Appendix A10.8 – Water Vole

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Contents

1 Introduction

1.1 General Background

1.1.1 This Appendix reports the assessment of potential impacts on water vole populations in the vicinity of the Northern Leg of the proposed scheme, supporting Chapter 10 (Ecology and Nature Conservation).

1.1.2 To aid the interpretation of the assessment, the AWPR Northern Leg study area has been divided into five route sections as follows:

- Section NL1 ch314800 – 316000 (Derbeth to Tulloch Road);
- Section NL2 ch316000 – 317400 (SAC Craibstone);
- Section NL3 ch317400 – 322600 (A96 to Nether Kirkton);
- Section NL4 ch322600 – 325370 (Nether Kirkton to Corsehill); and
- Section NL5 ch325370 – 331000 (Corsehill to Blackdog).

1.1.3 Studies on water voles were included as part of the Ecological Impact Assessment (EcIA), and were undertaken in accordance with the Design Manual for Roads and Bridges (DMRB) Volumes 10 and 11 and the Environment Impact Assessment (Scotland) Regulations 1999. The three stages of EcIA have been modified to be directly applicable to the proposed scheme, and are based on matrices from an early draft version of IEEM guidance on EcIA (IEEM, 2002) and Transport Advisory Guidance (STAG and WEBTAG). The bulk of the assessment for the AWPR Northern Leg was undertaken before the 2006 issue of the IEEM guidelines. This assessment therefore follows the general approach described in the IEEM 2002 guidelines, with cognisance of the later 2006 guidelines.

1.1.4 These studies included desk-based consultation to collate existing information about water voles in the area potentially affected by the proposed scheme and field surveys to provide current data about the status of any water vole populations undertaken in 2004.

1.2 Aims

1.2.1 Water voles (*Arvicola terrestris*) are patchily distributed across the UK (Harris et al., 1995) and are known to be present in North East Scotland (Jefferies, 2003). The proposed scheme (and a defined area around the alignment – the 'route corridor') was surveyed to evaluate and mitigate for, its potential impacts upon any water vole populations present. The survey results were reviewed against the current design, and no further surveys were considered necessary to undertake this assessment.

1.2.2 The objectives of the study were to:

- determine the presence or absence of water voles and the location and size of any water vole populations occurring within the route corridor;
- evaluate landscape features specific to water vole (including presence/absence of mink);
- assess the potential impacts of the proposed scheme on any water vole populations present within the route corridor;
- identify appropriate measures to mitigate for predicted negative impacts to water vole populations within the route corridor; and
- assess residual impacts of the proposed scheme following mitigation.

1.3 Background

Biology

1.3.1 Water voles are the largest of the British voles. Most water vole populations are associated with waterbodies including rivers, ponds, land drains and marshland. They show a preference for permanent slow-flowing water bodies with densely vegetated banks where they feed upon the aerial stems and leaves of waterside plants. During the winter, roots, bark and rhizomes represent an important part of the water vole's diet. Water voles are usually found within 2m of the water's edge where they dig burrows into soft banks.

1.3.2 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).

1.3.3 Water voles are found throughout England, Wales and Scotland but are absent from Ireland. In the UK most 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).

1.3.4 The British water vole population has 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*). Research has shown that abundant mink populations can easily decimate water vole colonies through predation rendering areas of potentially suitable habitat un-inhabitable for water vole.

1.3.5 Two national surveys undertaken by the Vincent Wildlife Trust from 1989-1990 and 1996-1998 have highlighted a serious population decline in water vole 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).

Status

1.3.6 The water vole was afforded partial protection under the Wildlife and Countryside Act 1981 (as amended) (WCA) 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 WCA (1981). 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.

1.3.7 In January 2005 the Department for Environment, Food and Rural Affairs (DEFRA) released a consultation paper that recommended that water vole protection status is increased to full protection under Schedule 5 of the WCA. However, there is as yet no date for when these changes will be implemented. The changes will mean that, as for red squirrel (see Red Squirrel Report A10.7), 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.

1.3.8 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 (i.e. water vole) a material consideration in the assessment of development proposals.

1.3.9 Water vole has been identified for priority action by the Biodiversity Steering Group (United Kingdom Biodiversity Partnership 2005) and is subject to a national Species Action Plan. The species is additionally subject to a North East Scotland Local Biodiversity Action Plan.

2 Methods

2.1 Previous Survey Information

2.1.1 Sections of the River Dee and Don catchments were surveyed in 1990 and 1996 as part of the National Water Vole Survey (Jefferies 2003). In addition, the National Water Vole Survey examined the River Ythan catchment (approximately 15km north of the route corridor) and coastal burns in the Buchan area (approximately 15km north of the route corridor) for evidence of water vole occupation.

2.2 Survey Methods

2.2.1 The DMRB does not outline specific guidance for water vole survey techniques. Therefore the survey methodology adopted followed that described in the Water Vole Conservation Handbook (Strachan 1998).

2.2.2 All riparian zones, watercourses and standing waterbodies within 250m of the proposed alignment were surveyed for evidence of water vole occupation.

2.2.3 All waterbodies were identified from Ordnance Survey maps, aerial photographs and through a preliminary walk over survey. Survey locations are detailed in Table 1 – 5 and presented in Figures 10.8a-g.

2.2.4 All watercourses and ponds were surveyed from the channel/pond where possible to give the best view of bank habitat. This was possible for all waterbodies apart from some deeper sections of the River Don. The survey comprised searching for field signs as described in Strachan (1998) which included burrows, latrines, foot prints and feeding stations.

2.2.5 The habitat suitability of water bodies for water voles was assessed using landscape factors known to be conducive to supporting water vole colonies (Woodroffe, 2000; Strachan, 1998).

2.2.6 Habitat suitability criteria included the following:

- **flow rate of water courses** - water voles prefer static to moderate flowing waterbodies;
- **water depth** - water voles prefer waterbodies 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 or wooded banks provide little suitable feeding habitat; and
- **bank suitability** - water voles require areas of soft bank in which to excavate their burrows; overly rocky bank habitat is unsuitable.

2.2.7 Each suitable waterbody was assessed for each factor using a high, medium or low scale in order to determine the overall habitat suitability for water voles. Suitability of vegetation and bank were given greater weight when assessing the overall suitability of habitat than flow rate and flow depth. Therefore, where a watercourse offered all four landscape factors in a favourable state, i.e. slow flowing / static water of a depth of at least 0.3m, with moderate/good suitable vegetation and moderate/good bank suitability, these locations were assessed as being of 'good' suitability for water voles.

2.2.8 Where watercourses offered moderate / good vegetation and bank suitability with either suitable water depth or suitable flow rate, the location was assessed as being of moderate suitability.

2.2.9 Where watercourses offered moderate / good vegetation and bank suitability with neither suitable water depth nor suitable flow rate, the location was assessed as being of poor / moderate suitability.

2.2.10 Where a watercourse offered either poor vegetation or poor bank suitability, these locations were assessed as being of poor suitability for water voles regardless of other landscape factors.

2.2.11 Signs of mink were noted when encountered, which included footprints, scats and physical mink sightings and for each waterbody were assessed as being either present, likely to be present or unlikely to be present.

2.2.12 All surveys were undertaken during June and July 2004. This is an optimal time to carry out water vole surveys as it is during the water vole breeding season when latrine marking is at its most active and thus permits easy identification by field survey.

Table 1 – Water Vole Survey Locations: Section NL1

Site Number	Grid Reference	Name	Figure
1	NJ 865 090 – NJ 870 091	Kepplehill Burn	10.8a

Table 2 – Water Vole Survey Locations: Section NL2

Site Number	Grid Reference	Name	Figure
2	NJ 866 097 – NJ 875 103	Gough Burn	10.8b
3	NJ 867 109	Craibstone Pond	10.8b
4	NJ 862 111 – NJ 876 111	Green Burn	10.8b

Table 3 – Water Vole Survey Locations: Section NL3

Site Number	Grid Reference	Name	Figure
5	NJ 873 044 - NJ 859 134	Bogenjoss Burn	10.8c-10.8d

Table 4 – Water Vole Survey Locations: Section NL4

Site Number	Grid Reference	Name	Figure
6	NJ 877 152 – NJ 885 143	River Don	10.8e
7	NJ 888 148 - NJ 893 151	Goval Mill Lade Aqueduct	10.8e
8	NJ 894 154 - NJ 885 143	Goval Burn	10.8e

Table 5 – Water Vole Survey Locations: Section NL5

Site Number	Grid Reference	Name	Figure
9	NJ 923 153 - NJ 922 157	Red Moss Burn	10.8f
10	NJ 944 145 - NJ 957 138	Blackdog Burn	10.8g

2.3 Evaluation of Ecological Importance

2.3.1 The method for assessing the importance/value of an ecological receptor uses all information collated in determining the baseline status of the resource. The ecological evaluation of a receptor

is determined by reference to statutory and non-statutory site designations, the results of the consultations, literature review and field surveys. The evaluation method incorporates a geographical framework where ecological receptors are assessed according to a series of criteria that are presented in Table 6. These criteria are based on the Ratcliffe Criteria (Ratcliffe, 1977) used in the selection of biological Sites of Special Scientific Interest (SSSI) and include size (extent), naturalness, rarity, typicality, vulnerability and position in an ecological/ geographical unit.

2.3.2 The criteria used in the ecological evaluation process include reference to the legal protection conferred on species or habitats as well as the conservation status of the receptor, such as presence on national or local Biodiversity Action Plans. These factors give rise to a level of conservation importance being assigned to species/habitats that reflects the geographical framework used in the evaluation process. Thus, for example species such as otters and bats are protected by international legislation, are referred to as internationally important in terms of their conservation status. Other species such as wych Elm, which are identified as priority species in the NE Scotland BAP are referred to as regionally important species.

2.3.3 The ecological evaluation of a feature or area of habitat takes into account the level of conservation importance of the species, as well as other factors such as the level of use of the habitat or feature by a species, whether the species or habitat is locally or regionally common or rare, as well as other criteria that contribute to a feature's importance. In this way, the method of evaluation provides a system that combines legislative protection on species and/or habitats and conservation parameters that all contribute to the ecological importance of the receptor.

2.3.4 The ecological importance of the local water vole population was determined in terms of nature conservation value by reference to any designations and the results of the consultations, literature review and field surveys.

2.3.5 The importance of water vole habitats was based not only on the valuation of the species as a whole but also the evaluation of the habitats derived from the habitat assessment.

Table 6 – Evaluation of Ecological Receptors

Value/ Importance	Criteria
International (European)	Habitats An internationally designated site or candidate site (SPA, pSPA, SAC, cSAC, Ramsar site, Biogenetic/Biosphere Reserve, World Heritage Site) or an area which would meet the published selection criteria for designation. A viable area of a habitat type listed in Annex I of the Habitats Directive, or smaller areas of such habitat which are essential to maintain the viability of a larger whole. Any river classified as excellent A1 and likely to support a substantial salmonid population. Any river with a Habitat Modification Score indicating that it is Pristine or Semi-Natural or Obviously Modified. Species Any regularly occurring population of internationally important species, threatened or rare in the UK. i.e. a UK Red Data Book species categories 1& 2 of UK BAP) or of uncertain conservation status or of global conservation concern in the UK BAP. A regularly occurring, nationally significant population/number of an internationally important species.
National (Scottish)	Habitats A nationally designated site (SSSI, ASSI, NNR, Marine Nature Reserve) or a discrete area which would meet the published selection criteria for national designation (e.g. SSSI selection guidelines). A viable area of a priority habitat identified in the UK BAP, or of smaller areas of such habitat essential to maintain wider viability. Any river classified as excellent A1 and likely to support a substantial salmonid population. Any river with a Habitat Modification Score indicating that it is Pristine or Semi-Natural or Obviously Modified. Species A regularly occurring, regionally or county significant population/number of an internationally/nationally important species. Any regularly occurring population of a nationally important species which is threatened or rare in the region or county (see local BAP). A feature identified as of critical importance in the UK BAP.
Regional (North East Scotland)	Habitats Sites 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 habitat essential to maintain wider viability. Viable areas of key habitat identified as 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

Value/ Importance	Criteria
	population. Any river with a Habitat Modification Score indicating that it is significantly modified or above. Species Any regularly occurring, locally significant population of a species listed as being nationally scarce which occurs in 16-100 10 km squares in the UK or in a Regional BAP or relevant SNH Natural Heritage Future area on account of its regional rarity or localisation. A regularly occurring, locally significant population/number of a regionally important species. Sites maintaining populations of internationally/nationally important species that are not threatened or rare in the region or county.
Authority Area (e.g. County or District) Aberdeenshire / City of Aberdeen	Habitats Sites recognised by local authorities (e.g.) District Wildlife Sites (DWS) and Sites of Interest for Nature Conservation (SINS). County/District sites that the designating authority has determined meet the published ecological selection criteria for designation, including Local Nature Reserves (LNR). A viable area of habitat identified in County/District BAP or in the relevant SNH Natural Heritage Future area profile. A diverse and/or ecologically valuable hedgerow network. Semi-natural ancient woodland greater than 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. Species Any regularly occurring, locally significant population of a species listed in a County/District BAP due to regional rarity or localisation. A regularly occurring, locally significant population of a County/District important species. Sites supporting populations of internationally/nationally/regionally important species that are not threatened or rare in the region or county, and not integral to maintaining those populations. Sites/features scarce in the County/District or which appreciably enrich the County/ District habitat resource
Local (immediate area or local village importance)	Habitats Areas of habitat that appreciably enrich the local 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 within the local area are not considered for the above classifications. Semi-natural ancient woodland smaller than 0.25 ha. Any river classified as fair B or poor C and unlikely to support coarse fishery. Rivers with a Habitat Modification Score indicating that it is severely modified or above. Species Populations/assemblages of species that appreciable enrich the biodiversity resource within the local context. Sites supporting populations of county/district important species that are not threatened or rare in the region or county, and are not integral to maintaining those populations.
Less than Local (Limited ecological importance)	Sites that retain habitats and/or species of limited ecological importance due to their size, species composition or other factors. Any river classified as impoverished D and/or 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.

Impact Magnitude

2.4.2 Methods of impact prediction used included direct 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. The magnitude of each impact was assessed independently of its value or statutory status. Magnitude criteria are presented in Table 7.

Table 7 – Impact Magnitude

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 ecological receptor's integrity but the effect on the receptor 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 a species but not affect its 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.
Negligible	The change may slightly adversely affect the receptor but will have no permanent effect on the integrity of the receptor or its key attributes. There are no predicted measurable changes to the species assemblage or population and the effect is unlikely to result in an increased vulnerability of the receptor to future impacts.
Positive	The change is likely to benefit the ecological receptor, and/or enhance the biodiversity resource of the receptor.
High positive	The change is likely to restore an ecological receptor to favourable conservation status, contribute to meeting BAP objectives (local and national) and/or create a feature that is of recognisable value for biodiversity.

Impact Significance

2.4.3 The significance of impact has been determined according to the matrix system illustrated in Table 8. Impacts can be beneficial or adverse, either improving or decreasing the ecological status health or viability of a species, population or habitat.

Table 8 – Impact Significance

Magnitude Importance	High Negative	Medium Negative	Low Negative	Negligible	Positive	High Positive
International	Major	Major	Moderate	Negligible	Moderate	Major
National	Major	Major	Moderate	Negligible	Moderate	Major
Regional	Major	Moderate	Minor	Negligible	Minor	Moderate
Authority Area	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. In general, 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 Survey Limitations

2.5.1 The field surveys were carried out during June and July 2004 which is the optimal time of year to undertake a water vole survey, as latrine marking is at its peak and therefore the presence of water vole can easily be identified (Woodroffe, 2000).

2.5.2 The field surveys were conducted following periods of dry weather therefore ensuring that field signs such as latrines were not destroyed by high water levels.

3 Baseline

3.1 Data Search

3.1.1 No previous water vole surveys and known to have been carried out within the Northern Leg study area.

3.1.2 However in 2006, water vole surveys were undertaken by Jacobs as part of the AWPR Fastlink options appraisal. This survey recorded evidence of water voles at a fishing pond (Fishermyre pond) at National Grid Reference NO 861 903 and at other waterbodies nearby: Green Ditch (NO 874 901 - NO 869 903), and at Fishermyre Moss (NO 866 904). This water vole population lies approximately 18km south of the start of the Northern Leg.

3.1.3 The 1996 National Water Vole Survey (Jefferies, 2003) recorded remnant water vole populations at a few isolated locations on the Upper Dee catchment. These populations were recorded at Muir of Dess (approximately 20km from the route corridor), the upper Derry (approximately 85km from the route corridor) and the Water of Feugh (approximately 20km from the route corridor).

3.1.4 Sites on the Lower Don that were found to be positive for water voles during the 1990 National Water Vole Survey (Jefferies, 2003) were found to be negative in 1996 with no new sites identified. Mink were recorded throughout both the Dee and Don catchments during the 1996 survey. Other notable water vole colonies in other river catchments identified in the National Water Vole Survey in proximity to the study sites include scattered, declining colonies around the lowland farmland of Buchan (approximately 15km north of the route corridor); several populations in narrow burns flowing directly to the sea along the Buchan coastline (approximately 15km north of the route corridor) and clusters of water voles surviving in the headwaters of tributaries of the River Ythan (approximately 25km north of the route corridor) (NES LBAP 2005).

3.2 Survey Results

3.2.1 No evidence of water vole field signs was found throughout Sections NL1-NL5 of the proposed scheme. However, good water vole habitat was recorded on the River Don and along stretches of Blackdog Burn (see Table 9).

3.2.2 Evidence of mink was around along the length of the River Don and along the length of Goval Burn.

Table 9 – Water Vole Habitat Assessment: Section NL1

Waterbody	Water Width (m)	Water Depth (m)	Flow	Bank Vegetation Suitability for Water Voles	Suitability of Banks for Water Voles	Mink Present	Suitability for Water Voles
Kepplehill Burn	1	0 - 0.10	Slow	Poor	Poor	Unknown	Poor

Table 10 – Water Vole Habitat Assessment: Section NL2

Waterbody	Water Width (m)	Water Depth (m)	Flow	Bank Vegetation Suitability for Water Voles	Suitability of Banks for Water Voles	Mink Present	Suitability for Water Voles
Gough Burn	1.5	0.05	Fast	Poor	Poor	Presence likely	Poor
Burn at Craibstone College	1.5	0.50	Fast	Poor	Poor	Presence likely	Poor
Pond at Craibstone College	N/A	1	Static	Moderate	Moderate	Presence likely	Moderate
Green Burn	2	0.10	Fast	Poor	Poor	Presence likely	Poor

Table 11 – Water Vole Habitat Assessment: Section NL3

Waterbody	Water Width (m)	Water Depth (m)	Flow	Bank Vegetation Suitability for Water Voles	Suitability of Banks for Water Voles	Mink Present	Suitability for Water Voles
Bogenjoss Burn mid-site (NJ 8595914269)	1	0.40	Moderate	Poor	Poor	Presence likely	Poor
Bogenjoss Burn mid-site (NJ 8589213360)	0.75	0.10	Fast	Poor	Poor	Presence likely	Poor
Bogenjoss Burn mid-site (NJ 8595914269)	1	0.40	Moderate	Poor	Poor	Presence likely	Poor
Bogenjoss Burn mid-site (NJ 8589213360)	0.75	0.10	Fast	Poor	Poor	Presence likely	Poor

Table 12 – Water Vole Habitat Assessment: Section NL4

Waterbody	Water Width (m)	Water Depth (m)	Flow	Bank Vegetation Suitability for Water Voles	Suitability of Banks for Water Voles	Mink Present	Suitability for Water Voles
River Don	22	0.30	Slow	Good	Good	Present	Good
Goval Burn	3	0.30	Medium	Good	Good	Present	Moderate

Table 13 – Water Vole Habitat Assessment: Section NL5

Waterbody	Water Width (m)	Water Depth (m)	Flow	Bank Vegetation Suitability for Water Voles	Suitability of Banks for Water Voles	Mink Present	Suitability for Water Voles
Red Moss Burn and Field Ditch System	1.5	No data	Fast	Poor	Poor	Presence likely	Poor
Black Dog Burn	1	0.15-0.5	Slow-Fast	Good	Good	Presence likely	Moderate/good

3.3 Survey Results Summary

3.3.1 No evidence of water voles was found throughout the Northern Leg despite suitable and good quality water vole habitat being identified. Evidence of mink and reports of mink were gathered, and it is considered likely that they are present throughout the study area.

4 Evaluation

4.1 Sections NL1-NL5

Potential Water Vole Habitats

4.1.1 Due to their national decline, water vole is a species of national conservation concern. West Brimmondside Pond (Section NL1), Craibstone Pond (Section NL2), River Don, Goval Burn (Section NL4) and Blackdog Burn (Section NL5) were all identified as being suitable for water vole, however no water vole were found in the study area despite these areas of suitable habitat being present. This has been attributed to predation by mink in the Aberdeenshire area; water voles have been previously recorded (consultation results and ongoing surveys) and there is therefore the potential for water vole to re-colonise any suitable habitat present. On this basis, moderate or good potential water vole habitat are assessed as being of local ecological importance and sites with poor habitat are assessed of being of no ecological importance for water vole.

5 Potential Impacts

5.1.1 An assessment in terms of potential impacts to water vole populations is not required as the field surveys did not record the presence of water voles in the study area.

6 Mitigation

Generic Measures

6.1.1 Although no water voles were recorded, generic mitigation is proposed for the potential presence of water voles due to habitat suitability. Water vole mitigation measures are generally aimed at maintaining populations, especially breeding populations, minimise disturbance; maintain access to their present habitats and to allow existing populations to expand and colonise new areas by:

- demarcation of areas where water vole activity is recorded within 50m of any construction activities during the construction period.
- restricting construction activities within 30m of water vole burrow sites or watercourses to reduce disturbance;

- the incorporation of bridges and box culverts (with mammal ledges) on every watercourse crossing to reduce risk of RTAs and reduce habitat fragmentation. However, given the length of some of the culvert crossings) it is likely that such crossing points would only be used infrequently by any water voles. Despite this culverts will reduce the impacts of habitat fragmentation with the aim that enough water voles would be able to traverse the road to permit the colonisation of new areas.

- areas will be marked off to prevent disturbance to the riparian zone (to 3m from the bank) during the construction period.
- enhancement of existing riparian habitat through fencing-off sections of riverbank (to encourage scrub growth), and the provision of wetland habitats, ox-bows and new stream alignments to compensate for habitat loss; and
- the use of Sustainable Urban Drainage Systems (SUDS) to prevent pollution incidents.

Water Vole Habitat

6.1.2 Given that suitable water vole habitat was recorded by the water vole habitat assessment within the route corridor and there remains the possibility that water voles could potentially re-colonise the area, it is recommended that existing habitats be maintained and enhanced in order to facilitate any potential future re-colonisation. Mitigation measures designed to maintain riparian and aquatic habitats in favourable ecological state recommended as part of the mitigation strategies for other riparian / aquatic ecological receptors (for example, otter) impacted by the proposed scheme will achieve the above target.

6.1.3 Measures that will indirectly mitigate for the loss, severance and/or pollution of water vole habitat during construction and operation of the proposed scheme are described in greater detail in the Otter Report (Appendix A.10.6), Amphibian Report (Appendix A10.11), Freshwater Habitat Report (Appendix A5.16), Water Shrew Report (Appendix A10.14) and in the Terrestrial Habitats Report (Appendix A10.1).

6.1.4 A brief summary of the proposed mitigation measures is outlined below:

- additional aquatic habitat will be created to offset habitat loss;.riparian planting incorporating wetland habitats will be provided where appropriate, designed to maximise their ecological value (refer to Figures 11.5 a-p). In addition where sections of watercourses require realigning this will be done in an environmentally sensitive manner, through the inclusion of meanders, soft banks, a natural substrate and emergent vegetation in the realignment design;
- 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; and
- maintenance of water quality will be achieved by the appropriate storage of materials, the choice of low impact locations for site compounds, disposal of site wastes and the development of effective drainage systems including features to divert runoff into drains, soak-aways and balancing ponds thus avoiding contamination of watercourses. Disturbance to stream and riverbeds will be kept to a minimum so as to prevent erosion and siltation.

7 Residual Impacts

Water Vole Habitat

7.1.1 Mitigation measures designed to maintain riparian and aquatic habitats in favourable ecological state recommended as part of the mitigation strategies for other riparian / aquatic ecological receptors will ensure that habitats of potential for future water vole re-colonisation are maintained in

favourable ecological condition and as such the residual impact is assessed to be of Negligible significance.

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