

WINTERINGHAM INGS TO SOUTH FERRIBY FLOOD
ALLEVIATION SCHEME

Water Vole Mitigation Strategy

Prepared for

Environment Agency

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Appendix A: Figures

- Location of Surveyed Drains for Water Voles (Haycock & Jay, July 2018)
- Figure 5.4 to ES - Water Vole Mitigation Plan - IMAN002289-CH2-00-300-DR-EN-0004

Appendix B: Water Vole Exclusion Fencing

Appendix C: Record of Water Vole Displacement

Appendix D: Tool Box Talk – Contractor Signatures

Appendix E: Water Vole Field Signs Guide

Document History

Winteringham Ings to South Ferriby Flood Alleviation Scheme

Water Vole Mitigation Strategy

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Notice:

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1. Introduction

1.1. Background

This Water Vole Mitigation Strategy (WVMS) has been prepared for the Winteringham Ings to South Ferriby flood alleviation scheme, hereafter referred to as the 'proposed scheme'. The proposed scheme location and design drawings are shown as Figure 1 below and Appendix A. The proposed scheme comprises of improvements to the existing tidal flood defences at South Ferriby, including managing the erosion risk using set-back defences to the south of Fulseas pumping station, and using new walls and gates to reduce flooding to properties east and west of South Ferriby Sluice during extreme flood events.

The existing landscape within the proposed scheme alignment supports a network of drains, which were surveyed for water vole *Arvicola amphibius* by Haycock & Jay Consulting in 2017 and 2018. The surveys confirmed the presence of water vole within five drains: two drains (ref 10 & 37) to the south of Sluice Road and three hydrologically connected drains north of Sluice Road, including Fulseas Drain (ref 3b) and drains 1a and 1b. Water vole signs were also recorded to the south of the proposed scheme in 2017 and 2018, albeit at a lower density (ref D3). Appendix A includes figures produced by Haycock & Jay Consulting, showing the Drain locations.

The Environmental Impact Assessment (EIA) confirmed the proposed scheme alignment to dissect Fulseas Drain, resulting in a potential direct negative impact upon the water vole population. The EIA identified the requirement for a WVMS to ensure the welfare of water vole is secured throughout all phases of the scheme.

This WVMS therefore sets out water vole mitigation for the proposed scheme. This is achieved by remaining compliant with the legislative protection afforded to water vole and in accordance with Natural England's (NE) licencing. The mitigation has been developed based on guidance set out in the 'Water Vole Mitigation Handbook' – The Mammal Society Mitigation Guidance Series' (Strachan *et al.*, 2016).

1.2. Scheme description

The scheme comprises works to improve the standard of flood protection to properties in South Ferriby and to the CEMEX to the west of the village, along with other assets (for example roads and agricultural land). The works consist of the raising of existing embankments, the construction of new embankments, sections of hard defences (flood walls) adjacent to properties, public highways and watercourses; and the provision of a number of demountable defences.

Construction works are currently programmed to commence in March 2019 and be completed by the end of December 2020. The source of some of the material for the new embankments will be a local quarry and will be transported to site by conveyor belt to the CEMEX site.

The scheme design and description of works is provided below. Construction activities underlined relate to where the works are located close to drains that support water voles.

West of Ferriby Sluice

- Raising existing embankments approximately 555m length, north of CEMEX
- Relocate existing soak dyke behind the raised, existing embankment
- Construction of a new embankment west of CEMEX, approximately 1120m in length.
- New demountable defences across A1077 with adjacent small sections of new wall to tie-in with new CEMEX embankment on the south and existing raised embankment on the north
- New embankment access slope to be provided for maintenance purpose.
- New wall on the left bank of River Ancholme to tie-in with existing parapet wall over West Drain.

From East Drain to Ferriby Sluice

- New flood wall around the back of two residential properties near the Hope and Anchor public house, which will tie into a wall along the A1077
- New demountable defences into the Hope and Anchor public house area
- New demountable defences across A1077 on either side of the sluice
- Flood wall along the right bank of the River Ancholme, to tie-in with existing buildings
- Re-grading of existing ground in area of existing Environment Agency site compound, to divert flood water into the River Ancholme

East of Ferriby Sluice

- New set-back embankment approximately 1,074m in length, to the south of the existing flood defence, to tie in with high ground, with provision to maintain existing accesses over the bank
- Turning head for maintenance vehicles at eastern end of new embankment
- New toe drains along new embankment
- Culvert and control to prevent tidal inundation where new embankment crosses Fulseas Drain
- New flood wall to replace existing wall along eastern bank of East Drain
- Replace existing wall with new flood wall and provide demountable defences on footbridge over East Drain.

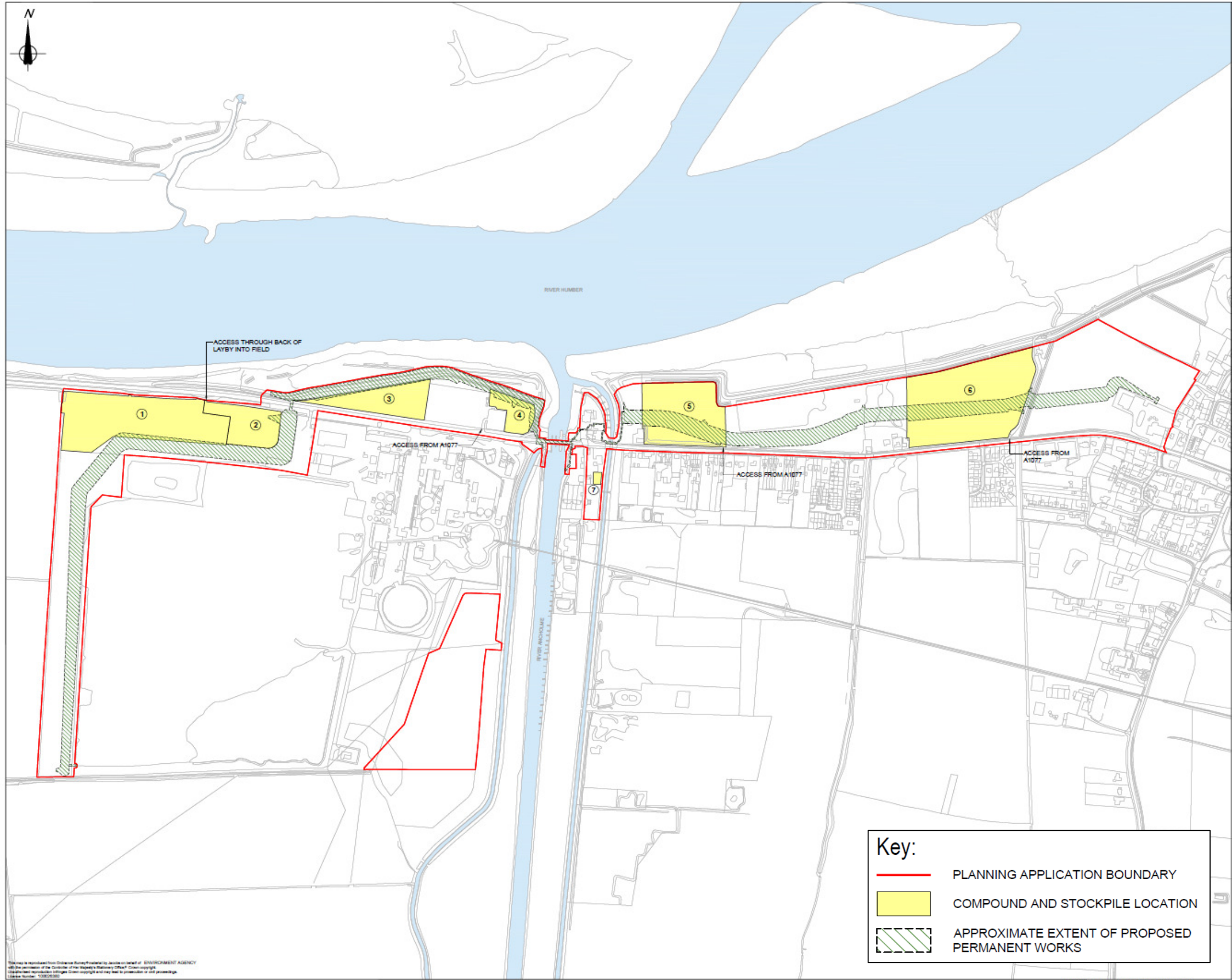


Figure 1: Scheme area boundary, embankment locations and compound locations

1.3. Scope of mitigation strategy

This WVMS details the approach and timing of mitigation for the water vole population at South Ferriby. The mitigation will be completed in accordance with the Natural England Organisational Licence (WML-OR23) held by the Environment Agency (EA). The licence is conditioned for use on flood alleviation and drainage works for the purpose of water vole displacement 'disturbance of water vole in their burrows and damage to water vole burrows by displacement'. Under the conditions of the licence, works are permitted up to 150m of a given watercourse, where both bank sides are affected.

The approach to water vole displacement is presented in this WVMS, together with other mitigation measures that are required to maintain the favorable conservation status of the local water vole population. Other mitigation measures include the following:

- Installation of temporary water vole exclusion fencing to facilitate displacement and to protect water voles during construction
- Control of American mink *Neovison vison* to reduce the risk of water vole predation prior to displacement
- Habitat creation and enhancement to reduce the effects of fragmentation on the water vole population and to increase the available extent of aquatic habitat for water voles to exploit post construction.

Key elements of the water vole mitigation are shown in **Appendix A – IMAN002289-CH2-00-300-DR-EN-0004**.

1.4. Legislation and strategies for conservation

Water voles and their burrows are protected against damage and disturbance under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). This makes it an offence to:

- Intentionally kill, injure or take (capture) water voles;
- Intentionally or recklessly damage, destroy or obstruct access to any structure or place used for shelter or protection by a water vole;
- Intentionally or recklessly disturb a water vole while it is occupying such a place;
- Possess, sell, control or transport live or dead water voles or parts of them (not water voles bred in captivity).

A place of shelter used by water voles refers to a network of active burrows and/or nest site established within the burrow, or above ground amongst dense vegetation.

Water vole are listed as a species of Principle Importance under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006. Under the NERC Act, the Secretary of State must take steps to further the conservation of the living organisms and promote public bodies to take active steps in promoting biodiversity. This is achieved through planning policies and strategies for conservation.

Water vole is listed on the Lincolnshire Local Biodiversity Action Plan (LBAP) (2011 – 2020). The LBAP states that whilst water voles are declining on a national scale, Lincolnshire supports a stable population that is generally widespread throughout the county. Surveys throughout Lincolnshire have reflected how vulnerable water vole are to local extinction,

which can result from a number of factors; development, land drainage, predation, pollution and unrestricted grazing from farming practice.

1.5. Licensing

The Organisational Licence held by the Environment Agency (WML-OR23), allows for water vole displacement up to 150m on either side of a water course. The licence permits the following activities for displacement:

- Removing vegetation back to bare earth
- Water draw down or removal
- Carrying out destructive search of water vole burrows after appropriate monitoring period where no fresh field signs are recorded, following vegetation removal
- Destroying water vole burrows.

Relative to the permitted displacement activities, key conditions of the licence include the following:

- Displacement can only be conducted within two windows: 1) 15th February and 15th April inclusive and 2) 15th September and 31st October inclusive
- Displacement should be undertaken when temperatures are generally >5°C because prolonged periods of cold weather will reduce the likelihood of water voles moving by displacement
- The mitigation identifies a suitable receptor site that can support and secure the welfare of displaced water voles
- The licence will be implemented by a competent person.

The Organisational License does not permit the trapping of water vole for relocation purposes.

Mitigation in the form of a net conservation gain for water voles (i.e. creation of new water vole habitat and/or improving linkages between water vole colonies) is not a requirement of the Organisational Licence. However, where works are being undertaken for conservation purposes, the works should include habitat creation or enhancement such that the scheme will deliver an overall net conservation gain. Where works are being undertaken for flood defence purposes, the licence does not require the delivery of a net conservation gain, because the purpose is for preserving public health and safety. However, under wider environmental duties for a protected species, consideration should always be given to creating a net conservation gain as part of construction operations.

1.6. Water vole ecology

Water voles exhibit strong preferences to habitats that contain dense riparian vegetation, including those with grass tussocks and emergent vegetation with little or no over-shading by dense scrubs or trees. Runs are made in dense bankside vegetation, which provide shelter and food sources, up to 5-8m from the water's edge (Strachan *et al.*, 2016).

The water vole typical breeding season extends from April to September, with adults rearing on average between three to four litters. Young are weaned for two weeks and by the third week are independently marking their territory. Nest sites are usually within underground burrows, although nests can also be established above ground within dense vegetation.

Generally, water vole favors slow-flowing and relatively deep water, over 1 m depth. They favor steep bank sides, i.e. gradient 1 in 1, which extend above flood levels (1 in 100-year flood). This allows water voles to build a series of holes to adapt to changing water levels.

Although water vole may remain locally common, the overall national trend shows a decline of this species. Predation by American mink forms the greatest threat to water voles, which can cause fragmentation and local extinction. Mink enter water vole burrows and remove the entire population by repeatedly returning to the same nest to predate individuals.

2. Baseline Conditions

Haycock & Jay Consulting produced two reports for the water vole surveys completed in 2017 and 2018 (ref. November 2017 and July 2018). The key survey findings are detailed in this WVMS. **Appendix A – Figures 2a and 2b** shows the drain reference numbering and combined water vole survey findings from 2017 and 2018 (figures extracted from Haycock & Jay, July 2018).

Table 2.1 provides a summary of the water vole survey findings, with water vole confirmed as present in the following drains:

- 2017: 1a, 1b, D3 and 3b (Fulseas Drain).
- 2018: D3, 3b, 10 and 37.

Drains 1a, 1b, D3 and 3b are all hydrologically linked, with a culvert under Sluice Road remaining passable for water voles. Water voles present in these connected drains are likely to form a single population. Drain 10 and 37 reflect a separate water vole population due to being located at the scheme’s western extent, by CEMEX. Drains 3b and 1b were concluded to support a medium population of water voles, with all other drains supporting a low water vole population. The assessment of a water vole population is based on the number of latrines within 100m survey sections, as established by Haycock & Jay Consulting (July 2018). It is important to note however, that water vole populations will regularly fluctuate.

Mink scat have been recorded in four ditches (C, 1d, 3b, 10 and 37). The presence of mink is likely to be widespread throughout the scheme extent and the surrounding landscape where favorable hydrological connections persist.

Table 2.1: Summary water vole survey findings 2017 and 2018

| Drain ref | Drain Character | 2017 Findings | 2018 Findings |
|-----------|---|---|--|
| A | Large field ditch with steep embankments, south of Sluice Road. Densely vegetated with common reed <i>Phragmites australis</i> . Sub-optimal for water vole due to persistent dry conditions during 2017 and 2018. | No water vole, drain was dry. | No water vole, drain was dry. |
| B | Large field ditch with steep embankments. Densely vegetated with common reed. Sub-optimal for water vole. | No water vole, drain was dry. | No water vole, drain was dry. |
| C | Large ditch adjacent to coastal habitat, common reed dominated, with areas of scrub. The central section of ditch is water logged with areas reaching a depth of 10-20cm. The habitat was noted as suitable for water vole in 2018. | No water vole, mostly dry. Mink scat observed. | No water vole, mostly dry, central section of drain holds water. |
| D1 | No ditch character, otherwise a hedgerow. | No drain present | No drain present |

| Drain ref | Drain Character | 2017 Findings | 2018 Findings |
|-----------|--|--|--|
| D2 | Small field ditch with hedgerow, part wet with floating sweet-grass <i>Glyceria fluitans</i> , willowherb <i>Epilobium</i> and shrubs. The ditch is suitable for water vole. | No, rodent feeding station, not confirmed as water vole. | No water vole, drain was dry. |
| D3 | Ditch with steep embankments, which are densely vegetated by scrub and tall ruderal. Water depth <10cm with a deep silt layer. The ditch is 1.5m wide and is suitable for water vole. | Water vole present , one latrine located. | Water vole present , latrine in north of ditch. |
| D4 | Ditch located adjacent to a hedgerow, 1m wide & water depth of 20-30cm. Vegetation characterised by scrub and tall ruderal. | No, rodent feeding station, not confirmed as water vole. | No water vole, although suitable habitat. |
| D5 | Ditch located south of Sluice Road with steep earth banks, approximately 1m wide and water depth 20-30cm in 2017. Tall ruderal and scrub present. The ditch is suitable for water vole. | No, field vole only. | No water vole, drain was dry. |
| 1a | Large ditch running parallel with existing embankment, steep embankments and water depth ranges from 50-100cm. Dense common reed and patches of scrub. The ditch is suitable for water vole. | Water vole present , latrines located. | Potential burrow & feeding remains typical of water vole. |
| 1b | Continuation of 1a with steep embankments and water depth ranges from 50-100cm. Dense common reed and patches of scrub. The ditch is suitable for water vole. | Water vole present , latrines located. | No water vole, although suitable habitat. |
| 1c | Continuation of 1b with steep embankments and water depth ranges from 50-100cm. Dense common reed and patches of scrub. The ditch is suitable for water vole. | No water vole. | No water vole, although suitable habitat. |
| 1d | 2m wide ditch running parallel with existing embankment. Water depth 50-100cm and dominated by common reed. Suitable for water vole. | No water vole. | No water vole, although suitable habitat. Mink scat observed. |
| 1e | Continuation of 1d, wide ditch running parallel with existing embankment. Water depth 50-100cm and dominated by common reed. Suitable for water vole. | No water vole. | No water vole, although suitable habitat. |
| 3a | Ditch bordering a residential garden, approximately 1m wide and 50cm deep. A hedgerow runs parallel with the ditch. Sub-optimal for water vole due to lack of in-channel vegetation. | No water vole. | No water vole, although suitable habitat. |

| Drain ref | Drain Character | 2017 Findings | 2018 Findings |
|------------------------|--|--|---|
| 3b Fulseas Drain | Linear ditch to the south of the existing embankment, steep sided with tall grass species. In channel water depth 20-30cm with yellow flag-iris <i>Iris pseudacorus</i> , water mint <i>Mentha aquatica</i> and brooklime <i>Veronica beccabunga</i> . The ditch is suitable for water vole. | Water vole present , latrines and other field signs. Mink scat observed. | Water vole present , latrines and other field signs. Mink scat observed. |
| 4 | Ditch to the south and running parallel with the existing embankment. Steep sided with water depth ranging between 50-100cm. Dense stands of common reed present. The ditch is suitable for water vole. | No water vole, although suitable habitat. | No water vole, although suitable habitat. |
| 5 | Ancholme River, canalised with the tidal Ferriby Sluice at the river's mouth. Width of river is approximately 8m, with the banks reinforced with metal sheet piling and wooden jetties. Adjacent vegetation comprises tall grassland with patches of reeds and sedges. The river is suitable for water vole. | No water voles. | No water vole, although suitable habitat. several field signs of field vole identified. |
| 10 | Large field ditch at edge of arable field, adjacent to Cemex. Steep-sided embankments and channel width approximately 3m and varying from 0.5 to over 1m deep. The ditch is suitable for water vole. | No water vole, mink scat. | Water vole present , several water vole latrines identified |
| 37 | Linear ditch running along the edge of an arable field, approximately 3m wide with steep embankments colonised by tall grasses. | No water vole, mink scat. | Water vole present , several water vole latrines identified |
| East Drain, | Linear ditch with steep sites and channel width approximately 3m. The embankments are characterised by tall grasses and patches of tall ruderal. | Not surveyed | No water vole, although suitable habitat. |
| P29 | Open body of water surrounded by dense stands of common reed. The waterbody forms hydrological connections with ditch 1e. | Not surveyed | No water vole, although suitable habitat. Otter spraint and feeding remains. |
| D6 | A large ditch between a hedgerow and dirt track. It has steep earth banks and a sense cover of grass and tall ruderal species. Predominately dry with over 10cm of water. | Not surveyed | Suitable habitat, no water vole. |
| D7 | A large ditch with steep earth banks, vegetated with dense grass and tall ruderal vegetation. The ditch is shallow with over 10cm of water present. | Not surveyed | Suitable habitat, no water vole but connected to D7 |

| Drain ref | Drain Character | 2017 Findings | 2018 Findings |
|-----------|--|---------------|----------------------------------|
| | | | where water vole is present. |
| P31 | Garden pond with open water and an area dominated by reed. The banks are shallow, and vegetation is frequently mown. | Not surveyed | Suitable habitat, no water vole. |
| P42 | Garden pond with open water, shallow banks with limited vegetative cover and regularly mown. | Not surveyed | Suitable habitat, no water vole. |
| P43 | A large pond in shallow scrape, heavily peached by cattle and bank vegetation dominated by rushes. | Not surveyed | Sub-optimal |

3. Impact Assessment

The proposed scheme embankment will dissect Fulseas Drain (3b) (see **Appendix A**), resulting in permanent loss of a 30m length of water vole habitat. During construction, 20m either side of the proposed embankment will be required as a working area, equating to an additional 40m length of temporary habitat loss. The construction activities will result in the direct disturbance of water vole and their habitat, with a significant risk of causing injury or killing of individuals.

A culvert will be integrated with the embankment at Fulseas Drain, although as a flood defence measure it will have a non-return valve, which will remain impassable by water vole. The embankment will therefore form a barrier to water vole dispersal once the scheme becomes operational, resulting in fragmentation of the current water vole population. Fragmentation can reduce the success of population expansion, through isolating individuals, a localised reduction in numbers and increased vulnerability to predation.

Given a direct negative impact on water vole is predicted during construction and permanent fragmentation is likely without mitigation once the scheme becomes operational, mitigation is required to offset the impacts, and to ensure the welfare of water vole is considered throughout all phases of the scheme.

4. Mitigation Strategy

4.1. Overview

Water vole mitigation shall adhere to conditions detailed in the EA's Organisational Licence (WML-OR23). As specified in the Organisational Licence, the EA has an Appointed Person to oversee all operations under the licence. Additional Authorised Persons and Accredited Agents can also be appointed to undertake mitigation activities, providing they are adequately trained and hold knowledge of water vole ecology. It is the responsibility of the Appointed Person to assess their suitability for operating under the licence. The licence to displace water vole will commence from the 15th February to 15th April 2019.

The Organisational Licence will allow for displacement up to 150m either side of Fulseas Drain (3b). The full length of Fulseas Drain is 200m, although only a 70m section will be subject to displacement. Temporary exclusion fencing will be installed to prevent water voles re-entering Fulseas Drain during construction. Alternatively, if the conditions do not allow for the installation of fencing, then either a combination of earth bunds and or vegetation management will be used, as approved by the Appointed Person.

Mitigation shall also include the creation of a ditch for water voles to exploit post construction, which will be hydrologically connected to Fulseas Drain. To address fragmentation, a section of the newly constructed embankment will be managed to facilitate water vole movement along the remaining sections of Fulseas Drain. The approach to mitigation is described below and illustrated in (**Appendix A**, IMAN002289-CH2-00-300-DR-EN-0004).

4.2. Mink control

Mink trapping will need to be undertaken prior to the displacement works; December 2018 and January 2019, possibly leading into February 2019. The trapping will take place on Fulseas Drain and the receptor drain (D3), ideally two traps per drain (four in total). Trap inspections will need to be completed daily to prevent unnecessary suffering of mink and to prevent accidental trapping of water voles.

The Design Engineer will need to ensure a suitably qualified person is appointed to undertake the trapping and disposal of mink.

4.3. Enhancement of Receptor Drain D3

Prior to displacement habitat enhancement will need completing in January 2019 for the first 100m section of the receptor Drain D3. This will involve cutting back a hedgerow on the western side of the drain, strimming the embankment and planting of primarily reed sweet-grass, translocated from Fulseas Drain.

The enhancement works will need to be overseen by an ecologist to prevent impacting water voles.

4.4. Tool box talk

All contractors involved with works that fall within 8m of a known water vole population (Drains 1a, 1b, D3, 3b, 10 & 37) will be required to attend a Tool Box Talk. For works specific to Fulseas Drain (3b) the Tool Box Talk will need to be delivered by the Authorised Person(s). This is necessary to ensure the mitigation being implemented fully adheres to the Organisational Licence conditions. For all other drains where water voles are known to be present, the Tool Box Talk can be delivered by the scheme's appointed Ecological Clerk of Works (ECoW).

The provider of the Tool Box Talk will need to ensure that contractors fully understand the working approach for water vole displacement, as well as general best practice for working within 8m of Drain 10 and 37. On completion of the Tool Box Talk, all contractors will be asked to confirm their understanding of working practices by signing the form included as Appendix D.

It is assumed that contractors will be provided with necessary drawing specifications as referenced in this Mitigation Strategy. To promote a site level understanding of the scheme's ecology, a visual guide of water vole field signs (**Appendix E**) will be provided to contractors, where appropriate. It is recommended that such information is placed in contractor compounds.

4.5. Pre-commencement survey

Prior to the start of displacement (15th February 2019) drains where water voles have been previously recorded will be surveyed. The number of burrows per drain will be recorded using a hand held Global Positioning System (GPS) and a count undertaken of the number of feeding stations and latrines.

4.6. Exclusion fencing

Following completion of the pre-commencement survey, temporary exclusion fencing will be installed to the north of Fulseas Drain. The location of the fencing is shown on Figure 5.4 (**Appendix A**) and a fencing specification included as **Appendix B**. Installation of fencing at this given location is necessary to displace water voles to the receptor site, located south of Sluice Road under a culvert that is passable to water voles. Once displacement is complete, additional exclusion fencing will be installed to the south of Fulseas Drain, to prevent water voles re-accessing the drain during construction. The exact location and timing of the fencing installation will be agreed on site and will be installed at least 5m away from any existing burrows entrances, to minimise risk of damaging any underground burrows.

If the current site conditions do not allow for an effective exclusion fence to be installed, then earth bunds may be installed within the footprint of displaced habitat to control the water levels. Or, alternatively vegetation management alone will be used in accordance with the condition of the licence, which would also mean the optional water draw down method would not be adopted to aid displacement.

Prior to construction of the embankment to the west of CEMEX, an exclusion fence will be required along the length of drains 10 and 37. The fence is required to maintain an 8m

exclusion zone for the purpose of protecting water vole burrows during construction. The fencing in this location will not be designed to prevent movement of water vole between the drain and the wider area, but rather to prevent workers from accidentally accessing the area.

4.7. Vegetation removal

Vegetation removal is required prior to displacement of water voles at Fulseas Drain (3b). The vegetation will be cut on both sides of the drain up to 70m, to include the permanent and temporary land take.

Starting at the location where the temporary exclusion fencing is proposed to the north of Fulseas Drain, the embankment vegetation will be initially cut to 150mm above ground level on the 15th February 2019. This will be followed by a second cut to take vegetation down to ground level. The cutting of vegetation will be completed using a hand-held strimmer and under supervision of Additional Authorised Person(s) of EA Organisational Licence.

The operator of the hand-held strimmer will cut through the vegetation slowly and progressively. Alternatively, a flail mounted on an excavator will be used. Upon instruction of the Authorised Person(s), it will be necessary to periodically stop cutting whilst careful hand inspections are completed.

All arisings will need to be removed from the side of the drain (minimum of 3m from the top of the bank) by either rake or with the careful use of a digger bucket, where the top layer of material is scraped away. This is necessary as water voles may seek refuge under any remaining areas of vegetation. Under supervision of the Authorised Person(s) grass turfs will be cut and temporarily stored for re-use when the new surface water drains are created, or to enhance the receptor drain (D3). In addition, reed sweet-grass will be translocated to the new receptor drain D3. See Figure 5.4 (**Appendix A**).

4.8. Displacement method

On completion of vegetation removal, displacement of water voles will proceed as follows:

- The Additional Authorised Person(s) of the Organisational Licence will mark out the location of all water vole burrows using canes, ensuring each burrow is given a unique reference number and its location recorded using a handheld GPS. Wildlife cameras will also be installed to supplement the monitoring of water vole activity
- Water drawdown, if utilised, will need to commence on completion of vegetation removal, if it's to be relied on as part of the displacement method
- Water vole activity (latrines, feeding stations and prints) will be monitored (using an endoscope for burrows) for a minimum of seven days to established if displacement has taken place. Where monitoring continues to find fresh water vole activity, the monitoring period may need to be extended
- The use of water vole rafts may be used to assist monitoring
- Subject to an absence of water vole activity, each burrow will be carefully excavated back to the termination point and carefully searched and subsequently destroyed in advance of the main works at Fulseas Drain. Where water voles are encountered, individuals must be allowed to escape to the receptor area.

- Following the full excavation of a burrow system the bank will be smoothed of with the excavator bucket to remove any niches, which otherwise an animal could re-enter the bank. This will be monitored to ensure there are no signs of burrowing activities ahead of the works
- Once it is confirmed that water voles are successfully displaced, the exclusion fence if required will be installed to the southern extent of the works. The works should then start as soon as reasonably possible.

4.9. Receptor site

Figure 5.4 (**Appendix A**) shows the location of the receptor site, which is a continuation of Fulseas Drain that supports low numbers of water vole. The receptor sites capacity to receive water voles from displacement activities includes the following:

- The receptor site has steep embankments that have an abundant grass cover
- The presence of reed sweet-grass along the length of the main channel reflects a drain that continually retains water
- The culvert under Sluice Road is passable for water voles.

Once the construction phase is complete at Fulseas Drain, any temporary exclusion fencing in place will be removed, enabling water vole to regain access to Fulseas Drain and the newly created drains.

4.10. New ditch construction

Unless alternative mitigation is identified and agreed with appropriate parties, a new ditch will be constructed to the east of Fulseas Drain and will connect and run in parallel to Fulseas Drain (for approximately 50m). The ditch will be profiled on a like for like basis with Fulseas Drain; a central channel for holding water and steep embankments to encourage water voles to establish burrows. Vegetation establishment will be encouraged early in the construction, including plug planting of reed sweet-grass in the main channel and distributing the stored turfs from Fulseas Drain. Seed application of a broad grass mix is recommended: false oat-grass *Arrhenatherum elatius*, cocks foot *Dactylis glomerata*, Yorkshire fog *Holcus lanatus* and sweet vernal-grass *Anthoxanthum odoratum*.

4.11. Habitat mitigation

The new embankment section that dissects Fulseas Drain is to be enhanced to facilitate the continued movement of water voles. This section equates to approximately 8m wide and to the depth of the new embankment (30m), which will be encouraged to develop into tall grassland so that there is sufficient vegetative cover for water voles to seek shelter, feed and migrate.

It may be necessary to manage the 8m width of tall grassland, i.e. cutting of any developing shrubs and sympathetic cutting using a strimmer. Strimming should only take place every 2-3 years and allow for the development of a debris in amongst tussock forming grasses. A minimum height of 30cm should always be maintained within the 8m width of vegetation.

4.12. Post-construction monitoring

Monitoring following displacement will take place at the receptor site, Fulseas Drain and the new surface water ditch for a period of 3 years, unless it is confirmed that the vole population is present and stable. The monitoring is scheduled until September 2022. All monitoring data will need to be systematically recorded so that the EA will be able to submit an annual report of activities that have taken place under the Organisational Licence.

4.13. Timing of works

Construction of the proposed scheme is scheduled to start in March 2019, with completion in 2020. The mitigation tasks and their timing for water vole displacement is detailed in Table 4.1.

Table 4.1: Timing of water vole mitigation works (year 2019) (see Figure 5.4, **Appendix A**).

| Activity | 2019 | | | | | | | | |
|---|------|------------------------------------|-----|-----|-----|-----|-----|-----|-----|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
| Mink – trapping and disposal (appointed contractor) | | | | | | | | | |
| Enhancement of receptor Drain D3 | | | | | | | | | |
| Installation of water vole monitoring rafts within Drain D3 & 3b (if required) | | | | | | | | | |
| Pre-commencement survey (14 th February). | | 14th | | | | | | | |
| Install temporary exclusion fencing as required, north of Fulseas Drain. | | 15th | | | | | | | |
| Vegetation removal & marking the location of water vole burrows with canes. | | 15th+ | | | | | | | |
| Start of displacement, 7-days. Monitoring period may need to extend. | | 16 th -22 nd | | | | | | | |
| Subject to no water vole activity, carry out destructive searches of burrows. Complete by early April. | | | | | | | | | |
| On successful completion of displacement, install exclusion fence south of Fulseas Drain as required. Complete by 15 th April. | | | | | | | | | |
| Start construction at Fulseas Drain, including creation of new water vole ditch. | | | | | | | | | |
| Remove any exclusion fencing on completion of works | | | | | | | | | |
| Monitoring of receptor site, construction area & exclusion fence. | | | | | | | | | |

+ Displacement should be undertaken when temperatures are generally >5°C because prolonged periods of cold weather will reduce the likelihood of water voles moving by displacement

5. References

CIEEM (2011). Competencies for Species Survey: Water Vole

Dean, M., Strachan, R., Gow, D. and Andrews, R. 2016. The Water Vole Mitigation handbook (The Mammal Society Mitigation Guidance Series). Eds Fiona Mathews and Paul Chanin. The Mammal Society, London.

Haycock & Jay Associates Ltd. (November 2017). Ecology Survey Report, South Ferriby, North Lincolnshire.

Haycock & Jay Associates Ltd. (July 2018). Update Water Vole Survey Report. South Ferriby, North Lincolnshire.

Strachan *et al* 2011. Water Vole Conservation Handbook.

Jacobs (2018) Humber South Bank Appraisal - Winteringham Ings to South Ferriby Environmental Statement.

Appendices

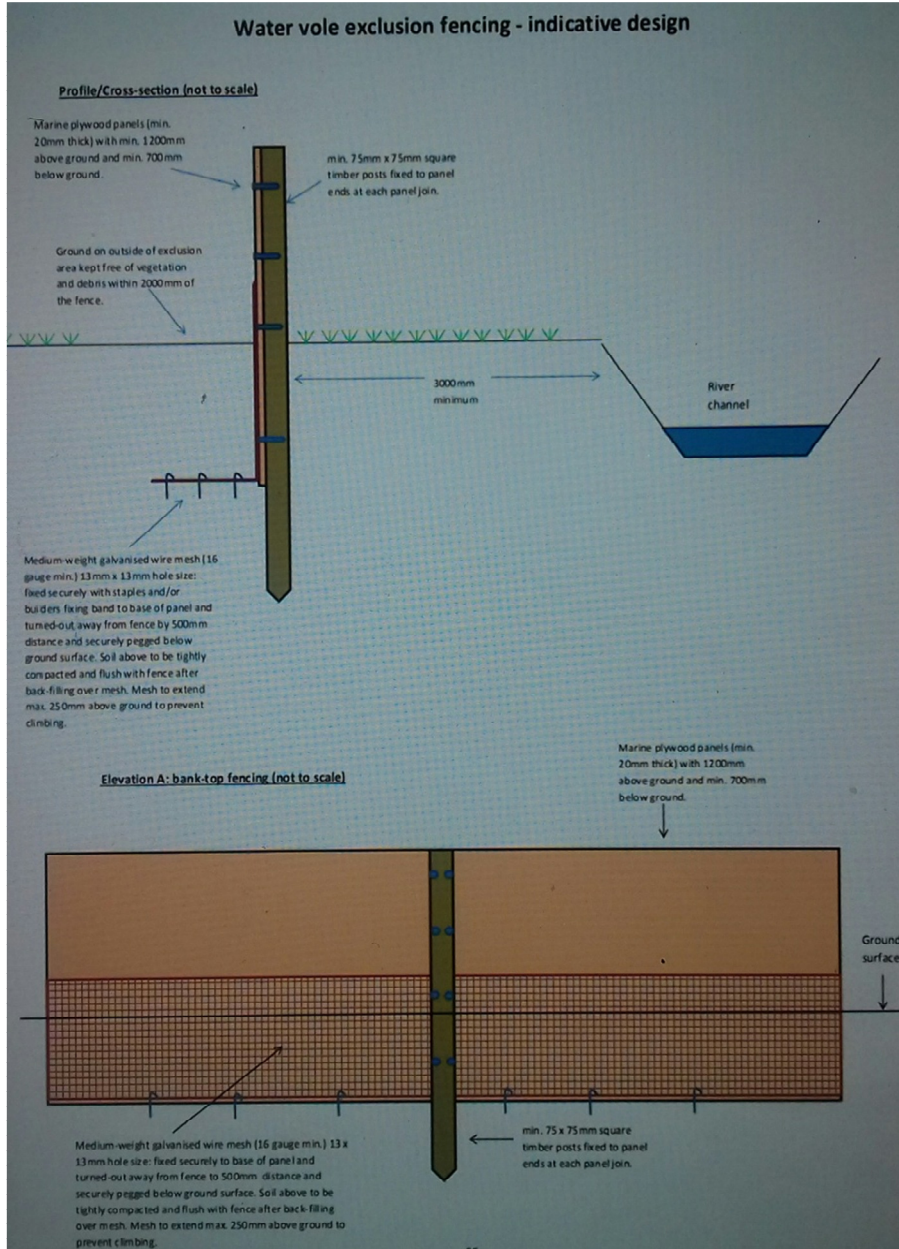
Appendix A: Reports & Figures

Reports with figures and figures issued as separate PDF files as described in the below table.

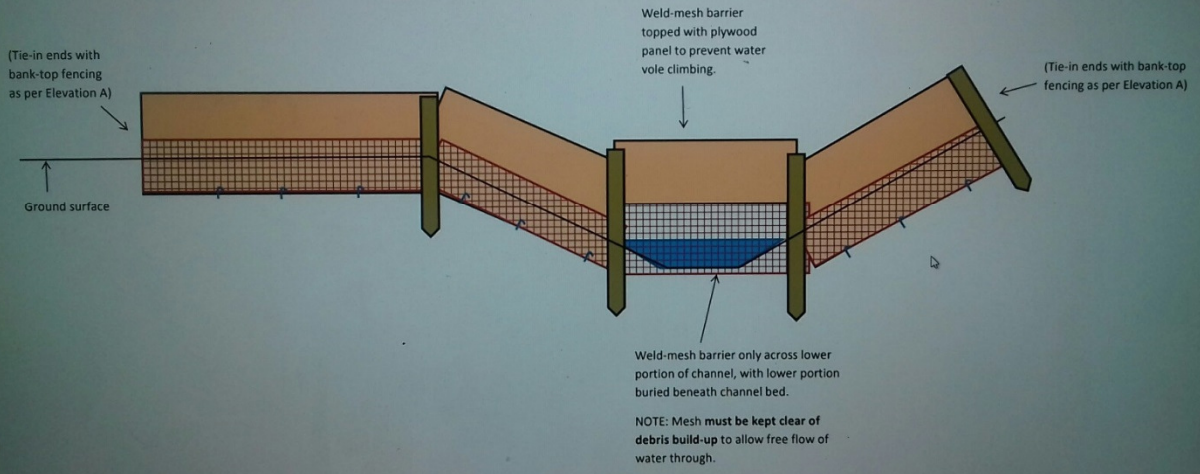
| Description | File name | Revision |
|--|----------------------------------|----------|
| Location of surveyed drains for water vole (see Appendix 5.1 to ES - Water Vole Report, Haycock and Jay, 2018) | IMAN002289-CH2-00-300-RP-BD-0001 | P01 |
| Figure 5.4 to ES - Water Vole Mitigation Plan (CH2M, 2018) | IMAN002289-CH2-00-300-DR-EN-0004 | P02 |

Appendix B: Water Vole Exclusion Fencing

Taken from *The Water Vole Mitigation Handbook – The Mammal Society Mitigation Guidance Series* (Strachan *et al.*, 2016).



Elevation B: Channel crossings (not to scale) – refer to main elevation (A) and profile for dimensions, fixings and materials.



Appendix D: Tool Box Talk – Contractor Signatures

Please sign once the working measures specified in the Water Vole Mitigation Strategy are understood.

| Date | Working Area Location | Name | Signature |
|------|-----------------------|------|-----------|
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Appendix E: Water Vole Field Signs Guide

The Water Vole Field Signs Guide is issued as a separate PDF file as described in the below table.

| Description | File name | Revision |
|------------------------------|----------------------------------|-----------------|
| Water Vole Field Signs Guide | IMAN002289-CH2-00-300-RP-BD-0010 | P01 |