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APPENDIX 1: WATER VOLE REPORT & MITIGATION STRATEGY

Client

Hargreaves Land Limited

Project

Lincolnshire Lakes (North), Scunthorpe

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1.0 INTRODUCTION

1.1 The following report has been prepared by FPCR Environment and Design Ltd on behalf of Hargreaves Land Limited. It provides the results of water vole surveys undertaken at the Lincolnshire Lakes (North) Site, Scunthorpe (Central OS grid reference: SE 86470 09734), herein referred to as 'the Site' (see Figure 1 of the EcIA for location).

1.2 This document is provided as an Appendix to the Ecological Impact Assessment (FPCR, 2024) and completes the ecological assessment for water voles.

Objectives

1.3 The purpose of this report is to:

- Present and discuss the results of water vole surveys undertaken;
- Determine any likely impacts to water vole as a result of the proposed development; and
- Present a strategy for mitigation and compensation in order to minimise any impacts and, where present, ensure that the Favourable Conservation Status of any water vole population, if present, are maintained.

Description of Works Likely to Impact Water Vole

1.4 To facilitate the proposed development it will be necessary to permanently impact two small sections of ditch D3.1b (Earl Beauchamp's Warping Drain); including the construction of a culvert to facilitate an access road and a headwall for the new water vole receptor. Additionally, ditch D3.7 and sections of D3.6 and D3.8, where part of the residential development will be constructed, will be permanently removed which consequently will isolate the rest of D3.6 and D3.8 as well as the connecting ditch D3.9. Works to the south of Brumby Common Lane, which includes two fields which are expected to be used as borrow pits, will not affect any suitable water vole habitat. See Figure 1.1 for ditch locations.

2.0 LEGISLATION

2.1 Water voles are fully protected under The Wildlife and Countryside Act 1981 (as amended) (WCA). This makes it an offence to:

- intentionally kill, injure or take water voles;
- possess or control live or dead water voles or derivatives;
- intentionally or recklessly damage, destroy and obstruct access to any structure or place used by water voles for shelter or protection;
- intentionally or recklessly disturb water voles whilst they are using such a place;

2.2 Water voles are listed as a Species of Principal Importance under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006. Water vole are also classed as a priority species within the Lincolnshire Biodiversity Action Plan (LBAP)[1].

2.3 If water voles are found to be present and impacts cannot be avoided, then depending on the size of area to be affected an appropriate Protected Species Conservation or Mitigation Licence from Natural England may be required and suitable mitigation implemented to ensure this

[1] Lincolnshire Biodiversity Partnership (2011) Lincolnshire Biodiversity Action Plan: 3rd Edition. North East Lincolnshire Council.

species comes to no detrimental harm during and after development and the scheme results in a conservation benefit to the species.

3.0 METHODOLOGY

Desk Study

3.1 In order to compile existing baseline information, a desktop survey was undertaken for existing ecological data regarding the presence of water vole within 2km of the Site. The following organisation was contacted:

- Lincolnshire Local Records Centre (LERC).
- Multi Agency Geographical Information for the Countryside (MAGIC) website[2].

3.2 Further inspection, using colour 1:25,000 OS base maps and aerial photographs (www.ordnancesurvey.co.uk) was also undertaken in order to provide additional context and identify any features of potential importance for nature conservation in the wider countryside.

Habitat Assessment

3.3 An initial habitat assessment was made by an experienced surveyor to determine the suitability of habitats within the Site to support water voles. Habitat requirements were based on those detailed in para 3.3.2 of the Water vole mitigation handbook[3] and Water vole Field Signs and Habitat Assessment[4] and include:

- dry areas above water level for nesting, either in burrows or above-ground woven nests;
- steep bank profiles;
- suitable bank substrate for burrowing;
- daily water level fluctuations;
- herbaceous marginal and bankside vegetation; and
- suitable water depth.

3.4 The Water Vole Mitigation Handbook outlines that water voles have the following three habitat requirements:

- dry areas above water level for nesting (either in burrows or occasionally in woven nest balls);
- herbaceous vegetation to provide food and cover; and
- water (as a means of escape from predators).

3.5 This criterion is rationalised in a recently published matrix[5] (Table 1) which we used in this case (see further below) to assess the potential value of habitat on Site for water vole.

[2] Department for Environment, Food & Rural Affairs. (n.d.). MAGIC Map. MAGIC. https://magic.defra.gov.uk/MagicMap.aspx
[3] Dean, M., Strachan, R., Gow, D & Andrews, (2016) The Water Vole Mitigation Handbook. The Mammal Society Guidance Series. Eds F. Matthews & P. Chanin. The Mammal Society, London.
[4] Dean, M, (2021), Water Vole Field Signs and Habitat Assessment: A Practical Guide to Water vole Surveys, Pelagic Publishing
[5] Dean M (2021) Water vole Field Signs and Habitat Assessment: A Practical Guide to Water Vole Surveys. Pelagic Publishing

Table 1: Assessing the value of habitat for Water voles (Deans, 2021 – Table 21).

Habitat category	Bank Profile	Bank substrate	Variation in water level	Herbaceous vegetation	Water
	Dry areas for burrows or nests				
Optimal (all criteria need to be met)	Steep (approaching 1:1) on at least one side of a watercourse. Steep or shallow banks on static waterbodies or fen-type habitat, where water levels do not fluctuate significantly	Earth or peat	No noticeable variation during the summer months; banks are not overtopped regularly [a]	Continuous swathe of tall and luxurious riparian vegetation providing 90-100% cover on the banks (tall tussocky grassland) and marginal/in-channel vegetation is present (emergent species)	Permanent water
Good (all criteria need to be met)	Steep (approaching 1:1) on at least one side of a watercourse. Steep or shallow banks on static waterbodies or fen-type habitat, where water levels do not fluctuate significantly	Earth or peat bank, or stony/reinforced bank with gaps allowing access to the earth behind	No noticeable variation during the summer months; banks are not overtopped regularly	Continuous swathe of bankside or in-channel (emergent) vegetation providing at least 60% ground cover. May be dominated by grasses and weeds, rather than luxurious riparian vegetation. The vegetation should generally be tall, except in urban or suburban areas, where shorted bankside vegetation may also qualify	Permanent water. Or routinely wet for at least 2-3 months during the summer, and where other 'good' habitat is present in immediately adjacent areas with permanent water
Suitable but poor *b*	Any habitat that falls short of the criteria to qualify as 'good' but does not meet the criteria of 'negligible value' could reasonably be considered to be suitable but 'poor'				
Negligible value (will generally need to meet the criteria for herbaceous vegetation	Shallow profile on both banks	Rocky or gravel, unsuitable for burrowing	Considerable variation in water level – the bank toe can move by more than 1m horizontally over the breeding season	No or limited bankside and marginal vegetation (due to shading or other 'permanent' factors – note that management can change and is often a 'temporary' factor)	n/a

Habitat category	Bank Profile	Bank substrate	Variation in water level	Herbaceous vegetation	Water
	Dry areas for burrows or nests				
and at least one other)	Vertical bank face with no burrowing opportunities behind it	Reinforced banks with no gaps	n/a		n/a

[a] overtopping once every 5-10 years is likely to be too frequent in most cases; overtopping less frequently than this may also be problematic for water voles.

[b] the term 'suitable but poor' is used to avoid the possible misinterpretation of this habitat category opposed to the term 'poor', which some would dismiss as 'unsuitable'.

Field Survey

3.6 Due to the length of ditches that needed surveying, surveys were completed over a number of days. Early season presence / absence surveys took place between the 7th and the 22nd June 2023 in accordance with the Water Vole Mitigation Handbook (2016)[6], and involved a systematic search for of evidence of water vole activity at the waters edge and within 5m, within suitable habitat, including ditches (see Figure 1.2). These surveys were undertaken by experienced ecologists during suitable conditions.

3.7 A late season (2nd phase) presence / absence was undertaken between the 14th and the 27th September (see Figure 1.3).

3.8 The banks/margins of the waterbodies and suitable habitat were surveyed for evidence of:

- *water voles* – live sightings;
- *latrines* - distinct piles of water vole droppings found near nest sites, at the ranges of territorial boundaries and where the animals enter and leave the water. The presence of droppings is the only field sign which can be used reliably on its own;
- *burrows* - burrow entrances are typically wider than high with a diameter between 4 and 8cm. Generally, these burrow entrances are located at the water's edge;
- *feeding stations* - areas with distinct neat piles of chewed lengths of vegetation along pathways or haul out platforms along the water's edge;
- *footprints* - identifiable prints in soft margins of the watercourse;
- *runways* - low tunnels that are pushed through the vegetation and often leading to burrows or feeding stations; and
- *nest balls* – woven vegetation of approximately the size and shape of a rugby ball, usually found within a tuft of vegetation above the water line.

[6] Dean, M., Strachan, R., Gow, D & Andrews, (2016) The Water Vole Mitigation Handbook. The Mammal Society Guidance Series. Eds F. Matthews & P. Chanin. The Mammal Society, London.

Assessment Rationale of Water Vole Survey Results

3.9 Water voles typically form a series of contiguous territories along the length of a watercourse. As many of the habitats that water voles tend to occupy in the UK are linear (e.g. streams / rivers / banks of waterbodies) it is therefore appropriate to measure their territory sizes in terms of 'length' in most UK habitats. Breeding female water voles are territorial, and their territories represent a 'breeding unit'; territory size will influence the number of breeding females that a given length of habitat can support. Frequent interactions and the presence of marker latrines determine the boundaries of a territory. Females may share their breeding unit with their female offspring; males are not territorial as such but have ranges that overlap with the ranges of many females and other males (Strachen et. al 2011)[7].

3.10 An assessment of the water vole populations within the Site was completed using guidelines outlined in the Water Vole Mitigation Handbook (Dean et al, 2016). Section 3.3.16 of the Water Vole Mitigation Handbook (Dean et al. 2016) states that the numbers of latrines recorded by the survey will give an indication of relative population size, and can be helpful in identifying the most valuable parts of a site for water voles.

3.11 Although the Water Vole Mitigation Handbook (Dean et al. 2016; Section 3.3.17) states that it is not possible to make robust estimates of absolute numbers of animals from latrine counts, latrines provide relative indices of activity suitable for the purposes of assessing impacts or designing mitigation. Section 3.3.16 of the Handbook suggests the density of water voles can be considered to be 'high', 'medium' or 'low' within a site (or within different parts of a site) using latrine counts, based on the criteria outlined in Table 2, below.

Table 2: Assessment of Relative Water Vole Population Density

Relative Population Density	Approximate number of latrines per 100m of bankside habitat	
	First half of survey season (mid-April to end of June)	Second half of survey season (July to September)
High	10 or more	20 or more
Medium	3–9	6–19
Low	≤ 2 (or none, but with other confirmatory field signs)	≤ 5 (or none, but with other confirmatory field signs)

3.12 Strachen et. al (2011) state that, depending on the overall population density, season and habitat quality, the length of territory varies between 30 m and 150 m for breeding females and 60 m and 300 m for males. The larger range sizes occur when the population density is low and / or the habitat quality is poor. Therefore, in optimal or good quality habitat, more water voles can be supported. When water vole populations are fragmented or small, water voles are likely to maintain fewer latrines as conflicts with neighbouring water voles are likely to be rarer. As part of the assessment, it has been broadly considered that a High population density would occupy breeding female territories of between 30m and 70m, a Medium would fall within the range of 70m and 110m and a Low would be in the range of 110m to 150m. This only is a broad estimate as other factors may be a consideration.

[7] Strachan, R., Moorhouse, T. and Gelling, M. (2011). Water Vole Conservation Handbook 3rd Edition. Wildlife Conservation Research Unit, Oxford.

3.13 A breeding unit refers to a single female prior to breeding. However, during and following the breeding season, this may also include her offspring. Therefore, the usage of 'breeding territories' in assessing impact does not necessarily translate into number of animals

Limitations

3.14 The desk study used species data derived from records submitted by members of the public and from specialist volunteer group surveys. It does not represent a definitive list of species that occur in the local area, and the absence of records does not necessarily imply absence of such species.

Weather

3.15 In the days prior to the final survey of the early season, there was a period of rain, which likely washed many latrines away. Whilst the survey still followed survey guidelines and waited for several days after this rain, there is potential that fewer records of positive evidence for water vole, such as latrines and feeding remains, may have been recorded. The ditches surveyed on this day included D3.6, D2.8, D5.2 and D2.5.

3.16 This is not considered to be a significant limitation to the detection of water vole presence on the Site as D2.5, D2.8 and D5.2 have no connectivity to the Site - all located to the west of the A1077(M)/M181. Only a small section of D3.6 is within the Site boundary; based on the evidence recorded, the population density of water vole (estimated using the abundance of latrines) was low in the early season. However, due to the potential constraint, we have assumed that the number of latrines were higher than recorded and have consequently increased the population density to Medium.

Dense vegetation

3.17 Whilst the early season surveys were undertaken well within the survey guidance between April and June, the vegetation in many of the ditches was far too dense to survey continuously. Additionally, a combination of heavy levels of silt, dense scrub and other obstructions made fully surveying several lengths of ditches highly challenging.

3.18 In most of these circumstances, a method of spot checking was implemented. This method involved checks of the ditches and surrounding area every 5 meters (as far as possible). Within these spot-checked ditches, water vole rafts were then placed – at approximately 10 meter intervals to be checked during the late season surveys.

3.19 Ditch D3.3 has steep banks and thick, silt substate. During the early season, it was not considered safe to conduct spot checking of this ditch. However, positive evidence of water vole to confirm presence has been identified in connected ditches, therefore, restricted access to certain stretches of watercourses is not considered to be a significant limitation and given the suitable vegetation water vole presence was assumed.

Ditch management

3.20 The network of ditches on Site are within the management area of Scunthorpe and Gainsborough Water Management Board (WMB)[8]. However, it is possible that only the following ditches are controlled and managed by the board (D2.5, D3.1a, D3.1b, D4.15a, D4.15b, D4.13 and

[8] Shire Group of IDBs (n.d.) Scunthorpe & Gainsborough WMB | Shire Group of Internal Drainage Boards. Available at: https://www.shiregroup-idbs.gov.uk/idbs/scun-gains/ (Accessed: 27 November 2024).

D4.11). The control and management regime of the other ditches within the Site boundary is unknown.

3.21 In the weeks prior to the second phase of surveys, many of the ditches onsite underwent intense management in the form of cutting/ flailing. Figure 1.4 displays the level of management in regard to each ditch. We have classified management as either 'High' or 'Partial', with the definitions of these terms outlines below.

- High - Vegetation has been completely cut down on both banks and in the ditch channel.
- Partial - Vegetation has taken place on the bank/vegetation has been cut on one bank, but the ditch channel vegetation remains.

3.22 Many ditches, particularly those in the south-eastern portion of the Site, underwent high levels of management involving flailing all vegetation. Additionally, many of the rafts that had been placed within the ditches were destroyed, and therefore unusable for gathering field signs for the late season surveys.

Survey data

In accordance with CIEEM's "Advice Note on the Lifespan of Ecological Reports and Surveys"[9], survey data older than 18 months may require reassessment based on specific ecological factors. Following the 2023 water vole surveys, professional ecologists from FPCR have conducted multiple site visits in 2024, most recently in November 2024. These assessments confirmed that the habitat and its management have remained consistent, with no significant changes observed. Consequently, we conclude that the survey data remains valid and reliable for informing the proposed mitigation and compensation strategies for the water vole.

4.0 RESULTS

Desk Study

4.1 Relevant results received from the 2km data search with LERC relating to water vole are spatially represented in Figure 1 of the EcIA (FPCR, 2024).

4.2 Within 2km of the Site, 49 water vole records were returned, of which, nine were recorded within the Site boundary from 2012.

4.3 The LERC did not provide any records of European mink *Mustela lutreola* within 2km of the Site boundary and there were no designated sites within the search area designated for their water vole populations.

4.4 Previous water vole surveys were conducted on the Site and in the wider area to inform previous outline application. Water Vole Mitigation Strategy produced by WSP[11] concluded that water vole were present within 70% of all ditches across the Site (which had a larger survey area than the application Site) and 50% of these ditches where water vole were present showed high levels of activity. Overall it was concluded that the Site supported a moderate population of water vole.

[9] CIEEM (2019). *Advice Note on the Lifespan of Ecological Reports and Surveys*. Chartered Institute of Ecology and Environmental Management, Winchester.

[11] WSP (2012) Appendix 12.3q Riparian Mammals PA/2013/1000 | North Lincolnshire Planning Portal.

4.5 Table 3 present a summary of WSP's survey results.

Table 3: Summary of WSP's water vole survey results

Ditch refs	Activity level
D2.5, D3.1, D3.4, D3.6, D3.8, 4.21, 4.2b, 4.2c, 4.11, 4.13, 4.15a and 4.15b	High water vole activity
D3.7, D3.9, D4.5a and D4.6	Medium water vole activity
D3.2, D4.3a, D4.12 and D4.14	Low water vole activity
D2.8, D3.3, D3.5, D3.10, D3.11, D3.12, D3.13, D4.4, D4.7, D4.8, D4.9 and D4.10	No evidence of water voles

Status of Local population

Habitat suitability and management regime

4.6 Figure 1.5 displays the locations and habitat suitability of ditches present within the Site boundary. The ditches varied across site in terms of vegetation cover, water level and general suitability for water vole occupation. Table 4 provides a summary of the general habitat suitability of the ditches for water vole prior to management – for the detailed assessment see Appendix 1a.

Table 4: Summary of habitat suitability prior to management

Ditch refs	Population estimate
D2.5, D3.1a, D3.1b, D3.2, D3.4, D3.6, D4.12 and D4.14	Optimal
D3.8, D4.2a-c, D4.5a, D4.6, D4.11, D4.13, D4.15A and D4.15b	Good
D3.3, 3.7, 3.9, 3.12 and 5.2	Suitable but poor
D2.8, D3.5, D3.11, D3.13, D4.8, D4.9, D4.10 and D5.1	Negligible

Field Survey Results

4.7 Table 5 below displays the results of the early (ref 1) and late (ref 2) season surveys. The full survey results are detailed in Appendix 1a

Table 5: Summary of peak population density recorded over the season

Ditch ref	Population density
D3.3, D3.11, D3.12,	Absent
D2.5, D3.1, D3.1b, D3.2, D3.7, D3.8, D3.9, D4.a-c, D4.5a, D4.6, D4.11, D4.12, D4.13, D4.14, D4.15a, D5.1, D5.2, D.15b	Low
D3.4, D3.6	Medium

5.0 IMPACT ASSESSMENT (BEFORE MITIGATION OR COMPENSATION)

5.1 The scheme has been designed as far as reasonably possible to minimise impacts to water vole. However, to facilitate the development, it will be necessary to culvert one 28m section of ditch D3.1b to create an access road. Additionally, a headwall will be constructed in the same ditch for the water vole receptor area, permanently removing a further 2m of habitat. The following ditches that support water vole (D3.7 and part of D3.6 and D3.8) will also be permanently removed which will then result in the isolation of D3.6 and D3.8 as well as the connected ditch D3.9.

5.2 There are three impact types anticipated to arise from the operations outlined above that need to be considered, which are:

a) habitat loss;

b) habitat isolation / fragmentation; and

c) disturbance.

As per Natural England's most recent water vole method statement template, we have also considered impacts of:

d) mortality;

e) pollution; and

f) increased predation.

5.3 Each impact type is considered in turn, below, see (Figure 1.1)

Habitat loss

5.4 Details of the proposed development ae included within the EcIA and summarised below and in Table 6. For reference, proposed layouts are included within Appendix 12.

Construction of New Access Road across ditch D3.1b

5.5 To provide vehicular access to the residential development it will be necessary to construct a new road across the onsite ditch – D3.1b. The new road is anticipated to be approximately 28m in width so the resulting permanent habitat loss in D3.1b will be 28m of 'optimal' quality habitat supporting a low population density of water vole. It would additionally require a further 10m buffer either side of this area to allow adequate working area for construction, resulting in the temporary loss of a further 20m of 'optimal' quality habitat during the construction phase. As such, a total length of 48m of 'optimal' quality habitat will be impacted.

5.6 Works to construct the road crossing on D3.1b will result in the loss of no more than 1 breeding female territory.

New Footbridge

5.7 A footbridge is also anticipated to be constructed north of the access road across D3.1b. This is to allow pedestrians to access the public open space and play areas in the north west of the Site. The footbridge has been designed to avoid impacts to water voles by constructing the bridge abutments at least 5m from the toe of the bank of the ditch and therefore spanning the water vole habitat beneath.

Construction of a Headwall to Provide Feeder Pipe for Water Vole Receptor Habitat

5.8 The water vole receptor (see Figure 1.7) will require a new headwall constructing in the western bank of D3.1b. This will result in the permanent loss of approximately 2m of 'optimal' water vole habitat and a further temporary loss of 20m to provide 5m working area and 5m buffer from any water vole burrows. This will impact a maximum of 1 breeding water vole territory.

Construction of the Residential Development

Habitat loss and Isolation/fragmentation

5.9 To facilitate the residential development parcel HA2, (see Appendix 12 of the EcIA for location) water vole habitat within D3.6, D3.7, D3.8 and D3.9 will be permanently lost. This will be from either direct habitat loss or isolation.

5.10 There will be a permanent loss of 488m of water vole habitat which consists of 119m of 'optimal' quality habitat; 30m of 'good' quality habitat and 339m of 'suitable but poor' quality habitat

5.11 In addition the construction of the residential development will result in the permanent isolation of water vole populations as a result of the proposals. The remaining sections of D3.6 and D3.8 as well as the connecting ditch, D3.9, will be isolated and therefore also considered to be lost. As such, this will result in the permanent isolation of 611m of water vole habitat which consist of 220m of 'optimal' quality habitat; 294m of 'good' quality habitat and 97m of 'suitable but poor' quality habitat. In essence, the retention of 611m of habitat supporting 'Low' and 'Medium' populations of water vole is functionally lost.

5.12 It is, therefore, expected that construction of the residential development aeras will result in the loss or isolation of up to 13 breeding female territories

5.13 As outlined in the Table 6 below, the proposals will result in the permanent loss of 518m and temporary loss of 40m of water vole habitat as well as 611m of isolated habitat. As such the resulting habitat loss has potential to impact up to 15 water vole breeding territories.

Summary of Habitat Loss and Isolation

Table 6: Summary of Impacts

Impact (ref)	Ditch ref	Habitat Suitability	Population Density	Perm Loss (m)	Temp Loss (m)	Isolated (m)	Total impacted (m)	Est. no. breeding female territories Impacted
Access Road	D3.1b	Optimal	Low	28m	20m	0m	48m	<1
Headwall for Receptor Feed	D3.1b	Optimal	Low	2m	20m	0m	22m	<1
Residential Development	D3.6	Optimal	Medium (assumed due to constraint)	119m	0m	220m	339m	<5
	D3.7	Suitable but poor	Low	339m	0m	0m	339m	<4
	D3.8	Good	Low	30m	0m	294m	324m	<3
	D3.9	Suitable but poor	Low	0m	0m	97m	97m	<1
Total							1169m	< 15 breeding female territories

Disturbance and Mortality

5.14 The works have been designed to avoid disturbance as much as possible. During construction, proximity to burrows whilst heavy machinery is operating presents a risk of mortality to any water voles which may be occupying burrows. To mitigate this all of the ditches on Site and in close proximity to works will have buffer zones of at least 5m clearly demarcated. This will help protect the burrows and therefore any water voles that might be present. As such, disturbance from construction activities is considered unlikely to result in any adverse impacts to water voles at a local population level.

Pollution

5.15 In the absence of mitigation, pollution would be a risk to any water voles within ditches adjacent to the working areas or downstream habitats of the Site. Standard good working practices to avoid damage to the banks of the watercourse habitat during construction, or pollution events, should always be employed with full consideration of the requirements of water voles which may be present.

Increased predation

5.16 Following the construction phase, the Site to the north of Brumby Common Lane will change use from agricultural to residential. Inevitably, the development will lead to an increase in the local domestic cat population and subsequent predation risk.

5.17 Enhancement and ongoing management of the retained ditches within the applicant's control will be undertaken to ensure continuity of habitat provision for water vole. The resulting vegetation will provide increased cover for water voles from predation. Creation of the new water vole mitigation area will be designed to be of greater habitat quality than the ditches on Site that are to be lost (see Figure 1.7). This will increase the carrying capacity of the Site for water vole, which is likely to result in an increase to the population size. This would in turn increase the tolerance of the population to a marginal increase in predation from domestic cats.

Summary of Impacts without Mitigation

5.18 The total impacts arising from the various operations outlined above (without mitigation) will be:

i. 149m of 'optimal' and 30m of 'good' and 339m of 'suitable but poor' quality habitat permanently lost;

ii. 40m of 'optimal' quality habitat temporarily lost; and

iii. 220m of 'optimal', 294m of 'good' and 97m of 'suitable but poor' quality habitat permanently isolated;

5.19 Collectively the program of works has the potential to impact 1169m of water vole habitat (of which, 1129m will be permanent impacts). This is anticipated to impact up to 15 breeding territories.

6.0 MITIGATION STATEGY

Overarching approach

6.1 The Site will be developed in phases, as outlined in Table 6, with the initial phases resulting the permanent loss of up to 28m of D3.1b to facilitate a road crossing and 2m for a headwall further up the same drain. This will utilise passive displacement. As more than two sections of the same watercourse are being impacted within 500m of each other works are not eligible to be undertaken under a CL31 class licence. As such once planning permission has been granted a mitigation licence will be sought from Natural England to cover all phases of works within the scheme. It is anticipated that these two displacements will be undertaken in Autumn 2025.

6.2 A custom built receptor providing 1154m of new optimal water vole habitat will be constructed during late 2025/ early 2026 and vegetation will be allowed to mature whilst water vole will be excluded from the area with the use of fencing.

6.3 The habitat loss and isolation associated with the residential development in parcel HA2, resulting in the loss of up to 1099m of ditches D3.6, D3.7, D3.8 and D3.9, will be mitigated through a trapping and translocation exercise whereby water voles will be relocated from these areas to the established receptor site will be undertaken in Autumn 2027 or spring 2028.

General Mitigation Measures During Construction.

6.4 A 'toolbox' talk will be held with the contractor prior to any work (which would result in impacts to protected species including water voles) being undertaken, to ensure that the contractors are aware of the protected species issues associated with the Site and mitigation delivery. This will be delivered by a suitably qualified ecologist and will include detailed coverage of the mitigation work, as provided in this document.

6.5 Should any evidence indicating the presence of water vole be recorded within the works area, works in that area will cease and the project ecologist will be contacted for advice as to how to proceed.

6.6 General pollution measures during construction include:

- Vehicle movements around the banks of the watercourse will be minimised to protect the banks and reduce the disturbance and discharge of soil, silt and dust which may enter the watercourse;
- As a pollution prevention measure, booms will be placed across the watercourse in order to contain any materials such as fuel or oils in the event of a spillage;
- Oil absorbent material and spillage kits ('Grab-Packs') will be located at all sites where works close to watercourses are taking place and staff trained in their use;
- No material or stockpiles to be located within 10m of the top of the bank. If materials cannot be delivered to site on an as and when basis, the minimal amount will be stored for a temporary period only; and
- No materials intended for the works or arising from the works will be stored or disposed of in the watercourse or in a location where it might enter the watercourse.

6.7 Wherever possible all works/ plant and machinery should maintain a 10m buffer from any water vole habitat. Where works need to encroach within this buffer an ecologist should be consulted and approached on a precautionary basis, with no works permitted within 5m of the toe of the bank.

Predation

6.8 All new households within the development would be provided with information outlining advice on measures that can be taken to reduce the effect that cats have on local wildlife, such as keeping them in overnight (at least an hour before sunset and an hour after sunset), collars with bells or other devices, keeping cats well-fed and cared-for, taking unwanted cats to a shelter and having cats neutered.

Displacement Details

6.9 It is intended to undertake two displacements along the length of B3.1b upon granting of planning permission. This is to facilitate construction of the access road and headwall for the receptor feed. The location of this is shown on Figure 1.7.

6.10 Displacement of water voles in two impacted area of ditch D3.1b can only be undertaken under licence by an appropriately experienced ecologist between 15th February and 15th April or 15th September and 31st October and should only be used in linear habitats less than or equal to 50m in length. It should be noted that if works need to occur outside of the period stated above then displacement would need to be undertaken in the proceeding periods and maintained in an unsuitable condition.

Displacement Methodology

6.11 All displacements will follow the following methodology as outlined below.

6.12 All relevant animal welfare legislation must be complied with at all times, including the Animal Welfare Act 2006 and the Wild Mammals (Protection) Act 1996.

6.13 Best practice will be followed at all times.

<u>Removal of vegetation including marginal vegetation (with water draw-down where needed) to displace water voles</u>

6.14 Prior to commencement of vegetation cutting a thorough survey of the area will be undertaken by an experienced ecologist and all burrows will be marked on a plan and also highlighted with a flag or marker.

6.15 Vegetation removal will only commence between 15th September and 31st October 2025, or 15th February and 15th April 2026 if works are delayed.

6.16 This will comprise the cutting of a continuous length of vegetation.

6.17 Both Banks will be cut concurrently.

6.18 Cutting will be undertaken with a strimmer or a Bradshaw bucket and will be supervised by the licensed named ecologist.

6.19 It is expected that water drawdown will not likely be utilised on the displacement. However, the option can be retained if necessary and would involve over pumping until the displacement is complete. Draw down will be limited to the same section of ditch as the vegetation cutting.

Destructive Search of Burrows

6.20 Following vegetation removal, the cut area will be left intact, for a minimum period of five consecutive days and a maximum period of ten consecutive days before a destructive search is carried out.

6.21 To minimise the risk water voles are harmed, prior to undertaking the destructive search, the cut area will be surveyed for evidence of the continued presence of water voles. Monitoring may include the use of an endoscope. Where this survey records no evidence that the burrows in the cut area are still occupied by water voles, each burrow affected will be carefully excavated and searched, and destroyed once the search is completed.

6.22 If it is judged that it is neither safe nor technically feasible to undertake a destructive justification for not undertaking a destructive search or modifying the methodology to account for any of the above constraints will be provided within the licence return.

6.23 Any water voles found during excavation of burrows will be either be allowed to escape to an adjacent refuge area or be captured and for released at an adjacent refuge area on the same day.

Commencement of Works

6.24 Works will seek to commence within five days of completing the destructive search, where this is not possible water voles will be deterred from return to the area by either:

- in-filling the channel immediately following the destructive search maintaining the works area as bare ground until the works have taken place;
- covering the ground with a suitable matting to ensure that vegetation regeneration does occur.

6.25 In these situations, the displaced area will be regularly monitored to ensure that vegetation does not establish, and water voles do not return prior to the work starting.

Trapping

6.26 Trapping of 1099m of the ditches D3.6, D3.7, D3.8 and D3.9 will be undertaken to prevent disturbance or mortality where the construction of part of the new residential development will take place and also to prevent isolation of small numbers of water vole territories through the loss of connective habitat

6.27 The impact will be permanent, fencing will be installed and trapping will commence either between the 15th September to 30th November or the 1st March to 15th April in the year of impact.

6.28 The licensable activities are to cover males and females, adults and juveniles.

Trapping Protocol

6.29 The weather forecast will be monitored on a daily basis, and the traps will be securely closed if adverse weather conditions are forecast. Trapping will not be undertaken if:

- night-time temperatures fall below 0°C;
- daytime temperatures rise above 20°C; or

- during high rainfall, where there is a danger that water levels may rise and flood the traps.

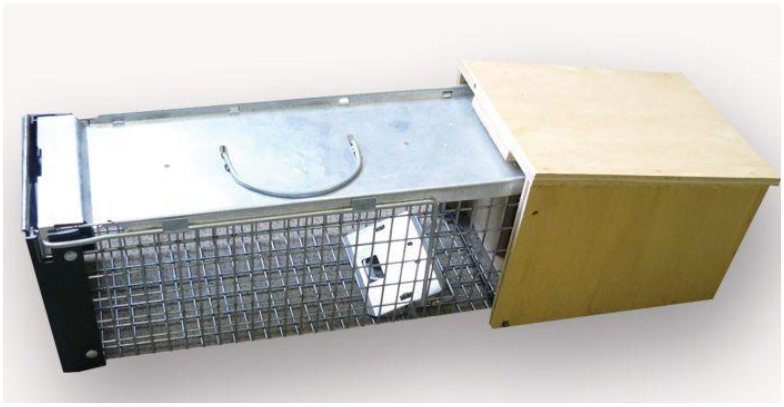
6.30 A combination of two types of traps will be utilised, neither of these traps are spring loaded:

6.31 Mesh water vole trap (50cm long x 15cm wide x 15cm high) constructed from 1cm x 1cm weld mesh with a shelter at one end (approximately 21.5cm in length) as shown in Photo 1. This trap is activated by a treadle and swing down door, with simple latch that falls between the mesh to lock the door.

Photo 1: Example of Mesh Water Vole Trap.

6.32 Greenalyte water vole trap (approximately 65cm long and 18cm wide) which provides a wooden shelter constructed of 12mm ply and mesh entrance tunnel, as shown on Photo 2. The trap is also activated by a treadle and this releases a slide down door with a locking spring.

Photo 2: Greenalyte Water Vole Trap



6.33 All traps will be numbered. They will be placed along the margins of the affected ditches within the trapping area at a minimum of 10m intervals, ideally adjacent to latrine sites or in areas where runs are obvious. Dry straw and half a fresh apple will be placed within the shelter area, and these materials will be changed at least every second day or more often, as required, if wet.

6.34 Traps will be positioned on a slight slope (where present), such that the rear is higher than the front to allow for fluctuations in water level. Traps will also be secured to the bank where necessary to prevent them slipping into the water. Traps will be set to ensure the treadle works efficiently and then baited with three small chips of sweet apple. They will be flagged, numbered on a plan and GPS located to prevent any being missed during checking.

6.35 Traps will be checked twice a day: once between 6am and 10am; and again, in the late afternoon, before dusk.

6.36 Any animals captured will be weighed and their gender determined. All works will be undertaken by suitably experienced ecologists, trained in sexing water voles and identifying lactating females. If lactating females are captured, trapping will be suspended and advice from Natural England will be sought immediately.

Best Practice

6.37 As per Section 4.4.11 of the Water Vole Mitigation Handbook (Dean et al. 2016), "trapping can be considered to be complete once there has been a period of 5 days or more (when the temperature has not dropped below freezing (0°C) overnight) with no further captures, and no field signs within the capture site." Floating rafts will remain in place for the duration, to aid this process.

Destructive Search

6.38 The destructive search will occur along both banks of all affected ditches.

6.39 Once trapping is completed, habitat on the banks of the impacted ditches will be subject to a destructive search, as described previously. As per Section 4.6.11 and Appendix 1 of Water Vole Mitigation Handbook (Dean et al. 2016), the destructive search will involve all burrows being excavated under ecological supervision. Vegetation will then be stripped (under direct supervision of an ecologist) from the affected section. The destructive search will continue until all vegetation has been stripped.

6.40 Gloves, nets and pre-prepared suitable animal containers or traps containing food and bedding (hay or straw) will be made available during the destructive search. Should any water voles be found they will be immediately transferred to a release pen within the receptor. The destructive search will then continue.

Biosecurity

6.41 All ecologists involved in the trapping will follow 'check-clean-dry' biosecurity protocol during site work. Risk assessments will also be followed; FPCR have a suite of risk assessments including for 'working with water voles', 'working in and around water', 'leptospirosis', 'working on live construction sites' for site surveys and mitigation works. During the translocation exercise, hands will be washed before and after checking traps and handling the water voles.

Fencing

6.42 To prevent colonisation of newly created habitat, water vole fencing will be utilised to enclose the water vole mitigation receptor whilst it establishes. This will prevent the receptor becoming colonised by water vole naturally as it establishes and also help keep other predators such as mink or rats out of the receptors. Fencing will also be utilised around the fields to the south of Brumby Common Lane which are to be used as borrow pits. This is necessary as precautionary mitigation since the works have the potential to create habitat for water vole.

6.43 During the trapping exercise, fencing will also be strategically used to prevent capturing of voles from outside the desired areas. The impacted ditches which are to be trapped (D3.6, D3.7, D3.8, D3.9) will be encapsulated within a fence. Where water flows in and out of the ditches the

fence will include a grill which will allow water to flow but prevent water voles from passing through or climbing over.

Fence specification

6.44 Appendix 5 of the Water Vole Mitigation Handbook (Dean et al. 2016) contains details of fence dimensions and materials, maintenance and monitoring, and indicative designs of water vole fencing. The water vole fencing used on Site is based on those specifications, as outlined below.

6.45 The fencing used on Site will be constructed of a flexible solid plastic sheet (such as Herpetosure) or alternatively plywood sheeting. This will be buried to a depth of approximately 50cm, with approximately 120cm showing above ground. The fencing will be supported by wooden posts at approximately 1.5m intervals. These posts will be on the side of the fence which it is designed to exclude voles from, so that they cannot be used by the animals to climb back into the Site.

6.46 The fencing will be set well back from the waterbodies, set at a 90° angle to ground with no inward slant, and will be monitored on a regular basis, with any holes or damage immediately repaired.

6.47 Where fencing is required to span flowing water in a ditch, either heavy gauge weld mesh 15mm x 15mm or holes will be drilled into the fencing (or potentially both, if deemed necessary) that will be used to allow water to flow through but not allow water voles to pass. This will be topped with plastic water vole fencing panels which will overlap the adjoining fencing to prevent animals from climbing over the resulting grid. This will be checked on a daily basis for the build-up of debris which may allow the water to back up.

Release details

6.48 It is not considered that it will be necessary to release the water voles offsite. The proposed water vole receptor will have a length of at least 1154m of banks of suitable water vole habitat that will be created in the north west section of the Site. Therefore, water voles will be released within their home range.

6.49 The 1154m length of the new water vole habitat has the capacity to accommodate 28 breeding female releases based at one female released every 40m. Any males captured could be released at alternate 40m sections as such the receptor site has capacity to accommodate up to 14 water voles.

6.50 Details of the Release Site are provided in detailed landscape proposals. This is planned to be excavated in 2025 and early 2026 The location is within the Site red line boundary and is not within a Designated Site.

6.51 Water voles will be (soft) released on the day they are captured between 1st March and 15th April or the 15th September and 30st November. Water voles will be released into soft release pens within the receptor site. These pens will have been situated within the receptor areas prior to translocation. Each individual water vole will be released into its own pen; no two water voles will be released into the same pen (unless they are clearly siblings of the same brood caught less than 24 hours of each other in the same location). They will be kept in the pen for five days and fed each day. Works will follow the guidance provided by Strachan and Moorhouse (2011). Photo 3 provides an example of the type of release pen that will be used.

Photo 3: Example of Soft Release Pen to be used

6.52 The number of water voles which will be translocated will be a very small number of individuals from the local population and therefore conservation status of the local population will be maintained.

6.53 The new receptor will be comprised of large pond with islands to create channels and larger pools and optimal water vole habitat. The banks will be constructed to the following specification.

- As close as possible to 45 degree (1 in 1) banks;
- a minimum of 0.5m of water depth (year round);
- planting shelf;
- emergent vegetation as a food source and cover; and
- vegetated banks to provide cover.

6.54 The habitat will be established using seeding and plug planting.

Statement Regarding Equipment

6.55 The proposed actions follow best practice guidelines and all of the equipment that is to be used is considered to be of a standard design/ type and has been successfully utilised in previous water vole mitigation by FPCR.

Offsite translocation

6.56 Water voles will not be taken offsite as part of this mitigation scheme.

Disease Risk Management Plan

6.57 As water voles will not be transported offsite, it will not be necessary to produce a disease risk management plan in this case. This does not negate vigilance for anomalies, or the use of good biosecurity as described in Paragraph 6.40. Advice will be sought from a specialist vet regarding any sick or injured voles caught during trapping.

Ownership of the Release Site

6.58 The Client has the consent of the land owner to create and utilise the receptor site.

Captivity Details

6.59 It is not anticipated that water voles will be taken into captivity.

7.0 COMPENSATION

Habitat Creation Details

7.1 The compensation described below is shown on the detailed landscape proposals.

New habitat

7.2 As described in the previous section the new biodiversity enhancement area in the north west of the Site will be utilised as a receptor (see Figure 1.7), creating at least 1154m of new water vole habitat. The broad specification of this habitat is provided in para 6.52. Following completion of the scheme the total length of habitat permanently impacted will be 1129m, as such, the length of habitat created will compensate for this loss and provide a small enhancement in habitat availability. However, the new habitat will significantly increase the water vole habitat quality and therefore the carrying capacity for water voles within the Site.

Management of Retained Ditches

7.3 Continued management of the retained ditches within the applicant's control will ensure sustained provision of suitable water vole habitat on Site. The following management prescriptions are designed to maintain and enhance the habitat quality available.

Bankside vegetation

7.4 Bankside vegetation should be maintained at a level with 10% or less scrub overshading the ditches or 3m back from the toe of the ditch to not hamper herbaceous vegetation growth. To achieve this:

- scrub should be managed on a 3-year rotational basis or as necessary to achieve the desired levels;
- any brash should not be placed within 3m of the toe of the bank although this could be used to create general wildlife habitat outside of this area;
- vegetation cutting would be undertaken on a 3-to-5-year rotational program;
- bank side and top vegetation will only be cut in the late summer between mid-July and mid-September.
- only one bank of any section of ditch will be cut in any one year and only if considered to be necessary;
- vegetation will not be cut to less than 10cm;
- maintenance will only be undertaken using machinery appropriate to the size of the task; and

- arisings should be removed at least 3m away from the toe of the bank but the ground must not be agitated with mechanical rakes in gathering these.

7.5 Consideration for potential impacts to nesting birds and other protected wildlife will be given as part of any habitat management operation.

Emergent and aquatic vegetation and siltation

7.6 Management of emergent and marginal vegetation will be undertaken to maintain the ditch with no more than 60% submerged or floating or emergent vegetation coverage and, therefore, leaving at least 40% open water within the channel. Marginal vegetation should be no less than 30cm wide on each bank. As with the bank side vegetation, management within the channel will be undertaken on a 3-to-5-year rotation (as necessary).

7.7 De-silting operations are to be rotational as far as possible or when necessary, following the principles set out on page 59 of the WVCH.

7.8 Management of emergent and marginal vegetation and de-silting operations follow the same general principles:

- operations will be undertaken no more than 20 - 30% of any ditch in one year, leaving 30m gaps of untouched ditch;
- confine vegetation clearance/desilting works to the centre of the channel leaving a 30 to 50cm fringe of marginal plants along each bank;
- works will be undertaken November to March (outside of the breeding season);
- only work from one bank;
- only use machinery appropriate to the size of the task;
- arisings/spoil will not be placed within 2m of the top of the bank;
- effort must be made not scrape the banks of the ditches.

Mink Monitoring and Management

7.9 Section 4.6.10. of the Water Vole Mitigation Handbook (Dean et al. 2016) states:

> *"Receptor sites will need to be managed to ensure that they continue to provide suitable habitat for water voles throughout the period of the relocation and in the longer term (for permanent receptor sites). This may need to include mink control measures in certain locations, at least until the colony within the receptor site has become established (on-site receptor sites) and in the long term (off-site receptor sites), where there is a constant threat to the population. Receptor sites should also be managed as suitable habitat for water voles in the long term (especially if they are off-setting loss of habitat as a result of development)."*

7.10 As such, a mink monitoring and control program will be carried out, until the receptor sites have become established (during the vegetation establishment period) and for the duration of the water vole monitoring.

7.11 As the WVCH states (page 85):

> *"an average mink territory size … may be 5km (male) and 3km (female), so trapping in only one locality [e.g. Receptor B or D] may simply create a territorial vacuum which will quickly be filled. Only the wider view is likely to have a long-term benefit for water voles."*

7.12 it is proposed that mink monitoring is carried out on as wide scale as possible within site boundary including by the newly created receptor.

7.13 This strategy will involve placing mink monitoring stations ('mink rafts') along each of the water courses at no more than 1km intervals across accessible parts of the Survey Areas.

7.14 Mink raft construction will follow the Game and Wildlife Conservation Trust's 'Mink Raft Guidelines [12]' – the rafts encourage mink to leave evidence of their presence in the form of footprints, and if their presence is identified, can also be used as a trap location. Mink rafts will be monitored monthly, and where mink footprints (or other evidence such as faeces or live sightings) are observed, trapping and control will commence for up to two weeks (or until a mink is caught, if earlier).

7.15 Regarding mink management, the WVCH states (page 84):

> *"the UK Water Vole Steering Group supports in principal the humane control of mink as part of a national plan…for the purposes of water vole conservation. Mink control should follow the UK WVSG guidelines to ensure maximum benefit for water voles… Any mink control project must have a stated objective and be for a defined period and should be reviewed, altered or terminated at specified intervals in the light of the monitoring results."*

7.16 The objective of mink control will be to dispose of mink until the water vole mitigation program and subsequent monitoring period has concluded. Mink control would follow the 'Best Practice Guidelines for Mink Trapping' which can be found at page 85 of the WVCH. This will entail trapping mink prior to their breeding season (i.e. trapping Feb – April), where possible, using the mink rafts mentioned earlier. Trapping will be conducted using live traps (to ensure non-target species are not killed or injured), by sufficiently experienced staff (able to distinguish mink from related species i.e. stoat, weasel, polecat, otter). When in action, traps would be checked at least once every 24 hours, and where mink are trapped, they would be disposed of using a high-powered air-pistol or air-rifle (as per page 89 of the WVCH).

7.17 The mink monitoring will be continued for at least 5 years after the translocation unless specified differently by Natural England within the licence

Summary of Compensation

7.18 The measures outlined above will compensate and provide a degree of enhancement for the permanent loss and isolation of habitat, this will not be realised until the habitat within the new receptor is established. Mink control will be included and would be considered an enhancement should any mink be successfully eradicated.

12 Available at: https://www.gwct.org.uk/advisory/guides/mink-raft-guidelines/ and https://www.gwct.org.uk/media/557953/GWCT-Mink-Raft-guidelines2015.pdf

APPENDIX 1A – DETAILED SURVEY RESULTS

Early and late season survey results

Ditch ref	Length	Survey ref	Survey method	Latrines found	Latrines per 100m	Other signs present		Survey Population estimate
D2.5	365m	1	Not surveyed	N/A	N/A	N/A		N/A
		2	Raft check	16	4.4	Burrows	0	Low
						Feeding	1	
						Other	18	
D3.1a	111m	1	Full	2	1.8	Burrows	10	Low
						Feeding	0	
						Other	8	
		2	Full	0	0	Burrows	3	Low
						Feeding	0	
						Other	4	
D3.1b	560m	1	Full	0	0	Burrows	23	Low
						Feeding	1	
						Other	1	
		2	Full	28	5	Burrows	50	Low
						Feeding	15	
						Other	36	
D3.2	260m	1	Full	4	1.5	Burrows	6	Low
						Feeding	14	
						Other	6	
		2	Full	0	0	Burrows	11	Low
						Feeding	4	
						Other	2	
D3.3	250m	1	Spot check	0	0	Burrows	0	None
						Feeding	0	
						Other	0	
		2	Raft check	0	0	Burrows	0	None
						Feeding	0	
						Other	0	
D3.4	215m	1	Spot check	0	0	Burrows	1	Low
						Feeding	0	
						Other	0	
		2	Raft check	15	7	Burrows	0	Medium
						Feeding	0	
						Other	2	
D3.6	340m	1	Spot check / Full where accessible	1	0.3	Burrows	3	Medium (assumed due to constraint)
						Feeding	8	
						Other	4	
		2	Partial Raft check	0	0	Burrows	0	Low
						Feeding	2	
						Other	0	
D3.7	340m	1	Spot check	0	0	Burrows	1	Low
						Feeding	2	
						Other	0	

Ditch ref	Length	Survey ref	Survey method	Latrines found	Latrines per 100m	Other signs present		Survey Population estimate
		2	Raft check	0	0	Burrows	0	Low
						Feeding	0	
						Other	1	
D3.8	325m	1	Spot check	0	0	Burrows	2	Low
						Feeding	12	
						Other	1	
		2	Raft check	0	0	Burrows	2	Low
						Feeding	0	
						Other	0	
D3.9	100m	1	Spot check	1	1	Burrows	2	Low
						Feeding	0	
						Other	0	
		2	Raft check	0	0	Burrows	0	None
						Feeding	0	
						Other	0	
D3.11	77m	1	Full	0	0	Burrows	0	None
						Feeding	0	
						Other	0	
		2	Full	0	0	Burrows	0	None
						Feeding	0	
						Other	0	
D3.12	340m	1	Spot check	0	0	Burrows	0	None
						Feeding	0	
						Other	0	
		2	Raft check	0	0	Burrows	0	None
						Feeding	0	
						Other	0	
D4.2a -c	238m	1	Not surveyed	N/A	N/A	Burrows	0	N/A
						Feeding	0	
						Other	0	
		2	Full	0	0	Burrows	2	Low
						Feeding	8	
						Other	0	
D4.5a	555m	1	Not surveyed	N/A	N/A	Burrows	0	N/A
						Feeding	0	
						Other	0	
		2	Full	0	0	Burrows	1	Low
						Feeding	1	
						Other	1	
D4.6	150m	1	Full	2	1.3	Burrows	7	Low
						Feeding	29	
						Other	3	
		2	Full	0	0	Burrows	1	Low
						Feeding	1	
						Other	0	
D4.11	150m	1	Full	0	0	Burrows	7	Low
						Feeding	7	
						Other	0	

Ditch ref	Length	Survey ref	Survey method	Latrines found	Latrines per 100m	Other signs present		Survey Population estimate
		2	Full	0	0	Burrows	1	Low
						Feeding	0	
						Other	0	
D4.12	215m	1	Spot check	0	0	Burrows	1	Low
						Feeding	1	
						Other	0	
		2	Raft check	0	0	Burrows	15	Low
						Feeding	0	
						Other	0	
D4.13	185m	1	Full	3	1.6	Burrows	31	Low
						Feeding	7	
						Other	0	
		2	Full	0	0	Burrows	0	Low
						Feeding	0	
						Other	0	
D4.14	275m	1	Partial	0	0	Burrows	0	Low
						Feeding	5	
						Other	0	
		2	Raft check	0	0	Burrows	0	Low
						Feeding	2	
						Other	0	
D4.15 a	235m	1	Full	1	0.4	Burrows	22	Low
						Feeding	80	
						Other	1	
		2	Full	4	1.7	Burrows	4	Low
						Feeding	1	
						Other	9	
D4.15 b	150m	1	Full	0	0	Burrows	6	Low
						Feeding	0	
						Other	0	
		2	Full	0	0	Burrows	1	Low
						Feeding	0	
						Other	0	
D5.1	300m	1	Spot check	0	0	Burrows	2	Low
						Feeding	0	
						Other	0	
		2	Raft check	0	0	Burrows	0	None
						Feeding	0	
						Other	0	
D5.2	575m	1	Spot check	0	0	Burrows	1	Low
						Feeding	2	
						Other	1	
		2	Inaccessible	0	0	Burrows	0	None
						Feeding	0	
						Other	0	

APPENDIX 1B: HABITAT SUITABILITY PRIOR TO MANAGEMENT

Ditch Ref	Picture	Description		Survey method	Habitat suitability prior to management
D2.5		Length	365m	Partial (Raft checked)	Optimal
		Water Depth	<50cm		
		Width	1-2m		
		Substrate	Silt/ mud		
		Flow	Sluggish		
		Profile	Steep >45º		
		Bank substrate	Earth		
		Vegetation	Reeds / Herbs / Tall grass		
		Comment	Not surveyed during the early season due to H&S concerns. The gradient of the banks were very steep but the bank vegetation was unmanaged and considered suitable for water voles. During the late season, the surveyors found the ditch to be safe to access. As such, the ditch was rafted for the second survey. The eastern end of the ditch has a concrete base for approximately 10m.		

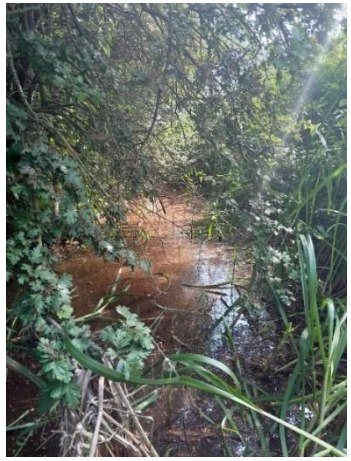
Ditch Ref	Picture	Description		Survey method	Habitat suitability prior to management
D2.8			Ditch was dry, with no sign of recent water retention.	N/A	Negligible
D3.1a		Length	111m	Full	Optimal
		Depth	<50cm		
		Width	1-2m		
		Substrate	Silt/ mud		
		Current	Sluggish		
		Profile	Steep >45°		
		Bank substrate	Earth/ Concrete		
		Vegetation	Reeds /Rushes /Herbs /Tall grass /Submerged plants		
		Comment	Concrete base of western end for approximately 10mnear culvert.		
D3.1b		Length	560m	Full	Optimal
		Depth	<50cm		
		Width	1-2m		
		Substrate	Silt/ mud		
		Current	Sluggish		

Ditch Ref	Picture	Description		Survey method	Habitat suitability prior to management
		Profile	Steep >45º		
		Bank substrate	Earth		
		Vegetation	Reeds /Sedges /Herbs /Tall grass /Submerged plants		
		Comment	Heavily silted ditch - surveyed from the bank top. Polluted water with oil slicks present.		
D3.2		Length	260m	Full	Optimal
		Depth	<50cm		
		Width	1-2m		
		Substrate	Silt/ mud		
		Current	Slow		
		Profile	Steep >45º		
		Bank substrate	Earth		
		Vegetation	Reeds /Sedges /Herbs /Tall grass /Rushes		
		Comment	Dense vegetation.		
D3.3		Length	250m	Partial (Raft checked)	Suitable but poor
		Depth	50cm - 1m		

Ditch Ref	Picture	Description		Survey method	Habitat suitability prior to management
		Width	1-2m		
		Substrate	Silt/ mud		
		Current	Slow		
		Profile	Steep >45º		
		Bank substrate	Earth		
		Vegetation	Bramble /Trees /Herbs /Bushes		
		Comment	Bramble dense - sporadic spot checking from bank. Rafted for second survey.		
D3.4		Length	215m	Partial (Spot checked and Raft Checked)	Optimal
		Depth	50cm – 1m		
		Width	1-2m		
		Substrate	Silt/ mud		
		Current	Sluggish		
		Profile	Steep >45º		
		Bank substrate	Earth		
		Vegetation	Reeds /Rushes /Herbs /Tall grass		
		Comment	Dense Vegetation and deep water – spot checked. Rafted for second phase survey.		
D3.5		Length	140m	N/A	Negligible

Ditch Ref	Picture	Description		Survey method	Habitat suitability prior to management
		Depth	Mostly Dry		
		Width	1-2m		
		Substrate	Silt/ mud		
		Current	Static		
		Profile	Steep >45º		
		Bank substrate	Earth		
		Vegetation	Trees /Bushes		
		Comment	Woodland ditch, mostly dry. Wetter during 2nd survey, but generally unsuitable.		
D3.6		Length	340m	Partial / Full (Middle section rafted as veg too dense).	Optimal
		Depth	<50cm		
		Width	1-2m		
		Substrate	Silt/ mud		
		Current	Static		
		Profile	Steep >45º		
		Bank substrate	Earth		
		Vegetation	Reeds /Sedges /Herbs /Tall grass /Short grass /		

Ditch Ref	Picture	Description		Survey method	Habitat suitability prior to management
		Comment	Matted vegetation restricted view. Surveyed two days after heavy rain. Rafts placed in central section where vegetation was dense, but rafts destroyed during management.		
D3.7		Length	340m	Partial (Spot checked and Rafted)	Suitable but poor
		Depth	<50cm		
		Width	1-2m		
		Substrate	Silt/ mud		
		Current	Static		
		Profile	Steep >45º		
		Bank substrate	Earth		
		Vegetation	Reeds /Sedges /Herbs /Bushes /Trees /		

Ditch Ref	Picture	Description		Survey method	Habitat suitability prior to management
		Comment	Southern end of ditch dry. Remaining section mostly dry in hedgerow and largely inaccessible. Northern section retaining water. Rafted for late season surveys, some rafts destroyed during management.		
D3.8		Length	325m	Partial (Spot checked and Rafted)	Good
		Depth	<50cm		
		Width	1-2m		
		Substrate	Silt/ mud		
		Current	Static		
		Profile	Steep >45º		
		Bank substrate	Earth		
		Vegetation	Reeds /Sedges /Herbs /Sedges /Tall grass /		
		Comment	Dense vegetation, spot checked. Rafted for late season surveys, most rafts destroyed during management.		

Ditch Ref	Picture	Description		Survey method	Habitat suitability prior to management
D3.9		Length	100m	Partial (Spot checked and rafted)	Suitable but poor
		Depth	<50cm		
		Width	1-2m		
		Substrate	Silt/ mud		
		Current	Static		
		Profile	Steep >45º		
		Bank substrate	Earth		
		Vegetation	Reeds /Sedges /Rushes /Tall grass /Trees /Bushes		
		Comment	Deep silt substrate, dense and scrubby vegetation, therefore spot checked. Rafted for late season surveys, vegetation on banks cuts and majority of rafts destroyed during management.		
D3.11		Length	77m	Full	Negligible
		Depth	Mostly Dry		
		Width	1-2m		
		Substrate	Silt/ mud		
		Current	Static		
		Profile	Steep >45º		

Ditch Ref	Picture	Description		Survey method	Habitat suitability prior to management
		Bank substrate	Earth		
		Vegetation	Rushes /Herbs /Sedges /Bank trees /Bushes		
		Comment	Almost dry, scarce food and cover availability.		
D3.12		Length	Ditch	Partial (spot checked and raft checked)	Suitable but poor
		Depth	<0.5m		
		Width	1-2m		
		Substrate	Silt / Mud		
		Current	Static		
		Profile	Shallow <45º		
		Bank substrate	Earth		
		Vegetation	Long grass /Herbs /Bank tree /Bushes		

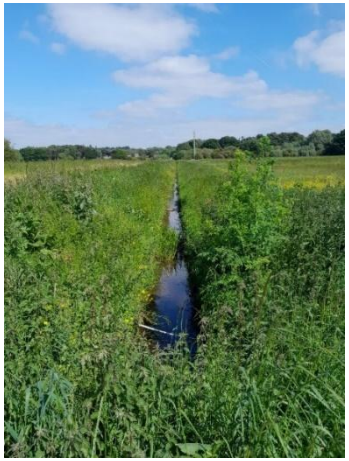
Ditch Ref	Picture	Description		Survey method	Habitat suitability prior to management
		Comment	Majority of ditch was dry, with small pockets of wet ditch to the north. These areas were difficult to access, but spot checked where possible. Rafted for second survey, some rafts destroyed during management.		
D3.13		Length	260m	N/A	Negligible
		Depth	Dry		
		Width	1-2m		
		Substrate	Silt/ mud		
		Current	N/A		
		Profile	Shallow <45º		
		Bank substrate	Earth		
		Vegetation	Trees /Bushes /Herbs		
		Comment	Dry ditch, no sign of recent water retention.		
D4.2a-c		Length	238m	Full	Good
		Depth	<50cm		

Ditch Ref	Picture	Description		Survey method	Habitat suitability prior to management
		Width	<1m		
		Substrate	Silt/ mud		
		Current	Static		
		Profile	Steep >45º		
		Bank substrate	Earth		
		Vegetation	Reeds /Rushes /Tall grass		
		Comment	Vegetation cut on both banks but vegetation remains within the water. Earth bridge stops connectivity to southern portion of the ditch. Only surveyed in late season.		
D4.5a		Length	555m	Full	Good
		Depth	<50cm		
		Width	<1m		
		Substrate	Silt/ mud		
		Current	Static		
		Profile	Steep >45º		
		Bank substrate	Earth		
		Vegetation	Reeds /Rushes /Tall grass		

Ditch Ref	Picture	Description		Survey method	Habitat suitability prior to management
		Comment	Vegetation cut on both banks but vegetation remains within the water. Only surveyed in late season.		
D4.6	N/A	Length	150m	Spot checked and Rafted)	Good
		Depth	<50cm		
		Width	1-2m		
		Substrate	Silt/ mud		
		Current	Static		
		Profile	Steep>45º		
		Bank substrate	Earth		
		Vegetation	Reeds /Herbs /Sedges /Rushes /Tall grass		
		Comment	Approximately 15m of the northern section wet, but remaining southern area dry.		

Ditch Ref	Picture	Description		Survey method	Habitat suitability prior to management
D4.8		Length	170m	N/A	Negligible
		Depth	<50cm		
		Width	1-2m		
		Substrate	Silt/ mud		
		Current	Static		
		Profile	Steep >45º		
		Bank substrate	Earth		
		Vegetation	Reeds /Trees /Bushes /Sedges /Rushes /Tall grass		
		Comment	Dry and very dense with vegetation.		
D4.9			Dry, no sign of recent water retention.	N/A	Negligible

Ditch Ref	Picture	Description		Survey method	Habitat suitability prior to management
D4.10			This ditch was dry, and had no signs of recent water retention.	N/A	Negligible
D4.11		Length	150m	Full	Good
		Depth	<50cm		
		Width	1-2m		
		Substrate	Silt/ mud		
		Current	Sluggish		
		Profile	Steep >45º		
		Bank substrate	Earth		
		Vegetation	Reeds /Sedges /Rushes /Tall grass /Herbs		
		Comment	N/A		
D4.12		Length	215m	Partial (Spot checked and Rafted)	Optimal
		Depth	<50cm		
		Width	<1m		

Ditch Ref	Picture	Description		Survey method	Habitat suitability prior to management
		Substrate	Silt/ mud		
		Current	Static		
		Profile	Steep >45º		
		Bank substrate	Earth		
		Vegetation	Reeds /Tall grass /Herbs		
		Comment	Largely dry, reed cover very dense – spot checked. Rafted for late season surveys, majority of rafts destroyed during management.		
D4.13		Length	185m	Full	Good
		Depth	<50cm		
		Width	1-2m		
		Substrate	Silt/ mud		
		Current	Sluggish		
		Profile	Steep >45º		
		Bank substrate	Earth		
		Vegetation	Reeds /Sedges /Rushes /Tall grass /Herbs		
		Comment	Largely dry, reed cover very dense in small patches – spot checked.		
D4.14	N/A	Length	275m		Optimal

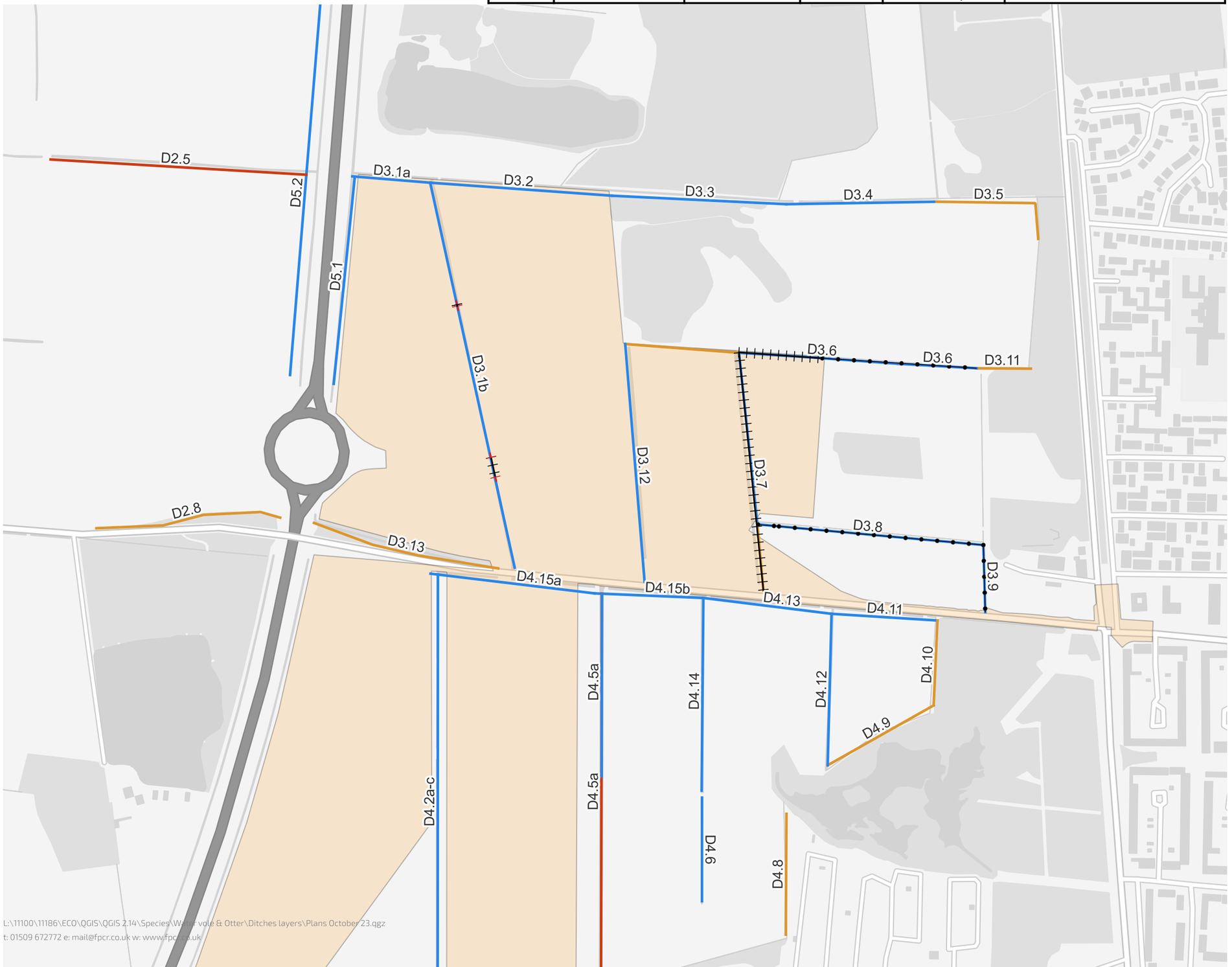
Ditch Ref	Picture	Description		Survey method	Habitat suitability prior to management
		Depth	<50cm	Partial (Spot checked and Rafted)	
		Width	1-2m		
		Substrate	Silt/ mud		
		Current	Static		
		Profile	Steep >45º		
		Bank substrate	Earth		
		Vegetation	Reeds /Sedges /Rushes /Tall grass		
		Comment	Dense vegetation – spot checked. Rafted for late season surveys, majority of rafts destroyed during management.		
D4.15a		Length	235m	Full	Good
		Depth	<50cm		
		Width	1-2m		
		Substrate	Earth		
		Current	Sluggish		
		Profile	Steep >45º		
		Bank substrate	Silt/ mud		
		Vegetation	Reeds /Herbs /Sedges /Rushes /Tall grass		
		Comment	Very dense vegetation		

Ditch Ref	Picture	Description		Survey method	Habitat suitability prior to management
D4.15b		Length	150m	Full	Good
		Depth	<50cm		
		Width	1-2m		
		Substrate	Silt/ mud		
		Current	Sluggish		
		Profile	Steep >45º		
		Bank substrate	Earth		
		Vegetation	Reeds /Herbs /Sedges /Rushes /Tall grass		
		Comment	N/A		
D5.1		Length	300m	Partial (spot check and rafted)	Negligible
		Depth	<50cm		
		Width	1-2m		
		Substrate	Silt/ mud		
		Current	Static		
		Profile	Shallow <45º		
		Bank substrate	Earth		
		Vegetation	Reeds /Trees /Bushes /Short grass /Rushes /Tall grass /Floating plants		

Ditch Ref	Picture	Description		Survey method	Habitat suitability prior to management
		Comment	Ditch within scrub. Poor cover and food availability, exposed under scrub. Deep silt and restricted access, therefore spot checked from bank. Concrete banks for approximately 40m at northern end. Rafted for late season surveys where accessible.		
D5.2		Length	575m	Partial (Sporadic spot checks)	Suitable but poor
		Depth	<50cm		
		Width	1-2m		
		Substrate	Silt/ mud		
		Current	Static		
		Profile	Steep >45º		
		Bank substrate	Earth		
		Vegetation	Reeds /Bushes /Short grass /Rushes /Sedges		

Ditch Ref	Picture	Description		Survey method	Habitat suitability prior to management
		Comment	Dense vegetation reduced access, therefore spot checked here possible. Concrete banks for 100m around connection with D2.5 and culvert under M181. Inaccessible during late season surveys due to dense vegetation cover.		

Ditch Ref	Permanent Loss (m)	Tempory Loss (m)	Isolated (m)	Habitat Suitability	Pop density
D3.1b	28	20	0	Optimal	Low
D3.1b	2	20	0	Optimal	Low
D3.6	119	0	220	Optimal	Medium (assumed due to constraint)
D3.7	339	0	0	Suitable but poor	Low
D3.8	30	0	294	Good	Low
D3.9	0	0	97	Suitable but poor	Low



N

0 100 200 m

Site boundary

Ditches location

Surveyed

Not Surveyed

Dry

Ditches Impacted

Permanent Loss

Tempory Loss

Isolated habitat

Total permanent impacts

Total Lost (m)	Total Isolated (m)	Total Impacted (m)
518	611	1129

date 03/02/25

drwn/chkd CAG / ET

client
Hargreaves Land Limited

project
Lincolsnhire Lakes (North)
Scunthorpe

title
IMPACTED DITCHES PLAN

scale 1:9,500 @ A3

number
FIGURE 1.1

rev -

L:\11100\11186\ECO\QGIS\QGIS 2.14\Species\Water vole & Otter\Ditches layers\Plans October 23.qgz
t: 01509 672772 e: mail@fpcr.co.uk w: www.fpcr.co.uk

FPCR | environment & design

N

0 100 200 m

Site boundary

Ditches

Water vole signs

Trampled latrine

Burrows

Untrampled latrine

date	drwn/chkd
16/01/25	CAG / ET

client

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project

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title	scale
1ST PHASE WATER VOLE SURVEY RESULTS	1:9,000 @ A3
number	rev
FIGURE 1.2	-

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N

0 100 200 m

Site boundary

Ditches

Water vole signs

Trampled latrine

Burrows

Untrampled latrine

date	drwn/chkd
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client

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title	scale
2ND PHASE WATER VOLE SURVEY RESULTS	1:9,000 @ A3
number	rev
FIGURE 1.3	-

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N

0 100 200 m

Site boundary

Ditch suitability

- Optimal
- Good
- Suitable but poor
- Negligible

date	drwn/chkd
16/01/25	CAG / ET

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title	scale
HABITAT SUITABILITY PRIOR TO MANAGEMENT	1:9,000 @ A3
number	rev
FIGURE 1.4	-

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N

0 100 200 m

Site boundary

Ditch management

- High management
- Partial Management
- No Management

date	drwn/chkd
16/01/25	CAG / ET

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Scunthorpe

title	scale
DITCH MANAGEMENT PLAN	1:9,000 @ A3

number	rev
FIGURE 1.5	-

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\\FPCR-FS-01\Projects2\11100\11186\ECO\QGIS\QGIS 2.14\Plans\Riparian Mammal Survey\11186-E-01 Water vole Plan Sept 2022.qgs

t: 01509 672772 e: mail@fpcr.co.uk w: www.fpcr.co.uk

N

0 100 200 m

Site boundary

Ditch flow

- Dry
- Static
- Sluggish
- Slow

Connectivity

- Culvert
- No connection

date	drwn/chkd
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title	scale
DITCH FLOW AND CONNECTIVITY PLAN	1:9,000 @ A3
number	rev
FIGURE 1.6	-

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N

0 100 200 m

Water vole mitigation area

D2.5 D3.1a D3.2 D3.3 D3.4 D3.5

D5.2 D5.1

BG1

D3.1b D3.12

D3.6 D3.11 D3.7 D3.8 D3.9

D3.13 D4.15A D4.15B D4.13 D4.11

D4.2a-c D4.5A D4.14 D4.12 D4.10 D4.9

- Site boundary
- Displacement area
- Trap and translocate area
- Water vole fence

date	drwn/chkd
16/01/25	CAG / ET

client
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title	scale
WATER VOLE MITIGATION PLAN	1:5,700 @ A3

number	rev
FIGURE 1.7	-

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