undertaken during May, July and August 2006. This is an optimal time to carry out water vole surveys as it is during the breeding season and latrine marking is at its peak (Woodroffe, 2000). The survey was conducted following periods of dry weather meaning that either precipitation or high water levels would not have washed any such latrines away. However, due to the variable nature of wildlife and the limitations of survey methods it is possible that not all field signs will have been recorded.

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Water Vole Presence

- 2.2.5 The survey consisted of searching for field signs as described in Strachan (1998), including burrows, nests, runs, latrines, foot prints and feeding stations.
- 2.2.6 The density of water vole latrines along a water course can be used to produce an estimate of population size.
- 2.2.7 Several equations have been produced to estimate water vole populations based upon latrine counts (Morris et al., 1998, Aars et al., 2001). However, many of these studies have been carried out in locations inappropriate for comparison with this study (lowland rivers in England and upland populations of water voles in Scotland). Lambin et al., (unpublished) produced an equation for estimating water vole population numbers using mark-recapture studies carried out on 6 lowland streams of the River Y than catchment in North-East Scotland. It was felt that this equation was most appropriate to use for the water vole surveys undertaken for the AWPR Environmental Statement.
- 2.2.8 Lambin's equation is $y = 0.653x$ where x = latrines counted per 100m and y = water voles per 100m.

Habitat Suitability

- 2.2.9 The habitat suitability of waterbodies for water voles was assessed using landscape factors known to be conducive to supporting water vole colonies (Woodroffe, 2000; Strachan, 1998). This assessment was based upon:
- flow rate of water bodies - water voles prefer static to moderate flowing water bodies;
 - water depth - water voles prefer water bodies to have a depth of at least 0.3m;
 - suitability of vegetation - water voles require stands of emergent vegetation or tall grasses on which to feed; areas of heavily shaded, wooded bank provide little suitable feeding habitat;
 - the composition of habitat types - availability of non-linear foraging habitat may provide refuge from mink predation even where mink are present;
 - bank suitability - water voles require areas of soft bank in which to excavate their burrows, overly rocky bank habitat is unsuitable; and
 - the status of mink in the local area.
- 2.2.10 For each factor, each waterbody was assessed using a high, medium or low scale to determine the habitat suitability for water voles. Suitability of vegetation and bank were given greater weight than flow rate and flow depth. Waterbodies were assessed for water voles as follows:
- high suitability: waterbody offers all landscape factors in a favourable state, i.e. slow flowing /static water of a depth of at least 0.3m with moderate/high suitable vegetation, moderate/high bank suitability and either absence of mink or potential refuge from predation.
 - moderate suitability: waterbody offers moderate/high vegetation and bank suitability with either suitable water depth or suitable flow rate the location and unknown status of mink and/or some potential refuge from predation.
 - low/moderate suitability: waterbody offers moderate/high vegetation and bank suitability, but neither suitable water depth nor suitable flow rate and/or confirmed presence of mink and no potential refuge from predation.
 - low suitability: waterbody offers either poor vegetation, low bank suitability and/or confirmed presence of mink and no potential refuge from predation.

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2.2.11 In addition, the overall area of suitable habitat on each waterbody was taken into account. Where areas of good quality water vole habitat were either small or fragmented, the waterbody was awarded a lower value for its suitability.

Mink Presence

2.2.12 Signs of mink were noted, including footprints, scats (faeces) and actual sightings. Each waterbody was assessed for mink populations and classed as being present, likely to be present or status unknown.

Water Vole Survey Locations

2.2.13 Water vole survey locations in sections SL1-SL6 are presented in Table 1.

Table 1 – Water Vole Survey Locations

Site Number	Habitat Area	Grid Reference	Name	Figure
Section SL 1				
1	S38	NJ 920 002 – NJ 027 998	Tributary of Loirston Loch	25.9a
2	S31	NO 909 990 – NO 913 990	Tributary of Findon Burn	25.9a
3	S31 and S34	NO 908 996	Jameston Ditch (Hare Moss)	25.9b
4	S31 and S34	NO 903 993	Hare Moss	25.9b
5	S31 and S34	NO 900 987 – NO 910 995	Burn of Ardoe, Heathfield Burn (Tributary of Burn of Ardoe), Bishopston Ditch (Hare Moss)	25.9b
Section SL 2				
6	S31	NO 898 992	Cowford Pond	25.9b
7	S32	NO 890 989 – NO 895 993	Cowford Burn	25.9b
8	S28	NO 887 989	Ditch at Greenloaning	25.9b
9	S28	NO 870 982 – NO 885 983	Burnhead Burn and Barnhill Burn	25.9c
10	S26 and S28	NO 870 982 – NO 870 987	Burnhead Burn (western reach)	25.9c
Section SL 3				
11	S46 – S49	NO 872 987 – NO 861 993	Blaikiewell Burn	25.9c
12	S49	NO 861 881 – NJ 857 003	Crynoch Burn	25.9d
13	S49	NO 860 993 – NO 859 996	Glenburnie and Glenburnie Ponds	25.9d
14	S50	NJ 863 995	Kingcausie Pond	25.9d
15	S47 – S51	NO 860 999 – NO 868 995	Kingcausie Burn	25.9d
16	S51	NJ 865 001	Burn 1 at Kingcausie	25.9d
17	S51	NJ 860 001	Burn 2 at Kingcausie	25.9d
18	S52	NJ 855 000 – NJ 857 002	Mill Bank Burn	25.9d
19	S52	NJ 854 004 – NJ 862 004	River Dee	25.9d

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Site Number	Habitat Area	Grid Reference	Name	Figure
Section SL 4				
20	S59	NJ 846 011	Drains at Culter House	25.9d
21	S59	NJ 849 016	Miltimber Burn	25.9d
22	S59, S60 and S62	NJ 885 018	Drain at Milltimber	25.9d
23	S62 and S63	NJ 851 019	Bellenden Burn	25.9e
24	S65	NJ 851 031	Beans Burn	25.9e
Section SL 5				
25	S70	NJ 853 040	Upper Beanshill Burn	25.9f
26	S67 – S70	NJ 848 041	Gairn Burn and Silver Burn	25.9f
27	S72	NJ 848 053	Moss of Auchlea	25.9f
28	S70	NJ 853 054	Drains at Kingshill Wood	25.9f
Section SL 6				
29	S73	NJ 851 064	East Kingsford	25.9g
30	n/a	NJ 857 082	Borrowstone Burn	25.9g
31	n/a	NJ 857 081	Borrowstone Pond	25.9g
32	n/a	NJ 867 091	Keppelhill Burn	25.9h

2.3 Evaluation of Nature Conservation Value

2.3.1 The ecological value of the local water vole population and the water vole habitat was determined by reference to any designations, the results of the consultations, literature review and field surveys. The criteria used were based on the Ratcliffe Criteria (Ratcliffe, 1977) used in the selection of biological Sites of Special Scientific Interest (SSSI). Sites and features were classified according to the general criteria identified in Table 2.

Table 2 – Evaluation of Ecological Receptor

Ecological Importance	Attributes of Ecological Receptor
International (European)	<p>Habitats An internationally designated site or candidate site i.e. Special Protection Area (SPA), provisional SPA (pSPA), Special Areas of Conservation (SAC), candidate SAC (cSAC), Ramsar site, Biogenetic/Biosphere Reserve, World Heritage Site or an area which meets the published selection criteria for such designation. A viable area of a habitat type listed in Annex I of the Habitats Directive, or smaller areas of such habitat that are essential to maintain the viability of a larger whole. Any river classified as Excellent A1 and likely to support a substantial salmonid population. Any river with a Habitat Modification Score indicating that it is Pristine or Semi-Natural or Obviously Modified.</p> <p>Species Any regularly occurring population of an internationally important species, which is threatened or rare in the UK, i.e. a UK Red Data Book species or listed as occurring in 15 or fewer 10km squares in the UK (categories 1 and 2 in the UK BAP) or of uncertain conservation status or of global conservation concern in the UK BAP. A regularly occurring, nationally significant population/number of any internationally important species.</p>
National (Scottish)	<p>Habitats A nationally designated site i.e. Site of Special Scientific Interest (SSSI), Areas of Special Scientific Interest (ASSI), National Nature Reserve (NNR), Marine Nature Reserve, or a discrete area, which meets the published selection criteria for national designation (e.g. SSSI selection guidelines) A viable area of a priority habitat identified in the UK Biodiversity Action Plan (UK BAP), or of smaller areas of such habitat that are essential to maintain the viability of a larger whole. Any river classified as Excellent A1 and likely to support a substantial salmonid population. Any river with a Habitat Modification Score indicating that it is Pristine or Semi-Natural or Obviously Modified.</p> <p>Species A regularly occurring, regionally or county significant population/number of an internationally/nationally important species. Any regularly occurring population of a nationally important species which is threatened or rare in the region or county (see local BAP). A feature</p>

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Ecological Importance	Attributes of Ecological Receptor
	identified as of critical importance in the UK BAP.
Regional (North East Scotland)	<p>Habitats Sites which exceed the county-level designations but fall short of SSSI selection criteria. Viable areas of key habitat identified in the Regional BAP or smaller areas of such habitat that are essential to maintain the viability of a larger whole. Viable areas of key habitat identified as being of regional value in the appropriate SNH Natural Heritage Future area profile. Any river classified as Excellent A1 or Good A2 and capable of supporting salmonid population. Any river with a Habitat Modification Score indicating that it is Significantly Modified or above.</p> <p>Species Any regularly occurring, locally significant population of a species listed as being nationally scarce which occurs in 16-100 10km squares in the UK or in a Regional BAP or relevant SNH Natural Heritage Future area on account of its regional rarity or localisation. A regularly occurring, locally significant population/number of a regionally important species. Sites maintaining populations of internationally/nationally important species that are not threatened or rare in the region or county.</p>
Authority Area (e.g. County or District) (Aberdeenshire/ City of Aberdeen)	<p>Habitats Sites that are recognised by local authorities e.g. Sites of Interest for Nature Conservation (SINS) and District Wildlife Sites (DWS). County/District sites that the designating authority has determined meet the published ecological selection criteria for designation, including Local Nature Reserves (LNR). A viable area of habitat identified in County/District BAP or in the relevant SNH Natural Heritage Future area profile. A diverse and/or ecologically valuable hedgerow network. Semi-natural ancient woodland greater than 0.25 ha. Any river classified as Good A2 or Fair B and likely to support coarse fishery. Any river with a Habitat Modification Score indicating that it is Significantly Modified or above.</p> <p>Species Any regularly occurring, locally significant population of a species that is listed in a County/District BAP on account of its regional rarity or localisation. A regularly occurring, locally significant population of a county/district important species (particularly during a critical phase of its life cycle). Sites supporting populations of internationally/nationally/regionally important species that are not threatened or rare in the region or county, and are not integral to maintaining those populations. Sites/features that are scarce within the county/district or which appreciably enrich the county/district habitat resource.</p>
Local (Immediate local area or village importance)	<p>Habitats Areas of habitat considered to appreciably enrich the habitat resource e.g. species-rich hedgerows, ponds etc. Sites that retain other elements of semi-natural vegetation that due to their size, quality or the wide distribution of such habitats within the local area are not considered for the above classifications. Semi-natural ancient woodland smaller than 0.25ha. Any river classified as fair B or Poor C and unlikely to support coarse fishery. Rivers with a Habitat Modification Score indicating that it is Severely Modified or above.</p> <p>Species Populations/assemblages of species that appreciably enrich the biodiversity resource within the local context. Sites supporting populations of county/district important species that are not threatened or rare in the region or county and are not integral to maintaining those populations.</p>
Less than Local (Limited ecological importance)	Sites that retain habitats and/or species that are of limited ecological importance due to their size, species composition or other factors. Any river classified as Impoverished D and/or and with a Habitat Modification Score indicating that it is Severely Modified.

2.4 Impact Assessment

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

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Impact Magnitude

2.4.2 The magnitude of an impact has been assessed for each element of the proposal. A definition of the magnitude impacts is presented in Table 3 and includes positive impact criteria in accordance with IEEM guidance (2002). The magnitude of each impact was assessed independently of value or statutory status.

Table 3 – Magnitude of Impact

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

Impact Significance of Impact

2.4.3 The significance of an impact was determined according to the matrix of importance and magnitude as illustrated in Table 4.

Table 4 – Significance of Impact

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

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

2.5 Limitations to Assessment

- 2.5.1 The survey was carried out during May, July and August 2006, which is the optimum time of year for conducting a water vole survey as latrine marking is at its peak (Woodroffe., 2000). The survey was conducted following periods of dry weather meaning that either precipitation or high water levels would not have washed any such latrines away. However, due to the variable nature of wildlife and the limitations of survey methods it is possible that not all field signs will have been recorded. The greatest potential for field signs to have gone unrecorded occurred where surveys took place in areas of bog and marshy grassland. In such areas, water voles are unlikely to use burrow systems and may not latrine mark. This means that evidence of water voles can be much more difficult to find. Two extensive areas of wetland were identified within the survey corridor at Hare Moss (Site 4) and at the Moss of Auchlea (Site 27).

3 Baseline

3.1 Consultation Information

- 3.1.1 Previous water vole surveys have been carried out within some areas of the route corridor (see paragraph 2.1.2), however, no evidence of water vole presence was found.
- 3.1.2 In 2006, otter surveys were undertaken by Jacobs as part of the AWPR Fastlink options appraisal. These surveys also recorded evidence of water voles at a fishing pond (Fishermyme pond) at National Grid Reference NO 861 903 and at other waterbodies nearby: Green Burn (NO 874 901 - NO 869 903), and at Fishermyme Moss (NO 866 904) (see Appendix 40.7: Water Vole, Fastlink). This water vole population lies approximately 1km south of the southern most section of the AWPR Southern Leg.
- 3.1.3 SNH reported that water voles have been sighted north of Stonehaven (pers.comm. to SNH via Mr David MacDonald from the Stonehaven and District Angling Association).
- 3.1.4 The 1996 National Water Vole Survey (Jefferies., 2003) found remnant water vole populations to be present at a few isolated locations in the Upper Dee catchment. These populations were recorded on the Muir of Dess (approximately 40km from the route corridor), the upper Derry (approximately 65km from the route corridor) and the Water of Feugh (approximately 20km from the route corridor). Sites on the Lower Don that were found to be positive for water voles during the 1990 survey, were found to be negative in 1996 with no new sites identified. Mink were recorded throughout both catchments during the 1996 survey. Other notable water vole colonies, identified in the National Water Vole Survey in proximity to the study sites, include scattered, declining colonies around the lowland farmland of Buchan (approximately 25km north of the route corridor); several populations in narrow burns flowing directly to the sea along the Buchan coastline (approximately 25km north of the route corridor) and clusters of water voles surviving in the headwaters of tributaries of the River Ythan (approximately 35km north of the route corridor) (NES LBAP 2005; Telfer et al., 2001).

3.2 Survey Results

Water Vole Presence

- 3.2.1 Water voles were not found to be present within the Southern Leg study area during surveys.

Habitat Suitability

- 3.2.2 Of the 33 sites surveyed, two waterbodies exhibiting 'high' suitability for water voles were identified. These were recorded at:
- Hare Moss; and

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- Moss of Auchlea.

3.2.3 These locations are described in Table 5 and shown on Figures 25.9a-h.

3.2.4 Twenty-five locations were identified as offering either 'low' or 'low/moderate' habitat suitability for water voles, with five identified as being of 'moderate' suitability.

Mink Presence

3.2.5 A farmer at Fairley Home Farm reported seeing mink around his fish pond (Borrowstone Pond) (landowner, pers. comm.). Evidence of mink was found along the length of Crynoch Burn and the River Dee. The Glenburnie Ponds are in close proximity to and are linked to the River Dee and are therefore also likely to be used by mink.

Table 5 – Water Vole Habitat Assessment

Watercourse Number and Name	Habitat Area	Water Depth (m)	Flow	Vegetation Suitability for Water Vole	Suitability of Banks for Water Vole	Mink Present	Additional Notes	Suitability for Water Vole
Section SL1								
1 - Tributary of Loirston Loch	S38	0 – 0.2	Static	Low - Moderate	Moderate	Unknown	Steep sided banks with lack of good vegetation.	Low
2 - Tributary of Findon Burn	S31	0 – 0.2	Static	High	High	Unknown	Ditch dry in places.	Low - Moderate
3 - Jameston Ditch (Hare Moss)	S31 and S34	0 – 0.1	Static	Moderate	High	Unknown	Ditch dry in places.	Low - Moderate
4 - Hare Moss	S31 and S34	0 – 0.5	Static	High	Low	Unknown	Scattered trees and scattered and dense scrub with areas of wet bog with pools and small areas of marsh / marshy grassland. Offers potential refuge, foraging and nesting habitat.	High
5 - Burn of Ardoe, Heathfield Burn, Bishopston Ditch (Hare Moss).	S31 and S34	0 – 0.1	Static - slow	Moderate	High	Unknown	Some ditches recently dredged and re-profiled. Others overgrown and dry in parts.	Low - Moderate
Section SL2								
6 - Cowford Pond	S31	0	Static	Moderate	Low	Unknown	Dry	Low
7 - Cowford Burn	S32	0 - 0.1	Static	Moderate	Moderate	Unknown	Dry in places, limited bank habitat in some places	Low - Moderate
8 - Drain at Greenloaning	S28	0 - 0.1	Static	Moderate	Moderate	Unknown	Dry in places.	Low - Moderate
9 - Burnhead Burn and Barnhill Burn	S28	0 – 0.5	Static	Low - Moderate	Low - Moderate	Unknown, although two dead common shrews found.	Some channels provided moderate – good habitat but overall too poached by cattle. Some sections dry.	Low - Moderate
10 - Burnhead Burn (western reach)	S26 and S28	0 - 0.1	Static	Moderate	Moderate	Unknown	Dry in places.	Low - Moderate
Section SL3								

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Watercourse Number and Name	Habitat Area	Water Depth (m)	Flow	Vegetation Suitability for Water Vole	Suitability of Banks for Water Vole	Mink Present	Additional Notes	Suitability for Water Vole
11 - Blaikiewell Burn	S46 – S49	0.1 – 0.5	Pools and riffles	High	High	Unknown	Good water vole habitat upstream of road. Downstream reach less suitable due to rocky banks and shading from coniferous trees.	Moderate
12 - Crynoch Burn	S49	0.2 – 0.7	Fast	Low	Low	Yes	Pool and riffle sequence present.	Low
13 - Glenburnie	S49	0.05 - 0.1	Slow	High	Low	Likely	Canalised in parts.	Low
13 - Glenburnie Ponds	SL0	0.5	Static	High	High	Likely	Permanent water with lush emergent vegetation and soft banks.	Low - moderate
14 - Kingcausie Pond	S47 – S51	0.01 – 0.3	Static	High	Moderate	Unknown	Large proportion of the pond dry, otherwise suitable habitat.	Low - Moderate
15 - Kingcausie Burn	S51	0.1	Moderate	Moderate	Moderate	Likely	Some sections in fields poached, parts in woodland overly shaded. Occasional short sections of high quality habitat.	Low
16 - Unnamed Burn 1 at Kingcausie	S51	0	None	Low	Low	Unknown	Dry	Low
17 - Unnamed Burn 2 at Kingcausie	S52	0- 0.02	Static	Low	Moderate	Unknown	None	Low
18 - Mill Bank Burn	S52	0.05 – 0.3	Static	Low - Moderate	High	Unknown	Heavily shaded in parts.	Moderate
19 - River Dee	S46 – S49	0.5	Moderate	High	Moderate/High	Yes	Good bankside vegetation and good burrowing habitat in earth banks.	Low - Moderate
Section SL4								
20 - Drain at Culter House	S59	0.02	Slow	Moderate	Moderate	Unknown	None	Moderate
21 - Milltimber Burn	S59	0.02	Moderate	Moderate	Low	Unknown	Reinforced bank.	Low
22 – Drain at Milltimber	S59, S60 and S62	0.03	Moderate	Moderate	Moderate	Unknown	Bank reinforced in places.	Moderate
23 – Bellenden Burn	S62 and S63	0 – 0.1	Slow	Low	Moderate	Unknown	Little if any vegetation in Milltimber Wood, largely dry in agricultural area. Culverted at southern end.	Low
24 - Beans Burn	S65	0 – 0.1	Static	Moderate	Moderate	Unknown	Ditch dry in places.	Low - Moderate
Section SL5								
25 - Upper Beanshill Burn	S70	0.01 – 0.1	Static - Slow	Low	Low	Unknown	Unsuitable water vole habitat in the form of peaty drains in coniferous forest.	Low

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Watercourse Number and Name	Habitat Area	Water Depth (m)	Flow	Vegetation Suitability for Water Vole	Suitability of Banks for Water Vole	Mink Present	Additional Notes	Suitability for Water Vole
26 - Gairn Burn and Silver Burn	S67 – S70	0.1 – 1.0	Slow	Low - High	Low - High	Unknown	Majority of drains offer unsuitable habitat in the form of low water levels and stone walls. However, some sections provide steep, well vegetated earth banks.	Moderate
27 - Moss of Auchlea	S72	0 – 0.6	Static	Moderate - High	Moderate	Unknown	Areas of willow and birch scrub on wet grassland. Includes areas of marsh and swamp. Offers potential foraging and nesting habitat in grass and rush vegetation. Burrowing habitat offered in drainage ditches. Only evidence of bank/field voles found.	High
28 - Drain at Kingshill Wood	S70	0	n/a	Low	Moderate	Unknown	Ditch dry.	Low
Section SL6								
29 - Drain at East Kingsford	S73	0	n/a	Moderate	Moderate	Unknown	Ditch dry.	Low
30 - Borrowstone Burn	N2	0.0-0.05	Slow - Dry	Low	Low	Unknown	Recently dredged and re-profiled	Low
31 - Borrowstone Pond	N2	0.2 – 1+	Still	High	High	Yes	Reported to be present 20 years ago by farmer	Low - moderate
32 - Keppelhill Burn	N11-N13	0.02 – 0.1	V. slow - Still	Moderate	Moderate	Unknown	Heavily poached	Low

3.3 Survey Results Summary

- 3.3.1 No water voles were found within the survey corridor. This is likely to be attributable to either limited suitable habitat, the presence of mink or the isolation, and therefore limited colonisation potential, for those areas assessed as offering habitat of high suitability.
- 3.3.2 Two extensive areas of wetland with habitat of 'high' suitability for water voles were identified at Hare Moss and the Moss of Auchlea (sites 4 and 27). These two locations are likely to be too small to sustain a water vole population on their own and both wetlands are isolated from other water vole populations by areas of intensive farmland. This isolation would preclude recruitment of water voles from elsewhere which would be necessary for the maintenance of a viable population.

4 Evaluation of Habitat Areas

- 4.1.1 All the waterbodies in the Southern Leg survey area and consequently all habitat sections have been evaluated as being of no ecological value to water voles. This is due to a lack of evidence of water voles being encountered during the survey and the distances (all greater than 7km) from the nearest known water vole population (at Fishermyle Moss (NO 866 904) in Appendix 40.7). These sites are all severed from the water vole population by intensive agricultural land. Water voles would be unable to colonise these areas using the main arterial watercourses as these are all well used by mink. Any water voles attempting to colonise any of the suitable stretches of these main watercourses would be likely to suffer from mink predation.
- 4.1.2 If mink were not present throughout the study area, it would be expected to support a moderate water vole population given the suite of localised waterbodies, many of which offer suitable habitat for water voles. Despite possessing some areas of suitable habitat it is highly unlikely that water voles will recolonise and gain a foothold within the AWPR Southern Leg whilst mink are still present.
- 4.1.3 SNH are currently piloting a mink eradication program in the Western Isles with a view to protecting breeding birds on the islands (SNH, 2003). Although the trapping scheme is progressing well, it is expensive and labour intensive. Whilst mink eradication on an island system is viable, it is likely to be much more difficult to achieve on the mainland as mink would be able to recruit from the wider population unless trapping was undertaken on a massive scale. Given the logistical problems, mink eradication on the mainland is unlikely to happen in the near future.

5 Potential Impacts

- 5.1.1 The survey found no water voles present in the study area. It is deemed unlikely that water voles will colonise any part of the AWPR Southern Leg study area within at least the next twenty years. Therefore, no potential impacts on water voles have been identified for the assessment of the Southern Leg of the scheme.

6 Mitigation

6.1 Introduction

- 6.1.1 Given that suitable water vole habitat is present and there remains the, albeit very low, potential that water voles will recolonise the area, it is recommended that existing habitats be maintained and enhanced in order to facilitate any future recolonisation.

6.2 General

- 6.2.1 Mitigation measures to maintain aquatic habitats in a favourable state are recommended as part of the mitigation for other ecological receptors potentially impacted by the proposed scheme. Many of these recommendations will also mitigate for impacts on suitable habitat for water voles, enabling water voles to recolonise the area should environmental conditions become suitable in the future. These mitigation measures are described in greater detail in Appendix 25.5 (Otter) and Appendix 25.9 (Freshwater Ecology) and are briefly summarised below:

Pollution and Other Indirect Impacts

- 6.2.2 During the construction phase, contractors must adhere to SEPA best practice guidelines with regards to preventing pollution incidents and protecting watercourses. Relevant guidelines include:
- PPG1: General Guide to the Prevention of Water Pollution;

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- PPG3: The Use and Design of Oil Separators;
- PPG5: Works In, Near, or Liable to Affect Waterbodies; and
- PPG6: Working at Construction and Demolition Sites.

6.2.3 This will necessitate the installation of drainage systems to divert runoff into drains, soakaways and detention basins, thus avoiding contamination of waterbodies. Chemical and oil storage tanks must be set back at least 10m from any watercourse and secondary containment must be provided to prevent pollution incidents from occurring. Disturbance to streambeds must generally be kept to a minimum to prevent erosion and siltation.

6.2.4 Where the proposed scheme crosses small watercourses, depressed invert box culverts designed to 0.5% AEP will be provided as these do not fill as rapidly as cylindrical culverts and can therefore be used by water voles. Culverts will be fitted with dry ledges that are accessible during high water levels (0.01 AEP). These mammal ledges will be made of solid concrete integral with the culvert and will be 500mm wide and be accessible both from the bank and the water by the provision of ramps or groups of large boulders. Ledges will be sited at least 150mm above the appropriate high flood level, allowing 600mm headroom. Where appropriate dense scrub will be planted on the banks to provide connectivity (see Appendix 25.9: Freshwater Ecology). The road drainage and treatment system will also aid in the prevention of pollution of waterbodies. Further details regarding pollution control during construction and operation can be found in Chapter 24 (Water Environment).

Habitat Fragmentation and Isolation

6.2.5 Connectivity of watercourses will be maintained to prevent fragmentation, isolation and severance of riparian habitats. Where necessary, links will be provided between severed stretches of watercourse through the provision of mammal ledges, over sized culverts and large span bridges to retain soft bank habitat, although it must be noted that culverts of excessive length are unlikely to be used by water voles.

Habitat Loss

6.2.6 Additional aquatic habitat will be created to offset habitat loss. Ponds designed to maximise their ecological value will be provided throughout the proposed scheme. The engineering of any new watercourses or realignment of watercourses will include meanders in order to create a more diverse flow pattern and more natural in-channel features. Uniform, straight sections will be avoided.

7 Residual Impacts

7.1.1 Given that survey found no water voles present in the study area, there are considered to be no residual impacts in relation to water voles.

7.1.2 However, mitigation measures designed to protect and maintain riparian and aquatic habitats recommended as part of the mitigation strategies for other riparian/aquatic ecological receptors (refer to Otter Report (Appendix A.10.6), Amphibian Report (Appendix A10.11), Freshwater Habitat Report (Appendix A5.16) and Water Shrew Report (Appendix A10.14)) will ensure that habitats with the potential for future water vole re-colonisation are maintained in a favourable ecological condition.

8 References

- Aars, J., Lambin, X., Denny, R. and Griffin, A. (2001) Water Vole in the Scottish Uplands: Distribution Patterns of Disturbed and Pristine Populations Ahead and Behind the American Mink Invasion Front. *Animal Conservation* 4, 187 – 194.
- Aars, J., Dallas, J.F, Piertney, B., Marshall, F., Gow, J.L, Telfer, S and Lambin, X. (2006) Widespread Geneflow and High Genetic Variability in Populations of Water Voles *Arvicola terrestris* in Patchy Habitats. *Molecular Ecology* 15, 1455 - 1466
- DEFRA, (2005). Fourth Quinquennial Review of Schedules 5 and 8 of the Wildlife and Countryside Act (1981), <http://www.defra.gov.uk/corporate/consult/wildlifeact-review58/consultation.pdf>
- Harris, S., Morris, P., Wray, S., and Yalden, D. (1995). A Review of British Mammals. JNCC, Peterborough.
- Highways Agency (2005). Design Manual for Roads and Bridges www.official-documents.co.uk/document/deps/ha/dmrb/index.htm
- Hill, D., Fasham, M., Tucker, G., Shewry, M. Shaw, P. (eds) (2005) Handbook of Biodiversity Methods- Survey, Evaluation and Monitoring, Cambridge University Press
- IEEM (2002) Draft Guidelines for Ecological Impact Assessment. Institute of Ecology and Environmental Management, UK.
- Jefferies, D.J. (2003). The Water Vole and Mink Survey of Britain 1996-1998 with a History of the Long-Term Changes in the Status of Both Species and their Causes. The Vincent Wildlife Trust, UK.
- JNCC (September 2002). Fourth Quinquennial Review of Schedules 5 and 8 of the Wildlife and Countryside Act (1981). Report and Recommendations from the Joint Nature Conservation Committee.
- Lambin, X., Telfer, S., Sah, S.A.M. (unpublished) Estimating Water Vole Population Size With Latrine Counts, Department of Zoology, University of Aberdeen.
- Morris, P.A, Morris, M.J, MacPherson, D., Jefferies, D.J, Strachan, R. and Woodroffe, G.L. (1998) Estimating Numbers of the Water Vole, *Arvicola terrestris* – a Correction to the Published Method. *Journal of Zoology*, 246: 61-62
- NES LBAP (2005). Water Vole Local Species Action Plan www.nesbiodiversity.org.uk/Water%20Vole_Web_Sep03.doc
- Ratcliffe, D.A. (1977). A Nature Conservation Review. Cambridge University Press, Cambridge.
- Raynor, R. (2002). Water Voles in the Highlands: a Myth or an Undiscovered Refuge? *British Wildlife* 13, pp. 255-257.
- SEPA (2004) Pollution Prevention Guidelines, www.sepa.org.uk/guidance/ppg/
- SNH (2003). News Releases: Positive Outlook for Mink Eradication Scheme www.snh.org.uk/pdfs/scottish/wisles/Minkfig.pdf

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Stewart, W. A., Dallas, J. F., and Piertney, S.B. (1999) Metapopulation Genetic Structure in the Water Vole, *Arvicola terrestris*, in NE Scotland, Biological Journal of the Linnean Society , 68: 159 - 171

Strachan, R. (1998). Water Vole Conservation Handbook. Environment Agency, English Nature, WildCRU. Oxford, UK.

Strachan and Jefferies (1993) The Water Vole *Arvicola terrestris* in Britain 1989 – 1990: its Distribution and Changing Status. – The Vincent and Wildlife Trust, London.

Telfer, S., Holt, A., Donaldson, R and Lambin, X. (2001) Metapopulation Processes and Persistence in Remnant Water Vole Populations. OIKOS 95: 31 – 42. Copenhagen

The Nature Conservation (Scotland) Act 2004.
<http://www.opsi.gov.uk/legislation/scotland/acts2004/20040006.htm>

UK BAP (1995) UK Water Vole Biodiversity Action Plan. JNCC, Peterborough. www.ukbap.org.uk

Woodroffe, G. (2000). The Water Vole. The Mammal Society, London.

WildCRU, Oxford University (2004) Water Vole Surveys in Fife and Central Cairngorms. SNH commissioned report No. 058