Altcar Moss Wellsite

Water Vole Survey Report

Compiled by Ecology Services Ltd.

on behalf of

Aurora Energy Resources Limited

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1.0 Introduction

1.1 Ecology Services Limited was commissioned by Aurora Energy Resources Limited in May 2018, to carry out a water vole (*Arvicola amphibious*) presence/absence survey of drainage and irrigation ditches on land located immediately north west of Sutton's Lane, Great Altcar, Lancashire; National Grid Reference; (NGR) 332670, 407523.

1.2 The ditches were all identified as containing habitat that was suitable to support water vole during a Preliminary Ecological Appraisal, which was conducted in April 2018. Water vole surveys were also undertaken in the area in 2017. See Drawing 1 showing the extent of the survey area.

1.3 The Applicant is proposing to construct a wellsite and access track, of approximately 1.72ha in area within which it will drill and core a vertical borehole, followed by the drilling of a second borehole, with a horizontal section approximately 1,500m in length. Both boreholes will then undergo hydraulic fracture stimulation. Both boreholes will then be separately flow tested and, subject to the results obtained, the horizontal borehole may then undergo an extended well test (up to 90 days). Gas produced will be incinerated on the application site in an enclosed ground flare. In the event that the exploratory works are unsuccessful, both boreholes will be decommissioned and the site restored. The application site comprises both the access track and the wellsite and is the area of land within which the proposed development will take place.

1.4 The aims of the water vole survey were to:

- Undertake presence and absence surveys of the affected watercourses and ditches to identify evidence of water vole;
- Record and map signs of water vole and other small mammals.

1.5 The water vole presence/absence surveys were undertaken between May 2018 and July 2018.

1.6 All survey works were undertaken by experienced Ecologists, during suitable weather conditions and at an appropriate time of year. Health and safety is essential when working near water and surveyors worked in pairs, complete with buoyancy jackets, where appropriate.

2.0 Regulatory & Planning Framework

Legal Protection & Licensing

2.1 In England and Wales water voles are listed on Schedule 5 of the Wildlife and Countryside Act 1981, receiving full protection since 2008. The Wildlife and Countryside Act 1981, together with amending legislation, lists the following as offences:

- Intentionally killing, taking or injuring a water vole (Section 9(1));
- Possessing or controlling any live or dead water vole, or any part or derivative (Section 9(2));
- Intentionally or recklessly damaging or destroying a water vole's place of shelter or protection (Section 9(4)(a));
- Intentionally or recklessly disturbing a water vole whilst it is occupying a structure or place which it uses for shelter or protection (Section 9 (4)(b));

- Intentionally or recklessly obstruction access a water vole's place of shelter or protection (Section 9(4)(c)); and
- Selling, offering for sale, or possessing or transporting for the purposes of sale, any live or dead water vole, or any part or derivative, or advertising any of these for buying or selling (Section 9(5).

2.2 It is generally agreed that a place of shelter or protection used by water voles includes a network of burrows and/or any nests that have been constructed within the burrow system or above ground amongst dense vegetation.

2.3 Legal protection requires that due attention is paid to the presence of water vole and appropriate actions are taken to avoid committing offences.

2.4 In England licences are available from Natural England to permit activities that would otherwise be an offence including:

- For intentional disturbance and damage or destruction of water vole burrows by means of "displacement";
- For internal drainage boards to intentionally displace water voles for work on flood defences, water courses or drainage systems;
- For scientific or educational purposes;
- For the purpose of ringing or marking;
- For conserving wild animals or introducing them to particular areas;
- For preserving public health or public safety;
- For preventing the spread of disease; and
- Preventing serious damage to any form of property or to fisheries.

2.5 There is no provision under the Wildlife & Countryside Act 1981 (as amended) for licensing what would otherwise be offences for the purpose of maintenance or land management.

2.6 Prior to February 2016 if it could be demonstrated that any action that would otherwise have been an offence was the "incidental result" of a lawful operation and could not reasonably have been avoided, this would have constituted as a defence against prosecution under the Wildlife & Countryside Act 1981 (as amended). However Natural England has reviewed their position on this and now believes that displacement activities (excluding justifiable mowing) are no longer covered by the "incidental result" defence. Therefore, any displacement activities now require a licence.

2.7 In England, displacement activities can be carried out under a Class Licence by a registered person provided that they conform to the licence conditions which include:

- Only to be used for displacement over a continuous length of bank not exceeding 50m (for water courses this equates to 50m on each bank);
- Only to be used during the period of 15th February to 15th April inclusive (with some exceptions as detailed in Appendix 1 of The Water Vole Mitigation Handbook);
- Planning consent must be granted for schemes that require such consent;
- The Class Licence can only be relied upon if there is no alternative i.e. when alternative measures that do not require a licence have been considered and proved to be either impractical or impossible;

- A report of action taken under this licence provided to Natural England.

2.8 In certain circumstances where displacement activities do not conform to the conditions set out in the Class Licence, such as weather conditions, activities will need to be carried out under a Site-specific licence.

2.9 In England and Wales, a licence to displace water vole, be it a Class Licence or a Site-specific Licence will be issued for the purpose of conservation. The proposed development will therefore need to deliver a conservation benefit for water vole.

2.10 Legal protection for water voles in Scotland differs to that of England and Wales.

Biodiversity Duty

2.11 The Natural Environment and Rural Communities (NERC) Act 2006 imposes a duty on all public bodies, including the Local Planning Authority (LPA) and statutory bodies in exercising their functions "to have due regard, so far as is consistent with proper exercise of those functions, to the purpose of conserving biodiversity" which includes 'restoring or enhancing a population or habitat'. The NERC lists UK Species of Principal Importance that are capable of being a material consideration in the making of planning decisions. Water vole is a UK Species of Principal Importance.

Planning Policy

2.12 Under National Planning Policy Framework (NPPF 2019) the presence of any Protected Species is a material planning consideration. The National Planning Policy Framework, states that the planning system should contribute to and enhance natural environments by "minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures". The NPPF advises that the planning system should plan for biodiversity at a landscape-scale across local authority boundaries. It states that the Government's planning objectives are to 'promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity'.

2.13 The Government Circular on Biodiversity and Geodiversity (06/2005) provides clarification on the essential need to determine presence or likely absence of a protected species, together with the likely impacts of proposed development on that species, before planning permission is granted. Circular 06/2005, although intended as guidance on Planning Policy Statement 9 (now replaced by the NPPF), has been retained as part of the guidance literature of the NPPF.

2.14 Planning conditions can be implemented to protect, and where possible, improve water vole habitat when a proposed development is granted in such areas. Unless material considerations indicate otherwise, planning law requires that planning applications must be determined in accordance with the provisions of the relevant development plan.

3.0 Methodology

Desktop Study

3.1 The desktop study involves contacting Local Record Centres for historic records of water vole. The Water Vole Mitigation Handbook 2016, requires certain types of works to be subject to a desktop study, in conjunction with a presence/or likely absence survey.

3.2 Water vole surveys were undertaken following standard guidance within *The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series) (Dean et al., 2016).*

Water Vole Presence or Likely Absence Methodology

3.3 The survey followed standard best practice methodology and involved walking along the top of the bank/wading in the channel to the required distance up stream to identify the presence of water voles. Undertaking the survey up stream wherever possible, ensures that disturbance of any water vole field signs is limited.

3.4 Water vole field signs searched for include; feeding remains, burrows, plugs, latrines, sightings, runs in vegetation and footprints. The presence of water vole droppings is the only field sign that can be used reliably on its own to confirm presence of water vole. Field signs of water voles are described in the *Water Vole Conservation Handbook (Strachan et al., 2011).*

3.5 It is important to note that water vole field signs must be interpreted carefully in order to distinguish differences in habitat use, ranging from inhabiting and foraging to excursion activities. The age of individual field signs and specific combinations in which they are found are also fundamentally important in determining the current use of a particular habitat.

3.6 All suitable areas of the water courses within the study area were closely inspected for signs such as those described above.

3.7 The age of individual field signs and specific combinations in which they are found are also fundamentally important in determining the current use of particular habitats.

3.8 A description of the physical features of the water courses were also recorded, including bank profile, depth, width and riparian habitats.

Survey Design

3.9 The type of proposed development works determines the baseline survey data required to prove presence or likely absence of water vole.

3.10 The 2018 survey area included the proposed crossing areas and up to 200m up and downstream within the catchment and connecting tributaries. Additional areas of watercourse were surveyed in order to scope out areas for potential mitigation. The 2018 survey area is shown on Drawing 1.

3.11 The scope of the survey changed between 2017 and 2018 as the proposed development was revised to reduce impacts to water voles and their habitat, therefore there are differences in the survey areas between 2017 and 2018.

3.12 For ease of surveying and reporting all ditches were amalgamated and broken down into 50m or 100m sections (refer to Drawing 1).

3.13 The water vole survey was designed taking into account potential impacted habitat and The Water Vole Mitigation Handbook 2016, see Appendix 1 for full details.

Timing of Survey

3.14 Two survey visits are required to be undertaken over the course of the water vole breeding season (April to September). This is due to changes in habitat suitability over this period of time. One visit should be undertaken in the first half of the season (mid-April[3] to the end of

June) and one in the second half of the season (July to September inclusive). These visits should be at least two months apart.

3.15 There may be some cases where a second survey visit may not be required such as; water vole presence was not confirmed during the first survey visit and the habitat is considered to be of very low suitability for water vole and the likelihood of water vole being present in the surrounding area, up to 2km or less where a significant dispersal barrier is present, is considered also to be very low. Further details can be found in Appendix 2.

3.16 The first water vole survey visits were undertaken between the 22nd and 25th May 2018. The second water vole survey visits were undertaken between the 23rd and 26th July 2018. Surveys were undertaken at least two months apart.

Weather Conditions

3.17 Weather conditions prior to and on the day of the water vole surveys were considered suitable; the surveys were completed during periods of dry conditions and it was dry on the actual days of the surveys.

Constraints

3.18 From previous surveys it is known that the ditches can contain deep water, deep mud and dense vegetation and scrub, making it difficult to access and survey thoroughly. To compensate for this, 60cm x 30cm 'latrine' rafts were placed within the ditch channel at 50m intervals (and 10m intervals in the impact areas) during the first round of surveys and collected during the second round of surveys.

3.19 The 2018 survey season has been unusually dry with very little rainfall. On the second survey round, the majority of the ditches were dry and contained dense terrestrial vegetation, however, surveyors were able to access the ditches at intervals.

Personnel

3.20 All survey works were undertaken by experienced Consultant Ecologists. The surveyors worked in pairs for health and safety reasons.

4.0 Survey Results

Desktop Study Results

4.1 A desktop study was undertaken as part of the Extended Phase 1 Habitat survey in 2018 and found 41 records of water vole within 2km of the application site, five of these records were from 2000 onwards.

Habitat Description

4.2 Descriptions of the watercourses and ditches subject to survey are provided in Table 1 below (refer to Drawing 1 for exact locations).

Table 1: Habitat Descriptions

Ditch: 1 (Section 5-6)

Habitat Description	
Bank profile	*Steep 2m banks. Channel approx. 1m width*
Bank substrate	*Soft earth*
Water depth	*Up to 0.3m on first survey round. Dry on second survey round.*

Water fluctuations?	*Yes*
Shading	*Little to no shading during first survey, however total coverage on second survey round.*
Bankside veg.	*Grassland, bramble and tall ruderal.*
In-channel veg.	*Duckweed sp. Dense terrestrial vegetation on second survey round.*
Management	*No evidence of bank side management. Culverts present at road crossings.*
Constraints?	*Dense terrestrial vegetation within the channel. Ditch dry on second survey round.*
Suitability for WV?	**YES**

Ditch: 2 (Section 7-8 & 14)

Habitat Description	
Bank profile	*Steep 2m banks. Channel approx. 1m width*
Bank substrate	*Soft earth*
Water depth	*<0.25m on the first survey round. Dry on the second survey round.*
Water fluctuations?	*Yes*
Shading	*Little shading during first survey however total coverage on second survey round.*
Bankside veg.	*Grassland, bramble and tall ruderal.*
In-channel veg.	*Yellow flag. Dense terrestrial vegetation on second survey round.*
Management	*No evidence of bank side management. Culvert present at road crossing.*
Constraints?	*Dense terrestrial vegetation within the channel. Ditch dry on second survey round.*
Suitability for WV?	**YES**

Ditch: 3 (Section 9-13)

Habitat Description	
Bank profile	*Steep 2m banks. Channel approx. 0.5m width.*
Bank substrate	*Soft earth*
Water depth	*Up to 0.1m on first survey round. Dry on second survey round.*
Water fluctuations?	*Yes*
Shading	*Little to no shading during first survey, however total coverage on second survey round.*
Bankside veg.	*Grassland, bramble and tall ruderal.*
In-channel veg.	*Reed canary-grass and yellow flag. Dense terrestrial vegetation on second survey round.*
Management	*No evidence of bank side management. Culverts present at bridge crossings.*
Constraints?	*Dense terrestrial vegetation within the channel. Ditch dry on second survey round.*
Suitability for WV?	**YES**

Ditch: 4 (Section 14)

Habitat Description	
Bank profile	*Steep 3m banks. Channel approx. 1m width.*
Bank substrate	*Soft earth*
Water depth	*<0.20m on first survey round. Dry on second survey round.*
Water fluctuations?	*Yes*
Shading	*Little shading during first survey however total coverage on second survey round.*
Bankside veg.	*Grassland, bramble and tall ruderal.*
In-channel veg.	*Duckweed sp. Dense terrestrial vegetation on second survey round*

Management	*No evidence of bank side management. Culverted at road crossing.*
Constraints?	*Dense terrestrial vegetation within the channel. Ditch dry on second survey round.*
Suitability for WV?	**YES**

Ditch: 5 (Section 15)

Habitat Description	
Bank profile	*Steep 2m banks. Channel approx. 2m width.*
Bank substrate	*Soft earth. Evidence of slumping.*
Water depth	*0.5m*
Water fluctuations?	*No*
Shading	*Little shading during first survey, however total coverage on second survey round.*
Bankside veg.	*Grassland, bramble and tall ruderal.*
In-channel veg.	*Reed canary-grass, greater reedmace and yellow flag.*
Management	*No evidence of bank side management. Evidence of engineered banks. Culverted at road crossing.*
Constraints?	*Water level was too deep- for health and safety, survey was undertaken from the banks.*
Suitability for WV?	**YES**

Ditch: 6 (Section 14)

Habitat Description	
Bank profile	*Steep 2m banks. Channel approx. 1m width.*
Bank substrate	*Soft earth*
Water depth	*<0.1m on first survey round. Dry on second survey round.*
Water fluctuations?	*Yes*
Shading	*Little shading during first survey however total coverage on second survey round.*
Bankside veg.	*Grassland, bramble and tall ruderal.*
In-channel veg.	*Terrestrial vegetation-grass. Dense on second survey round.*
Management	*No evidence of bank side management.*
Constraints?	*Dense terrestrial vegetation within the channel. Ditch dry on second survey round.*
Suitability for WV?	**YES**

Ditch: 7 (Section 1-4)

Habitat Description	
Bank profile	*Steep 2m banks. Channel approx. 1m width.*
Bank substrate	*Soft earth*
Water depth	*<0.05m water, deep mud on both survey rounds.*
Water fluctuations?	*Yes*
Shading	*Parts of the ditch has tree and scrub shading throughout the year.*
Bankside veg.	*Grassland, bramble and tall ruderal.*
In-channel veg.	*Greater reedmace and duckweed sp. Terrestrial vegetation including; scrub and tall ruderal.*
Management	*No evidence of bankside management. Culvert present at road crossing.*
Constraints?	*Dense terrestrial vegetation and scrub within the channel. Deep mud.*
Suitability for WV?	**YES**

Water Vole Presence or Likely Absence

4.3 The results of the water vole presence or likely absence survey are presented in Table 2 below (refer to Drawings 2 for detailed maps).

Table 2: Water Vole Survey Results (Round 1)

Ditch:	Date:	Results (Positive/Negative for WV)*	Section	Notes
1	22.05.18	Negative	5-6	Suitable habitat within catchment
2	22.05.18	**Positive**	7-8	Suitable habitat within catchment
3	22.05.18	**Positive**	9-13	Suitable habitat within catchment
4	22.05.18	Negative	14	Suitable habitat within catchment
5	22.05.18	**Positive**	15	Suitable habitat within catchment
6	23.05.18	Negative	14	Suitable habitat within catchment
7	24.05.18	**Positive**	1-4	Suitable habitat within catchment

Table 2 (cont.): Water Vole Survey Results (Round 2)

Ditch:	Date:	Results (Positive/Negative for WV)*	Section	Notes
1	23.07.18	Negative	5-6	Suitable habitat within catchment
2	23.07.18	Negative	7-8	Potentially suitable habitat.
3	23.07.18	Negative	9-13	Potentially suitable habitat.
4	23.07.18	Negative	14	Potentially suitable habitat.
5	23.07.18	**Positive**	15	Potentially suitable habitat.
6	24.07.18	Negative	14	Potentially suitable habitat.
7	25.07.18	Negative	1-4	Potentially suitable habitat.

**Positive identification of water vole within catchment in the form of latrines and droppings. Evidence such as burrows and feeding remains may be closer than the measurement given, but are not conclusive of water vole presence alone. Please refer to results maps for further information.*

'Latrine' Rafts

4.4 'Latrine' rafts were deployed at 50m intervals (and 10m intervals in the impact areas) across the 2018 survey area. Water vole latrines were found on the rafts placed in ditch 5 (section 15). No evidence of water vole was found on the rafts in any other ditches within the survey area.

Population Density

4.5 It is not possible to calculate the number of individual water voles from the number of latrine counts. However, the number of latrines indicates a level of water vole activity at the application site suitable to be used to assess the impacts of the proposed development and design appropriate mitigation.

4.6 The number of latrines present will give an indication of the relative water vole population size. The number and location of latrines will also identify areas of the application site most valuable for water vole. The survey area can then be divided into three categories that support water voles at a "high", "medium" or "low" density.

4.7 Relative water vole population density is calculated by counting the number of latrines per 100m of bankside habitat during the first and second survey.

4.8 Table 3 below shows the Relative Population Density of Water Vole taken from The Water Vole Mitigation Handbook 2016 (page 16).

Table 3: Relative Population Density of Water Vole

Relative Population Density	First half of Survey season (mid-April - June)*	Second half of Survey season (July - September)*
High	10 or more	20 or more
Medium	3 to 9	6 to 19
Low	Less than 2 or none, but with other confirmatory field signs	Less than 5 or none, but with other confirmatory field signs

**Approximate number of latrines per 100m of bankside habitat*

4.9 Based on the results of the field survey and after reviewing Table 3, the Relative Population Density of water vole within the catchment are presented in Table 4 below. Where there are variations of relative population sizes along a watercourse, all results have been added. For ease of reporting each 100m section has been assessed individually.

Table 4: Relative Population Density of Water Vole based on Survey Results

	Relative Population Density and Likely Absence Results	
Section	Survey 1	Survey 2
1	No signs recorded.	No signs recorded (likely absence).
2	**One latrine Low population.** Burrows recorded.	No signs recorded. Burrows recorded.
3	**One area of droppings recorded (not conclusive of territorial latrine) Low population.** Burrows recorded.	No signs recorded. Burrows recorded.
4	Indicative water vole feeding in conjunction with burrows.	No signs recorded. Burrows recorded.
5	Indicative water vole feeding in conjunction with burrows.	No signs recorded. Burrows recorded.
6	Indicative water vole feeding in conjunction with burrows.	No signs recorded. Burrows recorded.
7	Indicative water vole feeding in conjunction with burrows.	No signs recorded. Burrows recorded.
8	**One area of droppings recorded (not conclusive of territorial latrine) Low population.** Burrows recorded.	No signs recorded. Burrows recorded.
9	**One area of droppings recorded (not conclusive of territorial latrine) Low population.** Burrows recorded.	No signs recorded. Burrows recorded.
10	**One area of droppings recorded (not conclusive of territorial**	No signs recorded. Burrows recorded.

	latrine) Low population. Burrows recorded.	
11	**Two areas of droppings recorded (not conclusive of territorial latrine) Low population.** Burrows recorded.	No signs recorded. Burrows recorded.
12	**One area of droppings (not conclusive of territorial latrine) Low population.** Burrows recorded.	No signs recorded. Burrows recorded.
13	**One area of droppings (not conclusive of territorial latrine). Low population.** Burrows recorded.	No signs recorded. Burrows recorded.
14	No signs recorded. Burrows recorded.	No signs recorded (likely absence). Burrows recorded.
15	**2 latrines and numerous droppings. Low population.** Burrows recorded.	**2 latrines. Low population.** Burrows recorded.

**Positive identification of water vole within catchment can only be determined form of latrines and droppings. Evidence such as suitably sized burrows and/or feeding remains, without latrines or droppings, cannot conclusively indicate water vole presence alone, but it is important to record this information, as populations of water vole can expand and contract over very short periods. Please refer to results maps for further information.*

4.10 Refer to Survey Results Drawings showing field signs and positive identification of water vole within the catchment area of each impacted ditch.

4.11 The 2017 survey areas/sections differ to the 2018 survey areas/sections, where sections are the same, the peak results are presented below for both 2017 and 2018 for comparison.

Table 5: Peak Population Results 2017 and 2018

Section (2018 ref no.)	2017	2018
1	Not surveyed	No signs recorded (likely absence).
2	Not surveyed	**Low population**
3	Not surveyed	**Low population**
4	Not surveyed	Indicative water vole feeding in conjunction with burrows.
5	No droppings/latrines recorded.	No signs recorded. Burrows recorded.
6	No droppings/latrines recorded.	No signs recorded. Burrows recorded.
7	**Low population**	Indicative water vole feeding in conjunction with burrows.
8	**Low population**	**Low population**
9	**Medium/High population**	**Low population**
10	**Medium population**	**Low population**
11	Not surveyed	**Low population**
12	Not surveyed	**Low population**
13	Not surveyed	**Low population**
14	**Medium population**	No signs recorded. Burrows recorded.
15	**High population**	**Low population**

4.12 The 2017 surveys found low, medium and high populations of water vole across all ditches. The surveys were undertaken at a peak time of year and are indicative of a breeding population. There was a significant decline in the population between the first and second round of surveys in some ditches. It was not known as to the cause of the decline but it could be attributed to three factors; predation (mink), flood event or ditch maintenance. Ditch clearance may have attributed to the decline in Section 16, however no physical indication was forthcoming for the dramatic drop in activity at Section 17 giving rise to the theory that mink could be the main cause. Note sections 16 and 17 is Ditch 5 (Section 15) in the 2018 survey.

4.13 The 2018 surveys found low populations of water vole in sections 2, 3, 8-13 and 15 on round 1 of the surveys, however the numbers were indicative of commuting behavior (typically males), with the exception of Ditch 5 (Section 15). Round 2 of the surveys showed a significant decline in the population and presence of a low population of water vole was confirmed in Ditch 5 (Section 15) only. It is not known as to the cause of the decline in population found during the 2018 survey. It is speculated that this decline could be attributed to the unseasonably dry weather between May and July 2018, as Ditch 5 (Section 15) was the only ditch to be found holding water, all other ditches were dry. Water vole generally require water as one of three habitat 'preferences' (along with herbaceous vegetation and dry areas above water level for nesting). It is thought that the populations may have retracted to ditches still containing water, outside of the survey area. There was no evidence of other speculative factors of population decline such as; ditch maintenance works or of predation (mink).

4.14 Feeding remains indicative of water vole and burrows of a size and shape for water voles were found throughout the survey area on both the 2017 and 2018 surveys. This evidence cannot be used reliably on its own, however, these signs in conjunction with others (droppings and latrines) are highly suggestive of water vole presence and are mapped accordingly.

Mink Raft Results

4.15 Mink are known to be very active within the West Lancashire lowland plains and can decimate whole colonies within a short space of time.

4.16 Following the Game and Wildlife Conservation Trust (GWCT) guidelines, mink rafts were sited at the two proposed crossing points (impact zones) in Sections 4 and 9 of the 2018 survey area to detect the presence of this species. No evidence of mink was found at either of the locations.

5.0 Conclusion & Recommendations

5.1 The development includes the construction of a new temporary access road, which will be constructed within arable land to the west of Suttons Lane. The temporary access track will be located over 5m away from unaffected ditches.

5.2 Two existing ditch crossings need to be extended in order to construct the access road, the existing culverts will be replaced. The existing culvert into the field off Sutton's Lane that links the adjacent ditch, is circular in shape, this is blocked with a 100/150mm unblocked gap at the top, the current culvert length is 5.7m. The culvert running under Broad Lane is rectangular with good height and visibility through, it is partially collapsed. There is a third culvert under Sutton's Lane that was totally blocked by sediment and debris, the shape of the culvert could not be determined. To facilitate access off Sutton's Lane a T shaped box

culvert 1.1m high, with a mammal ledge will be installed. The base of the culvert shall be installed below the average water level (300mm) with 650mm of headroom. The total length of the T shaped culvert is up to 18m. The culvert extensions will result in the permanent loss of approximately 10m of ditch, however, the culvert design will be a significant improvement on the existing and will strengthen linkages within the ditch systems.

The ditch crossing close to the pylon, also utilises an existing ditch crossing. The culvert here is circular in shape and partially blocked with 300mm unblocked gap at the top, the current culvert length 3.4m and there is visibility through the culvert. The culvert will be extended to permit access across the ditch. The new culvert will be a box shaped culvert 1.1m high, with an incorporated mammal ledge. The base of the culvert shall be installed below the average water level (300mm) with a 650mm headroom. The total length of the culvert will be 15m. This will result in the permanent loss of approximately 11.6m of ditch, however, the culvert design will be a significant improvement on the existing and will strengthen linkages within the ditch systems.

5.3 The total loss of ditch habitat at the crossing points is 21.6m, however, the culvert design will be a significant improvement on the existing and will strengthen linkages within the ditch systems.

5.4 An outlet pipe (150mm) will be installed into an existing ditch in the southernmost corner of the proposed wellsite with an associated bagwork headwall. The area of ditch bank affected will be no more than 2m wide and 1.2m high. The ditch bank will need to be cut back by 1.0m in order to site the unit / bags etc. so as not to restrict the existing flow of the ditch. The outlet is located on the opposite side of a short length of culvert (5 or 6 m long) to ditches which supported water voles in 2017 and 2018.

5.5 At the time of the 2018 later survey, water voles were not detected in the areas of affected ditch, at the time of writing there are no known impacts upon water voles arising from the proposed development.

5.6 The 2017 and 2018 surveys highlight the importance of ditch 5 (Section 15), as a potential core population which expands to connected ditches, when suitable. It is common for there to be fluctuations in distribution and population size throughout the year as environmental conditions change. As there has been no change in the composition of the bankside vegetation and aquatic vegetation was still present in some of the dry ditches on the 2018 survey, it is speculated that the population will re-colonise the area if the water levels return back to their normal levels. It is recommended that pre-development surveys of the ditches are undertaken at an appropriate time of year prior to any future works in line with up to date relevant guidance. The pre-development water vole surveys will advise further if water voles are affected, at that time and if works can proceed under Ecological Clerk of Works (ECoW) following best practice or if a LICL/Natural England Site Licence is required. The pre-development water vole surveys could be secured by a suitably worded planning condition covering the survey and method statements if required.

5.7 Given the extent of the impacted areas, it is expected that works can be undertaken under a Low Impact Class Licence (LICL), if required, which can be obtained following the granting of any planning permission. There are timing constraints associated with undertaking works under a LICL. The works can only be undertaken between the 15th February and 15th April inclusive (with some exceptions as detailed in Appendix 1 of The Water Vole Mitigation Handbook). The ditches appear to already be managed by the Environment Agency, but if a

LICL is required, silt removal in the main channel to create a deeper water depth, either side of the crossing points could be undertaken as mitigation/enhancement.

5.8 If works are to be undertaken outside of this time period, works could be undertaken under a Natural England Site Licence. Water vole mitigation can only be undertaken between the 15th February and 15th April inclusive or between 15th September and 30th November (the latter as a last resort only).

5.0 References

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Strachan, R., Moorhouse, T. & Gelling, M. (2011) Water vole conservation handbook (3rd Ed.). Wildlife Conservation Research Unit, Oxford.

The Wildlife & Countryside Act 1981 (As amended)

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Drawings

Drawing 1: Water Vole Survey Area Map

Downholland Moss

Drawing 1:
Water Vole Survey Area

Map Ref: (NGR) 332670, 407523
Map Scale: 1:3,500 @ A3

Key:

- Site boundary
- Survey Area (including Suttons Lane)
- Crossing point
- Surveyed ditch

Ditch 5
Ditch 5
Section 15
Ditch 2
Ditch 4
Section 14
Ditch 6
Section 10
Ditch 3
Section 9
Section 12
Section 11
Ditch 3
Section 13
Altcar Moss
Section 5
Section 4
Ditch 1
Section 6
Ditch 7
Section 3
Section 7
Ditch 2
Section 8
Section 2
Altcar Moss
Section 1
Ditch 7
Sutton's Farm
Tyrer's Farm

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Drawing 2a: Water Vole Survey Results (R1)

Downholland Moss

Drawing 2a: Water Vole Survey Results Round 1

Map Ref: (NGR) 332670, 407523
Map Scale: 1:3,500 @ A3

Key

- Site boundary
- Survey Area (including Suttons Lane)
- Crossing point
- Surveyed ditch
- Ditch surveyed from bank
- Water vole latrine
- Wate vole dropping
- Burrows present
- Small mammal run

Ditch 5
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Altcar Moss
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Ditch 7
Sutton's Farm
Tyrer's Farm
Altcar Moss
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Drawing 2b: Water Vole Survey Results (R2)

Downholland Moss

Drawing 2b: Water Vole Survey Results Round 2

Map Ref: (NGR) 332670, 407523
Map Scale: 1:3,500 @ A3

Key

- Site boundary
- Survey Area (including Sutton Lane)
- Crossing point
- Surveyed ditch
- Ditch surveyed from bank
- Water vole latrine
- Wate vole dropping
- Burrows present
- Small mammal run

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Ditch 3
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Altcar Moss
Section 5
Section 4
Ditch 1
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Ditch 7
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Section 7
Ditch 2
Section 8
Section 2
Altcar Moss
Section 1
Ditch 7
Sutton's Farm
Tyrer's Farm

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Appendix 1: Survey Design. (*The Water Vole Mitigation Handbook, Box 1, Page 9*)

1. Type of works: Very *small-scale* works affecting up to 15m of watercourse	
Example project	Construction of an outfall, bridge repair works, or installation of pipes up to 15m long within a narrow field drains (where these do not form part of a larger development)
To confirm presence or likely absence of water voles	Field survey – footprint of the works, including temporary work areas plus 100m upstream and downstream. A comprehensive desk study exercise will not necessary be required.
Additional information (if water voles present)	Micro-mapping of the habitat and burrow locations to allow design to minimise impacts (when relevant). Further data may be needed to ensure that there is sufficient alternative habitat available to displace water voles into. This may be obtained through desktop study or a habitat assessment combined with 'spot checks' for water voles over a wider area (1-2km upstream and downstream of the works.

2. Type of works: Works *temporarily* affecting up to 50m of watercourse	
Example project	Pipeline crossing a watercourse
To confirm presence or likely absence of water voles	Field survey – footprint of the works, including temporary work areas, plus 200m upstream and downstream of the works. A comprehensive desktop study exercise will not necessarily be required.
Additional information (if water voles present)	Micro-mapping of the habitat and burrow locations to allow design to minimise impacts (when relevant). Further data may be needed to ensure that there is sufficient alternative habitat available to displace water voles into. This may be obtained through desktop study or a habitat assessment combined with 'spot checks' for water voles over a wider area (1-2km upstream and downstream of the works).

3. Type of works: Works *temporarily* affecting more than 50m of watercourse	
Example project	Watercourse re-profiling or repair/reinstatement of bank stabilisation structures
To confirm presence or likely absence of water voles	Field survey – footprint of the works, including temporary work areas, plus at least 200m upstream and downstream of the works. For works affecting more than 500m of watercourse, the study area should increase to 500m upstream and downstream of the works. A comprehensive desk study exercise will not necessarily be required, but would be advisable for works affecting ≥ 250m of watercourse.
Additional information (if water voles present)	Desk study – Site and up to 2-5km around it (or a habitat assessment combined with 'spot checks' for water voles) to inform the approach to mitigation and the assessment of fragmentation effects. The study area should be proportionate to the length of habitat affected.

4. Type of works: Works with *permanent* impacts affecting 15-50m of watercourse	
Example project	Bank side revetment works
To confirm presence or likely absence of water voles	Field survey – footprint of the works, including temporary work areas, plus 100-200m upstream and downstream of the works (proportionate to the length of watercourse affected).

	Desk study – site and up to 2km around it (or a habitat assessment combined with 'spot checks' for water voles).
Additional information (if water voles present)	Sufficient information is likely to have been provided by the 'presence/likely absence' surveys.

5. Type of works: Works with *permanent* impacts affecting more that 50m of watercourse OR Works requiring *permanent* culverting of watercourse	
Example project	Bank side revetment works OR Highway schemes or some residential/mixed-use developments
To confirm presence or likely absence of water voles	Field survey – footprint of the works, including temporary work areas, plus 200-500m upstream and downstream of the works (proportionate to the likely fragmentation effects). Desk study – site and up to 2-5km around it, or a habitat assessment combined with 'spot checks' for water voles.
Additional information (if water voles present)	The study area for the desk study (or habitat assessment combined with 'spot checks' for water voles) may need to be increased to inform the approach to mitigation.

6. Type of works: Very large scale works	
Example project	Coastal re-alignment projects (where there are reasonable grounds to expect the presence of water voles)
To confirm presence or likely absence of water voles	Field survey – footprint of the works, including temporary work areas, plus approximately 1km around it. Desk study – site and up to 10km around it (or a habitat assessment combined with 'spot checks' for water voles.
Additional information (if water voles present)	The study area for the desk study (or habitat assessment combined with 'spot checks' for water voles) may need to be increased to inform the approach to mitigation.

Appendix 2: Field sign surveys - one site visit or two?

The Water Vole Mitigation Handbook (Page 15)

Field sign surveys – one site visit or two

The water vole is a mobile species that responds to habitat changes over the course of the breeding season: a single visit can therefore be insufficient to confirm likely absence in many cases. In addition, where water voles are present, survey data based on two visits will allow a more robust assessment of the impacts of the project, particularly where water voles use different parts of a site during different parts of the breeding season. This can also be important in determining the most appropriate approach to mitigation. These guidelines therefore recommend that two field survey visits are routinely undertaken. However, it is recognised that the second visit may not be required in some cases, and it may therefore be possible to make a case for an assessment based on one visit. Examples of scenarios where a single visit (before submitting a planning application) may be sufficient as follows:

1. Water vole presence is confirmed during the first survey visit.

A second visit may not be needed where the assessment of effects on water voles can be made on a precautionary basis (i.e. water voles are present throughout the site at the maximum density that the habitat could support), **and** the approach to mitigating incidental mortality (displacement, relocation by trapping, off-site translocation, etc.) can be determined from the first visit alone.

The assessment of the quality of the habitat, and therefore the likely maximum density of water voles, will need to consider changes to the habitat in different parts of the breeding season as a result of natural processes (e.g. changes to water level) and management activities. This can be a difficult assessment to make for many sites.

2. Water vole presence is not confirmed during the first survey visit.

A second visit may not be needed where the habitat is of very low suitability for water voles and there is a very low likelihood that water voles are present in the surrounding area - up to 2km from the area of the proposed works, or less where significant barriers to water vole dispersal are present.

The assessment of the suitability of the habitats will need to consider changes to the habitat in different parts of the breeding season as a result of natural processes and management activities. This can be a difficult assessment to make for many sites. It will be difficult to make a robust case for not undertaking a second survey where access to surrounding areas is limited or impossible.

A second visit may also not be needed where the assessment of effects on water voles can be made on a precautionary basis (as per point 1 above)

In all cases, a second visit would be advisable prior to commencing works.