

M20 Junction 10a

TR010006

Appendix 8.8 Protected Species Report - Riparian Mammals

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Appendix 8.8 Protected Species Report - Riparian Mammals

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Executive Summary

This technical appendix report has been produced to inform the Environment Statement (ES) of the impacts of both the Main and Alternative Schemes upon riparian mammals once mitigation has been implemented. This is one of a series of reports on nature conservation features that were identified as potential ecological receptors in the M20 Junction 10a Scoping Report¹ that could be affected by the Main and Alternative Schemes. Riparian mammal species were included as a likely receptor to be considered further.

Surveys were undertaken to confirm presence or likely absence, and to determine the population size. This survey data has informed an assessment of the potential impacts that both the Main and Alternative Schemes could pose on them, and is presented in this report. Mitigation to reduce the impacts on the ecological receptors has been considered. This mitigation seeks to avoid impacts in the first instance, through carefully siting infrastructure away from sensitive habitat and timing works to avoid sensitive periods. Other principles adopted in the mitigation strategy are to ensure no net loss of valued habitats and to maintain dispersal corridors. Mitigation would reduce the potential for adverse effects and provide some potential positive effects.

This report details an assessment of effects for riparian mammals in consideration of the impacts and mitigation described to determine the residual effect, and any further compensation measures that may be required in order to minimise the effects. The method of assessment (which follows guidelines within the Design Manual for Roads and Bridges (DMRB) and the Chartered Institute of Ecology and Environmental Management (CIEEM)), is detailed in the ES and is not reproduced in this report. The findings of the surveys on riparian mammals and the corresponding assessments of effects are summarised Chapter 8 Nature Conservation, Volume 6.1.

¹ Highways Agency (2015) M20 Junction 10a Environmental Scoping Report (341755-90-140-RE-02 Rev D).

1. Introduction

1.1 Description of the Main Scheme and the Alternative Scheme

- 1.1.1 The Main Scheme consists of a new gyratory roundabout over the M20 motorway approximately 700m south east of the existing junction 10 and a new dual carriageway link road to the existing A2070 Southern Orbital Road (SOR) to the west of St Marys Church, Sevington. The Main Scheme includes demolition of the existing M20 Highfield Road bridge, construction of 2 new bridges over the motorway, 4 new slip roads, closure of the existing east facing slip roads at junction 10, a new footbridge across the motorway, a new footbridge to replace the existing footbridge over the A2070 at Church Road and a new retaining wall at Kingsford Street.
- 1.1.2 The 'Alternative Scheme' is the Main Scheme with the addition of an access to the proposed adjacent Stour Park development, which would comprise a three-arm roundabout located midway along the proposed A2070 link road.
- 1.1.3 Reference to 'the Scheme' refers to both the Main Scheme and the Alternative Scheme.
- 1.1.4 For a detailed Scheme description refer to Chapter 2 The Proposed Scheme, Volume 6.1.

1.2 Purpose of the Report

- 1.2.1 The Extended Phase 1 Report, Appendix 8.1, Volume 6.3, and M20 Junction 10a Scoping Report² identified the requirement to undertake surveys of riparian mammals, i.e. water vole *Arvicola amphibious* and otter *Lutra lutra*, in order to determine whether the proposed Scheme has the potential to affect the conservation status of those species, and consider appropriate mitigation and the residual effect. Therefore the objectives of this report are:
- Detail the surveys undertaken, including methodology and survey findings.
 - Identify presence, their population size, and confirm any important habitats.
 - Consider species specific mitigation and undertake an assessment of the likely impacts in order to inform Chapter 8 Nature Conservation, Volume 6.1.

² Highways Agency (2015) M20 Junction 10a Environmental Scoping Report (341755-90-140-RE-02 Rev D).

Study Area

1.2.2 The riparian mammal study area included the riparian habitat within the Main and Alternative Scheme footprints, comprising the Aylesford Stream corridor.

1.3 Status and Legal Protection

Legal Protection

1.3.1 Water voles are listed on both Schedule 5 Section 9 of the Wildlife and Countryside Act 1981 (as amended). This legalisation makes it an offence to:

- Intentionally kill, injure or take a water vole.
- Intentionally or recklessly damage, destroy or obstruct access to any place that a water vole uses for shelter or protection or disturb water voles while they are using such a place.

1.3.2 Otters are protected under the Conservation of Habitats and Species Regulations (2010, as amended) and fully protected under Schedule 5 of the Wildlife and Countryside Act 1981. This makes it illegal to:

- Intentionally or deliberately kill, injure or capture an otter.
- Possess or control any live or dead specimen, or anything derived from an otter.
- Intentionally or deliberately damage, destroy or obstruct any access to any structure or place used for shelter, breeding, or protection by an otter.

Status at the National Level

1.3.3 Historically, water vole was listed as a UKBAP species due to decline in number and their vulnerability to mink³. They are now listed as a species of 'principal importance for the conservation of biodiversity in England' under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006. Following the production of Biodiversity 2020, the national strategy for England, actions were identified by experts to help in the recovery of populations of the S41 listed species⁴. Actions identified for the recovery of water vole include the following:

- Maintain a national water vole database and GIS. Continue or establish (as appropriate) and maintain a programme of regular monitoring in National and Regional Key Areas and at a sample of other sites.

³ JNCC (2010) UK Priority Species data collation Arvicola terrestris version 2 updated on 15/12/2010. Available from: http://jncc.defra.gov.uk/_speciespages/115.pdf

⁴ Natural England. S41 Priority Species – Action Spreadsheet. Updated 14 May 2014. Available from: <http://publications.naturalengland.org.uk/publication/4958719460769792?category=5856835374415872>

- Reduce the impact of mink predation, prioritising action in Regional Key Areas.
- Maintain appropriate protection of the water vole and its habitat under the Wildlife and Countryside Act 1981 (as amended).
- Continue and extend the National Key Sites for water vole initiative. Identify Regional Key Areas for water voles following agreed methodologies.
- Maintain and where appropriate extend the area of suitable water vole habitat in National and Regional Key Areas.

1.3.4 Otter were also listed as a UK BAP species, and are listed as a species of 'principal importance for the conservation of biodiversity in England' under Section 41 of the NERC Act 2006. Although otters were known to be recovering successfully, otter were not thought to be at a favourable conservation status⁵. Threats to the species include accidental mortality by road kill or entanglement as fishery bycatch; and pollution of water ways from industry. Habitat fragmentation due to roads is also listed as a constraint. The following actions were identified by experts to help in the recovery of the species that are pertinent to this Scheme:

- Continue to monitor otter recolonisation across the UK in periodic national surveys, augmented with annual surveillance where possible.
- Maintain surveillance of otter health and impacts of toxic chemicals through a programme of post-mortem and tissue analysis work.
- Continue to work towards meeting water quality objectives on all rivers across the UK so they can support healthy fish stocks.
- Ensure that riparian habitat has sufficient bankside vegetation and undisturbed terrestrial cover to provide resting and breeding sites for otters.

Status at the County Level

1.3.5 Although the UK BAP has been superseded, BAPs are still widely used at county level to support Biodiversity 2020. Water vole and otter are both listed as a Kent Biodiversity Action Plan species.

1.3.6 Water vole are considered to be a species in decline, although Kent is considered to be a stronghold⁶. Threats to water vole include insensitive river engineering, agricultural intensification, urbanisation of flood plains reducing and fragmenting water vole habitat, predation by mink, and poisoning due to rodenticides intended for rats. Drier summers and wetter winters may pose

⁵ JNCC (2010) UK Priority Species data collation Lutra lutra version 2 updated on 15/12/2010. Available from <http://jncc.defra.gov.uk/speciespages/428.pdf>

⁶ Kent BAP (2004) Species Factsheet: Water vole - *Arvicola terrestris*. Available from: http://www.kentbap.org.uk/images/uploads/Water_vole.pdf

additional threats in the long term by affecting the habitat suitability. Actions to secure the population status include monitoring and controlling mink, and the sharing of information on successful methods to protect known populations.

- 1.3.7 Otter are thought to be making a comeback in Kent and are subject to local Environment Agency plans. Underpasses in relevant transport schemes are encouraged⁷.

1.4 Ecology

- 1.4.1 Water voles can inhabit a variety of waterways, with a preference for slow moving or still waters. Steep banks are an important habitat feature as they allow a choice of burrows at different levels above the water – especially significant in areas at risk of flooding. Water voles can have up to 3 to 4 litters per year, with the young born between April and September. Colonies of water voles will live alongside each other on a waterway, with females marking their territories using discrete latrine sites and scent glands on their hind feet. Water voles are predominantly herbivorous and will eat a vast array of food, with grasses, sedges and reeds forming the largest part of their diet.
- 1.4.2 Otters have been known to use up to 20km of river habitat, often depositing spraints in prominent places around their range in order to mark their territory. Otter litters can be born at any time of the year, usually consisting of 2 or three 3. The cubs are born in dens called holts, normally located with tree root systems, bank holes or under a pile of rocks. The diet of the otter consists mainly of fish such as eels and salmonids as well as crayfish at certain times of the year, while they will occasionally take water birds and frogs⁸.

⁷ Kent BAP (2004) Species Factsheet: European Otter - *Lutra lutra*. Available from:
http://www.kentbap.org.uk/images/uploads/European_otter.pdf

⁸ Chanin, P. (2003) Ecology of the European Otter Conserving Natura 2000 Rivers Ecology Series No. 10, English Nature, Peterborough.

2. Methodology

2.1 Desk Study

2.1.1 A desk study was undertaken to identify records of water vole and otter within the study area and wider surrounds up to a distance of 2km from the red line boundary, where data is available. This included reviewing previous survey reports undertaken on the study site (Middlemarch, 2014, 2012, and Parsons Brinckerhoff, 2008), an updated record search from Kent and Medway Biological records Centre, and from the Highways England Environmental Information System (EnvS). The results of the desk study are outlined in Table 2.1.

Table 2.1 Desk study results for water vole and otter records

Water vole and otter records	
2007 (survey)	Water vole surveys were carried out in August and September 2007 by Parsons Brinckerhoff. Signs of water vole activity were identified from Aylesford Stream flowing west from the M20 Lacton Farm Culvert to the A2070 Culvert. A single mink footprint was also identified. No signs of otter presence were recorded during the surveys completed at the same time as the water vole surveys.
2010 (survey)	Water vole surveys were repeated in August 2010 by URS and results were consistent with 2007 survey results. Signs of water vole presence along Aylesford Stream were confirmed. No signs of otter presence were recorded during the surveys completed at the same time as the updated water vole surveys.
2012 (survey)	Water vole surveys repeated in May 2012 by Middlemarch Environmental Ltd. Results were consistent with those of 2007 and 2010. Presence of water voles along the stream was confirmed with 10 potential water vole burrows along the southern bank; a run through the bank side vegetation; and other signs of water voles. The survey undertaken was for water voles only, and no signs of otter were reported.
2015 (records search)	Records from the Kent and Medway Biological Records Centre ⁹ , dated within 10 years and located within 2km of the Scheme, comprised 2 records of water vole to the south, approximately 500m and 1km from the Scheme; and 2 records more than 1km to the west. No records of otter were received from KMBRC within 2km of the Scheme that were dated within the last 10 years. No records of water vole or otter were identified from the Highways EnvS database ¹⁰ .
2015 (pers comm ¹¹)	Officers from Kent Wildlife Trust reported an old spraint and fresh paw prints and odour found at a development site near the Julie Rose Stadium at Conningbrook to the Environment Agency.

⁹ Kent and Medway Biological Records Centre (2015)

¹⁰ Highways England Environmental Information (2015)

¹¹ Environment Agency (personal communication) 26th February 2015.

2.2 Habitat Assessment

- 2.2.1 A walk over survey was undertaken on 19 November 2014 by two Mott MacDonald ecologists. The channel has natural earth banks, comprising sandy vertical banks at a gradient of >45°. The bank profile was approximately 1.5m high and were lined with frequent stands of alder *Alnus glutinosa*, although other occasional / rare stands of other species are present¹². There was no vegetation within the channel of the stream, as shown in Table 2.2. Although at the time of the initial walk over the flow rate was rapid, subsequent visits found that the flow was highly changeable and that the majority of the time the rate of water flow was moderate to low. The water was turbid, with the majority of the Stream bed substrate comprised of sand with silt, although a few areas of rubble were evident.
- 2.2.2 The depth of water is variable along the River corridor; with shallow and deep water in parts but averaging approximately 30cm deep. However, the water appeared deeper towards the Lacton Farm Culvert, with steeper bank profiles approximately 2m high.
- 2.2.3 Both banks provided well developed riparian cover, including a variety of herbaceous plants. Erosion of the banks was evident in localised areas along the stream, but comprised a very small proportion of the stream habitat within the section surveyed. These attributes lead to an overall assessment that the stream was highly suitable for water vole^{13,14}.
- 2.2.4 The M20 balancing pond reed swamp was dominated by common reedmace *Typha latifolia* and common reed *Phragmites australis* common reed, with willow coppice growing through. The pond bed had silted over and was solid enough to walk on carefully in some parts. The aquatic habitat declined to a small channel of water through the middle of the reed bed approximately 50cm wide, although water mint *Mentha aquatica* clogged the channel as the year progressed. The pond has potential to provide foraging opportunities for water vole, but is not considered suitable nesting habitat as the reed was not sufficiently dense to provide cover from predators. The edges of the pond were concrete lined and not suitable for burrows.
- 2.2.5 A ditch approximately 35m long lay perpendicular to the Aylesford Stream, and adjacent to the M20 balancing pond. The ditch was dry at the time of the River Habitat Survey³⁴, although a trickle of water was seen in November 2015. There is potential for water vole to use this on an adhoc basis, as part of the Aylesford Stream corridor.

¹² Mott MacDonald (2015) Habitat Report

¹³ Harris, J., Markwell, H. Raybould, B. (2009). A method for assessing water vole habitat suitability. Ecology and Environmental Management - In Practice 65: 28 – 31

¹⁴ Strachan, R. et al (3rd ed 2011) Water Vole Conservation Handbook, Wildlife Conservation Research Unit.

2.2.6 On the northern side of the M20, Aylesford Stream passes along the edge of a hay meadow, with steep tree lined banks. The stretch of stream is approximately 110m long, and passes beneath a culvert below the A20 carriageway. On the north side of the A20, the stream was shallow and slow moving, with deep silt that was not considered suitable habitat for water vole burrows. However, the adjacent broadleaf woodland could provide terrestrial habitat for water vole.

Table 2.2 Aylesford stream corridor

Description	Photo
Aylesford Stream (April 2015)	
Ditch adjacent to the M20 balancing pond and perpendicular to Aylesford Stream (November 2015)	
M20 balancing pond (April 2015)	

Description	Photo
Section of Stream between the M20 and A20 carriageways (April 2015)	
Stream to the north of the A20 Culvert (April 2015)	

2.2.7 To the north and upstream of the stretch of the Aylesford Stream surveyed, the stream passes through agricultural and woodland habitats via various ditch and drain networks. Beyond the A2070 to the west, the stream passes through an urban landscape, and connects to other small waterways to the south of Ashford. Some of these waterways are likely to support water vole.

2.2.8 The Aylesford Stream corridor is not considered suitable habitat for otter as the habitat is not of a sufficient extent to form a viable territory, and provide a sustainable source of prey items. The stream corridor is highly variable, with water flow and volume fluctuating considerably with shallow areas, for example to the north of the A20, and other areas deep and fast moving, such as just south of the balancing pond, which feeds into the stream the surface and drained water from the M20 carriageway. The stream is approximately 1.8km from the Great Stour River at Conningbrook, where recent evidence of otter presence was identified as part of the desk study. To find and access the Aylesford Stream from the Great Stour and Conningbrook Lakes, otter would need to travel across woodland, traversing several local roads. At the southern end, Aylesford Stream passes through the urban environment around the south eastern fringe of Ashford, and beneath the CTRL and local railway network before connecting to the East Stour, 1 of the 2 distributaries of the Great Stour. Given the limitations of the Stream and the greater habitat potential of the Great Stour River and Conningbrook Lakes for otter, permanent presence within the Aylesford Stream corridor is extremely unlikely. Whilst adhoc presence cannot be discounted entirely, the stream would not be able to support a resident otter or breeding unit.

2.3 Survey Objectives

2.3.1 As the desk study provided evidence of previous records of water vole and the habitat was considered suitable, it was deemed necessary to survey water voles to confirm current presence and to inform an assessment of effects, and to determine any mitigation that would be necessary in the event of design requirements. The confirmation of recent evidence of otter within the wider surrounds required evidence of this species also to be searched for during the field surveys.

2.4 Field Survey Methodology

2.4.1 On the 27 May and 8 September 2015 surveys were undertaken along the Aylesford Stream corridor. The surveys were undertaken after a period of at least 5 dry days to ensure any evidence of presence would be apparent, and not have been washed away. The sides of the bank were obscured by vegetation along the crest of the banks and along the slope faces, therefore the surveys were undertaken by 3 ecologists, with 1 ecologist walking along the stream bed, supported by 2 ecologists on either side of the banks. Both sides of the stream were inspected from the stream, where it was possible and safe to do so. The field signs for water vole that were searched for included:

- Feeding signs and stations.
- Faeces and latrines.
- Burrows and nests.
- Footprints and obvious runways through vegetation.
- Characteristic 'plop' sound made when water voles enter the water.

2.4.2 Field signs for otter include spraints, holts, couches and footprints¹⁵.

2.4.3 Any positive field signs were mapped and recorded on the standard data sheet. Although footprints were noted, these were not accepted as evidence of water vole alone as juvenile rats and water vole prints are similar²⁰.

2.4.4 Latrines can be used to indicate relative population density at 'high', 'medium' or 'low'¹⁶ as detailed in Table 2.3.

¹⁵ Chanin, P. (2003) Monitoring the Otter Conserving Natura 2000 Rivers Monitoring Series No. 10

¹⁶ 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.

Table 2.3 Relative population densities

Relative population density	Approximate number of latrines found 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)

During the water vole surveys, the ecologists were also vigilant for signs of mink.

Both field surveys were undertaken by suitably qualified and experienced ecologists appointed by Mott MacDonald.

3. Results

3.1 Summary of Findings

- 3.1.1 During the first survey in May 2015, numerous burrows (85), latrines (28), footprints, feeding stations and runs through vegetation were recorded, both old and new, indicating water vole were active at the time of survey (see 0). Based on current guidelines as described in Table 2.3, the 28 latrines found along the 600m stretch between the M20 and A2070 give an average of 6 latrines per 100m, indicating a medium population density. No signs of water vole were observed along the stretch of the stream between the M20 and A20 Culverts. During a bat survey on the 1 July 2015, two water voles were observed foraging along the eastern end of the stream section.
- 3.1.2 The second survey, undertaken in September 2015, identified 21 latrines and 5 burrows along a stretch of the stream from the A2070 Culvert to approximately half way along the Stream within the study area. The remaining half to the east could not be surveyed as the overhanging tree branches and deep water areas prevented safe access. These results also suggest a medium population.
- 3.1.3 No signs of otter or mink were recorded during the surveys. A squashed, dead mink was found during other survey work, on the A20 road by Swatfield Culvert.
- 3.1.4 The optimal time for undertaking surveys is from April to September / early October, when water voles are most active¹⁷. The latter survey was postponed on 2 occasions due to bad weather on the day of the survey. The surveys were undertaken in suitable weather conditions, dry, warm and clear sky with no heavy rainfall or flooding in the days preceding the surveys which could have washed away signs of water vole. The water level appeared stable and there was no evidence of levels recently fluctuating.
- 3.1.5 No evidence of otter was identified during the May and September surveys along the Aylesford Stream corridor, or within the wider surroundings. Additionally, although signs of otter were not specifically searched for during other surveys along the Aylesford Stream corridor, no evidence of otter was reported.

3.2 Survey Constraints

- 3.2.1 The varying depth of the Aylesford Stream channel and the steepness of the banks resulted in small sections (<5m length) of the stream being inaccessible

¹⁷ Strachan, R. et al (3rd ed 2011) Water Vole Conservation Handbook, Wildlife Conservation Research Unit.

to survey for presence during the first survey in May. This could have led to fewer recordings of field signs, however as the ecologist could view most areas from the bankside, water vole field signs were recorded relatively evenly throughout the whole length of stream surveyed and the inaccessible sections were very short. Therefore the likelihood of water vole or otter activity being under recorded is deemed negligible.

- 3.2.2 Approximately half of the stream was inaccessible during the second survey in September. This was in part due to overhanging branches and deep water obstructing or making the river unsafe to walk through, and along other sections dense vegetation that obscured the steep banks prevented access to the water. There is therefore a near certain likelihood that water vole were under recorded during the second survey. It is possible that in the event of otter presence prior to or during the September survey, signs of otter may have been missed. However, given that the Aylesford Stream corridor is only suitable to provide temporary, adhoc habitat as part of a much wider territorial range, the likelihood of presence is low but will be assumed as part of a precautionary approach.

4. Discussion

4.1 Results

- 4.1.1 Aylesford Stream, the fishing lake to the north of the A20, and other water bodies, ditches and terrestrial habitats within the wider area are suitable habitats for water vole. Surveys confirmed presence of water vole. Historic records from previous surveys (Table 2.2) and the dead mink found in 2015 indicates the population is at risk from mink predation. There are no escape opportunities available to evade mink, as the stream is linear with burrows that would be easily accessible to mink. The reed swamp (within the M20 balancing pond) does not provide sufficient extent and density of reed to provide a retreat. Therefore, in combination with normal seasonal flooding; extreme flooding events; and other biotic pressures including disease and predation by native predators and mink, it is possible that the population of water vole within the Aylesford Stream corridor would be at risk.
- 4.1.2 Furthermore, the habitat along the stream is also becoming less favourable to water vole, as the trees have clearly not been pollarded or coppiced for many years, with the large stems and overhanging branches casting considerable shade over the stream and bank side vegetation. The ground vegetation was also overgrown and not subject to any maintenance during the survey period. Over the next few seasons, the habitat would be susceptible to succession, with nettles and scrub outcompeting grasses and herbs, reducing the botanical diversity and foraging potential along the Stream corridor. These factors would also be detrimental to the water vole population, unless the management regime changes.
- 4.1.3 The evidence of water vole activity along the stream indicates they are acclimatised to some human activity, including farming activities, occasional vehicle movements and pedestrians / dog walkers.

4.2 Valuation

- 4.2.1 The population of water vole within the study area are considered to be of **Medium / County** value, given the population lies within the watershed of the Stour Valley, which is considered to be one of the stronghold areas for the species in Kent. There is potential for the population to be supported by individuals from the north and south, although connectivity is sub-optimal. Given the range of potential threats identified within the study area, it is possible that the population is at risk of decline.
- 4.2.2 Due to the conservation efforts within Kent, the otter population may be recovering. Otter presence within the study area would therefore be of greater importance as part of the species recovery within the county. No evidence of otter was identified during the surveys, but presence is assumed on the basis of the recent record of otter presence within the wider surrounds and potential

for adhoc presence. Given the mobility of the species, their large territories, and conservation status, the value for otter is considered to be of **Medium/County** importance.

5. Mitigation and Compensation Measures

5.1 Construction

Risk of death, injury or disturbance to individuals

- 5.1.1 The proposed bridge over the Aylesford Stream by Lacton Farm Culvert to support the slip road from the junction 10a Interchange would damage a small section of the stream. This would include the reduction and removal of mature trees, vegetation clearance to ground level, and the placement of the bridge over the stream. The surveys undertaken in May 2015 identified 2 burrows within 50m of Lacton Farm Culvert, south of the M20, therefore the development would pose a short term risk to individuals during the bridge works due to killing or injury, and destruction of habitat. This would constitute an offence under the Wildlife and Countryside Act 1981. Mitigation for the bridge works would comprise the displacement of water voles from the works footprint, and within a 10m buffer around the works.
- 5.1.2 There is also a proposal for a temporary bridge to provide a haul route over the Aylesford Stream. This would also require vegetation clearance along the Aylesford Stream to enable the bridge to be installed, but it is assumed that the bridge could be installed without requiring water vole to be displaced due to risk of compaction, and that the connectivity of the banks beneath the bridge would be retained.
- 5.1.3 Displacement is a passive relocation strategy to encourage water voles into suitable adjacent habitat, and must be undertaken under the supervision of a class licence holder and the site registered with Natural England. The displacement must be undertaken along a length no greater than 50m, and can only be undertaken between 15 February and 15 April (with some seasonal and geographic variation) prior to breeding activity in order for the methodology to be effective. Displacement involves phased vegetation clearance until only bare earth remains, removal of the arisings, and a destructive search of the works area 3 days later¹⁸. Any water voles present in the affected area would retreat below ground during the vegetation clearance, potentially eating root systems below ground in the aftermath. The methodology then relies on the water voles leaving their burrows to find more suitable habitat elsewhere, so that the area is devoid of individuals during the destructive search. Ideally, this would mean individuals would be safeguarded against killing or injury during construction operations. However, both vegetation clearance and the soil strip would be undertaken using a sensitive and phased approach, under the supervision of an ecologist. Ideally the bridge

¹⁸ 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.

installation would be undertaken immediately after the destructive search to ensure works were completed prior to the regrowth of vegetation, which would encourage re-colonisation to occur. Should the bridge installation not be undertaken immediately after the destructive search, any regrowth would need to be cut back on a weekly basis and the area checked for presence of water vole. The exact methodology must follow the Class Licence (WML –CL31¹⁹) and would be detailed in the Construction Ecological Mitigation Strategy and CEMP.

- 5.1.4 A capture / relocation strategy has not been considered appropriate for this Scheme, as capture is stressful to individuals and disproportionate given the small section of the stream within the works footprint. Although the effectiveness of the displacement strategy is regarded with concern for large scale clearance of riparian habitat, provided the displacement is undertaken in accordance with the class Licence, the likelihood of efficacy is greater. Selected pruning and strimming of ground vegetation along the riparian corridor to reduce shade and promote a greater botanical species assemblage, would provide more favourable habitat conditions away from the culvert. This would help attract the water vole at the same time as persuading them away from the working area by Lacton Farm Culvert. Should any other earth works be necessary along the Aylesford Stream corridor that would necessitate water vole displacement, those works would have to be undertaken on a different year to that of the Lacton Farm Culvert works. Works in the location of Swatfield Culvert could be undertaken at the same time, as the habitat along the stream corridor to the north of the A20 was considered unsuitable for water vole.
- 5.1.5 In the event of a mink control programme in operation within the wider area, it would be recommended to become part of that programme to provide a co-ordinated effort. This would reduce the pressure on water vole, and ensure greater population resilience during the works. However, a mink cull is not recommended for the site in isolation. The previous record of mink found in 2007²⁰ and the continued existence of the water vole population suggests the current predator / prey dynamic is stable. A site based eradication programme would have the potential to create a vacuum that could encourage more mink into the area, increasing predation pressure to an untenable level. A better alternative (to reduce predatory pressure on water vole for greater resilience) would be an increased effort on fox control locally.
- 5.1.6 The construction of the A2070 link road, roundabout joining the A2070, and new balancing ponds have the potential to cause noise, vibrations and visual disturbance that would affect the habitat integrity for water voles. The majority of the construction works would be undertaken during daytime, when water

¹⁹ Natural England (December 2015) CLASS LICENCE Intentional disturbance of water voles and damage/destruction of water vole burrows by means of 'Displacement' (To facilitate development activities). Available from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/489598/CL31-water-vole-displacement.pdf.

²⁰ Parsons Brinkerhoff (2008) M20 J10A Access To South Ashford. Phase II Water Vole Assessment. Report No: GR050 Issue 2.

vole tend to be less active. Construction activity is expected to be at least 15m from the stream, which should ensure there is sufficient privacy for water vole to carry out their normal behavioural activities. The provision of Heras fencing around the site compound, and boarded fencing along the temporary haul route and over the bridge, would provide a physical boundary between vehicle movements and the Aylesford Stream, and would restrict visibility of vehicle movements to minimise the visual degradation of the riparian corridor. However, noise and vibrations from vehicles using the haul route would disturb foraging and other natural activities within that localised vicinity, causing stress to individuals, reducing fitness, and reproductive success. Ensuring that site activity builds up progressively would help the water vole become acclimatised to the change in their wider environment. Given the water voles present have become habituated to the use of occasional heavy machinery relating to farm management immediately over their burrows, the population may become habituated to the continuous noise and vibrations of the construction works and the passage of vehicles along the haul route. However, habituation is not assumed for the purpose of assessment, and it is likely that the disturbance would degrade the habitat quality and reduce breeding productivity during the construction works.

- 5.1.7 Welfare provision would be sited away from the Stream, to prevent the continual presence of people alongside the Stream that could deter water vole from foraging. Any overnight material and plant storage would be located away from the stream corridor or boarded fencing installed to prevent illumination from security lighting disturbing their normal behaviour. Proximity of site works, welfare and site compounds increases the availability of human food, encouraging vermin, which present health risks to site personnel. Good housekeeping, regular removal of rubbish and sealed bins would be essential. The use of poison to control vermin should be avoided as this could kill water vole inadvertently.
- 5.1.8 Mitigation for otter would comprise an updated walk over survey with a close inspection of the banks within the proposed footprint for signs of current otter presence. In the highly unlikely event that a resting place (such as a couch or holt) is found within the working area, a mitigation licence would be required to obstruct and destroy it. Additionally, as much as is practicable, the culvert and Aylesford Stream corridor should be accessible through out works to maintain connectivity for otter movements.

Habitat Loss and Fragmentation

- 5.1.9 The Scheme involves the removal of 19.15ha of habitat, which comprises 55% of the DCO boundary and is a small proportion of the total available habitat along the stream. This includes 0.3ha of habitat along the riparian corridor, and would reduce the habitat available for foraging and burrowing water vole. Although the Stream cannot be extended to replace the lost area, following completion

- 5.1.10 Habitat clearance within the wider landscape would reduce the availability of sub-optimal foraging habitat during the construction works. Loss of suitable habitat within the wider landscape would predominantly comprise of arable land adjacent to the stream, although as water vole are known to disperse up to 1.5km from riparian habitats, they may potentially lose the utility of hedgerow and pasture habitats as well. However, where present these habitat types are of low quality; damage and loss of these habitats is unlikely to affect the conservation status of the species at the site during works.
- 5.1.11 It is not anticipated that the works would cause fragmentation of water vole habitat, as the route of the stream would retain connectivity to upstream and downstream opportunities throughout the works. As part of the embedded mitigation, landscape habitat planting would be undertaken following completion of construction works. This would provide foraging and refuge opportunities within the wider landscape.
- 5.1.12 The construction works have the potential to cause pollution to the stream due to soil wash off, fuel or other spill. This would have an adverse impact to the habitat quality for water vole, and depending on the type and severity of the pollution effect could kill or damage the health and long term survival prospects of individuals, or the reproductive success of the population. It is recommended that best practice pollution prevention measures are included in the CEMP and applied during works, including the availability of emergency equipment, such as booms and straw bales, in the highly unlikely event of an incident with the application of precautionary measures. All site personnel should be made familiar with the emergency measures and their application.

5.2 Operation

- 5.2.1 The presence of the proposed A2070 link road and associated roundabouts would isolate the remaining land area between the link road, A2070 and M20 routes, forming a triangle of land. As the only suitable connective habitat for water vole within the Scheme comprises the stream, and the stream would remain in the long term, it is not anticipated that the presence of the link road would affect the water vole population in the long term. Furthermore, the likelihood of otter utilising the stream as part of a wider network would not be affected.
- 5.2.2 There is a risk of road kill to riparian mammals due to the operation of the A2070 link road. However, this risk may be avoided via the provision of the mammal tunnel and reptile tunnels, and the badger fencing. If installed correctly, so that the smaller holes are along the bottom of the fence, riparian mammals would be discouraged from accessing the Highways estate and the fencing, in combination with the planting, would direct animals to the tunnels. Noise from the A2070 link road may be greater than the baseline level, but is not anticipated to affect water vole given they readily use the culvert beneath the A2070 carriageway and are habituated to the noise.

- 5.2.3 Within the existing range of water vole presence (i.e. between the A2070 and the M20), 3 new balancing ponds have been proposed as part of the Scheme, including 1 which is designed to be a wet pond, and a large pond to provide flooding attenuation in the event of a 1-in-100 year event, and thus likely to be dry for the majority of the time. The existing balancing pond would be retained and provide further connectivity to the north. North of the M20, a smaller pond would be created. These ponds would provide additional aquatic and terrestrial habitat for water voles. It is anticipated that this would provide greater resilience against adverse events, such as flooding or lower water levels, and more opportunities to evade mink predation. Additionally, it is recommended that the landscape habitat creation would include species of grasses, wetland edge plants, woody shrubs and trees of particular value to water vole. All new planting would comprise native species, with provenance of local origin where possible. Where possible, habitat creation would be undertaken in advance of construction works, comprising part of the land area between the southern bank of the Aylesford Stream corridor and the proposed A2070 link road. There is potential for surface water runoff from the A2070 link road to affect the water quality of the Aylesford Stream, or in the event of an extreme adverse event (ie HGV fuel or other chemical spill). It is assumed that the drainage design has considered these possibilities and that the infrastructure would prevent or slow down a pollution pathway so that emergency pollution control measures could be affected. Water vole habitats should be audited following any such events to determine any appropriate actions needed, and to identify and react to any water voles in distress. It is also assumed that works within the Mersham Quarry landfill site would be undertaken in such a way as to prevent any leachate or similar from contaminating the Stream.
- 5.2.4 In order to provide enhancements for habitat connectivity, mammal ledges have been incorporated into the design of the proposed new bridges over Aylesford Stream²¹. These features would provide safe dispersal routes particularly during times of high water levels and flow, when conditions may be unfavourable for riparian mammals to swim through the culvert. Additionally, a mammal tunnel beneath the link road would be incorporated during the construction of the Scheme, which would ensure connectivity to wider terrestrial habitats for foraging, and allow for dispersal to the wider surroundings. Finally, following completion of works any remaining landscape habitat planting would be undertaken.

5.3 Summary

- 5.3.1 Mitigation measures to safeguard riparian mammals during construction and operation phases are summarised in Table 5.1 below.

²¹ Env Agency consultation meeting notes 17022015 and letter dated 23 December 2014. See Drainage Mitigation Strategy

Table 5.1 Summary of mitigation, responsible party and compliance mechanism

Mitigation	Responsible party	Compliance mechanism
Pre-Construction		
Updated walk over assessment and close inspection of affected areas for signs of otter.	Contractor	CEMP
Habitat creation where possible; habitat enhancement along the Stream corridor comprising habitat creation planting selective pruning and strimming.	Contractor	CEMP
Phased and sensitive tree reduction, vegetation clearance and soil strip as part of licenced displacement methodology.	Contractor	CEMP
Monitoring and control of mink would be recommended, as part of a co-ordinated landscape level effort with other land owners across the Stour River network. Not recommended on a site only basis. Increased fox control effort.	Recommendation only	Recommendation only
Construction		
Installation of Heras fencing at least 20m from the edge of the Stream.	Contractor	CEMP
Welfare arrangements to be set up away from the Stream.	Contractor	CEMP
Good housekeeping on site; avoid any need for vermin control.	Contractor	CEMP
Pollution prevention measures.	Contractor	CEMP
Re-planting where possible; Habitat improvement along the selective pruning and strimming to enhance retained habitats on an annual basis during works to improve habitat.	Contractor	CEMP
Maintain connectivity through all culverts along the Aylesford Stream corridor during works.	Contractor	CEMP
Installation of mammal and reptile tunnels, and ledges at Lacton Farm Culvert.	Contractor	CEMP
Operation		
Landscape planting and new balancing ponds would increase habitat opportunities.	Contractor	CEMP
Monitor water vole population for 2 years.	Contractor and licenced ecologist	CEMP
Audit water vole habitats following any extreme adverse events.	Highways England maintenance contractor	Area 4 contractual obligations

6. Predicted Nature Conservation Effects

6.1 Construction

Main Scheme

- 6.1.1 The removal of 0.3ha, or 10% of the available riparian corridor, as part of the displacement strategy and site clearance presents the risk of harm to any water voles present at the time of vegetation clearance. The majority of the stream would be left intact during the construction works, although another area would be subject to indirect impacts due to disturbance from passing plant and vehicles via a haul route that would cross over the Stream. This would have a **Minor Adverse** magnitude of impact, as water voles would naturally retreat below ground during clearance operations (and dispersing to more favourable areas following cessation of the activity). This would result with a **Slight Adverse** effect at **Local** level. Confidence of prediction is **Probable**.
- 6.1.2 In the unlikely event that an otter resting place is identified prior to works, and with the implementation of the mitigation identified, a **Negligible** magnitude of impact is anticipated. Given that the habitat within the Scheme boundary would only provide a transitory, short term provision, any otter would be likely to disperse in any case. It would not affect the species at county level since the loss of any individuals is not anticipated. Therefore a **Neutral** residual effect is expected at Local level. Confidence of prediction is **Certain**.
- 6.1.3 The bridge works would be of a minimal duration, approximately 2 – 4 weeks. It is anticipated that the culvert would remain open during works, maintaining connectivity of the Stream, and that the displacement strategy would be effective in persuading water voles from occupying any burrows within the works area. Therefore a **Negligible** magnitude of impact with a **Neutral** effect during the duration of these works is expected at Local level. Confidence of prediction is **Certain**.
- 6.1.4 In regards to the wider Scheme, the construction works with the mitigation measures applied as outlined have the potential to cause disturbance to natural behaviours that could reduce the population resilience. This would have a **Minor Adverse** magnitude of impact during works, given the prediction that the water voles would already be stressed and in decline without the Scheme and associated mitigation. The residual effect would be **Slight Adverse** at **Local** level, as the effect would be during construction only and unlikely to affect the status of the species at County level due to the temporary nature of the works. Confidence of prediction is **Probable**.
- 6.1.5 Loss of habitat within the wider surrounds as a result of clearance for the construction of the link road, junction 10a and slip roads, and the A2070 roundabout is unlikely to be detrimental to the water vole, given the poor

habitat quality of the semi natural habitats present. Therefore a **Negligible** magnitude of impact and **Neutral** effect at **Local** level is considered **Probable**.

6.1.6 These impacts are summarised in Table 6.1.

Table 6.1 Summary of impacts during construction

Cause	Impact	Mitigation	Magnitude of impact	Residual effect
Vegetation clearance as part of displacement strategy and site clearance prior to bridge construction.	Death or injury of a water vole. Obstruction or destruction of an otter resting place; death or injury.	Sensitive clearance methodology. Pre-works assessment (licence in unlikely event of presence).	Minor Adverse	Slight Adverse
Construction activities; site compound, haul route.	Disturbance of natural behaviour; loss of population resilience. Leachate or pollution of Aylesford Stream.	Considerate construction methodologies; site access and welfare arrangements. Pollution prevention measures to be implemented and emergency guidelines, equipment and training provided.		
Loss of habitat extent.	Reduction in foraging availability within wider surrounds.	Enhancement of riparian habitat along Aylesford Stream corridor.		

Alternative

6.1.7 Due to the location of the Alternative Scheme along the A2070 link road, no riparian mammal habitat or individuals would be impacted. Therefore there would not be any additional impacts, so the magnitude of impact and effects during the construction phase would be the same as for the Main Scheme.

6.2 Operation

Main Scheme

6.2.1 The Operational phase would not affect the connectivity of habitat for water vole, and with the landscape habitat replanting and new ponds, the quality of habitats and therefore foraging availability would be better than currently present. Furthermore, the landscape would provide more opportunities to evade mink and flooding events, ensuring a more resilient population.

Therefore a **Minor Beneficial** magnitude of impact with a **Slight Beneficial** effect is anticipated at **Local** level, with a **Certain** confidence of prediction.

6.2.2 In the event of occasional passage through the site by otter, there would be a low risk of road mortalities. The mammal tunnel beneath the A2070 link road would mitigate this risk, and the retrofit of the mammal ledge at Lacton Farm Culvert would improve the connectivity of the Aylesford Stream corridor. Therefore a **Minor Beneficial** magnitude of impact with a **Slight Beneficial** residual effect is predicted as **Certain** at **Local** level.

6.2.3 Additional road noise from traffic using the A2070 link road could affect the tranquillity of the wider area. Given the current noise from the existing Highway routes, habituation to the noise, and the use of low noise surfacing and the low speed limit, the magnitude of impact would be **Negligible**. Potential for changes in the water levels and water quality are also predicted to be **Negligible** at **Local** level, with a **Probable** certainty.

6.2.4 These impacts are summarised in Table 6.2.

Table 6.2 Summary of impacts during operation

Cause	Impact	Mitigation	Magnitude of impact	Residual effect
Operation of the A2070 link road.	Habitat creation.	Landscape planting	Moderate	Slight Beneficial
	Habitat connectivity.	Mammal and reptile tunnels; mammal ledge through Lacton Farm Culvert		
	Noise from traffic.	Low noise road surface.	Negligible	
	Change in water levels.	Availability of alternative habitats with 3 more balancing ponds.	Negligible	
	Pollution from surface water run-off.	Drainage infrastructure to incorporate safeguards to prevent pollution to stream. Emergency measures to be undertaken in accordance with operational and Environment agency guidelines in the event of extreme events.		

Alternative

- 6.2.5 Due to the location of the Alternative Scheme along the A2070 link road, no riparian mammal habitat or individuals would be impacted during the Operation of the Scheme. Therefore there would not be any additional impacts, so the magnitude of impact and effects during the construction phase would be the same as for the Main Scheme.

7. Conclusion

7.1.1 Water vole and otter are considered to be ecological receptors, and with mitigation to minimise impacts and habitat enhancements prior to, during and following completion of construction works, the residual effect is considered **Beneficial**. The overall impacts and the residual effect are summarised in Table 7.1 below.

Table 7.1 Summary of impacts during operation

Resource Ref: Riparian mammals (Water Vole and otter)				
Description: Medium density water vole population present along Aylesford Stream between the A2070 and the M20. No otter presence identified. Nature Conservation Value ¹ : Medium Policy and Legal Context ² : Wildlife and Countryside Act, 1981 (as amended). Integrity / Conservation Status ³ : UK BAP priority species, Kent BAP priority species. IUCN: Least Concern Factors / Criteria ⁴ : UK BAP criteria, Kent BAP criteria, IUCN.	Construction Phase, Operation Phase or Decommissioning Phase Impacts			
		Biophysical Change ⁵ :	SI: Minor Adverse Prediction: Certain CO: Direct and indirect EC: 0.3ha of habitat clearance SZ: Partial loss RE: Reversible DU: Temporary TF: One off constraint on timing of displacement methodology.	Mitigation: Habitat creation and enhancement prior to works. Displacement methodology to be undertaken in accordance with Class Licence and under supervision of the Class Licence holder. Quantification / Measure: Within the existing range of water vole presence (i.e. between the A2070 and the M20): 2 ponds are to be created; all located within close proximity (300m) to the existing habitat. The existing balancing pond would be retained. Mammal ledge to be installed in Lacton Farm Culvert, providing greater connectivity to the north and a further balancing pond. These would provide alternative habitats during periods of flooding, ensuring greater population resilience. Following construction, planting would provide better foraging habitat within the wider surrounds than the
	Potential disturbance of habitat and to individuals along the Aylesford Stream corridor during construction phase.			
	Potential changes in water levels as a result of re-alignment north of M20.			
	Reduction of foraging opportunities in the wider surrounds, although of low value.			
	Noise and vibration, and presence of heavy machinery and personnel within wider area, has potential to cause disturbance, as it is beyond			

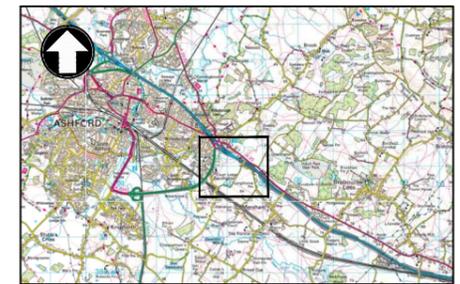
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Resource Ref: Riparian mammals (Water Vole and otter)				
	existing levels of activity and habituation.		arable land that would be lost. Mechanism for Delivery: Contractor delivery following Scheme design and plans set out in the Environmental Statement, which forms a contractual obligation.	
<p>Key CO (Complexity): Direct, Indirect, Cumulative EC (Extent): Area measures and percentage of total (e.g. area of habitat/territory lost) SZ (Size): Description of level of severity of influence (e.g. complete loss, number of animals affected) RE (Reversibility): Reversible or Not Reversible (can the effect be reversed, whether or not this is planned) DU (Duration): Permanent (P) or Temporary (T) in ecological terms. Where differing timescales are determined in relation to the lifecycle of the receptor, these should be defined. TF (Timing and frequency): Important seasonal and/or life-cycle constraints and any relationship with frequency considered</p> <p>¹ This is the value assigned to the resource using the guidance provided in the Resource Valuation table, Interim Advice Note 130/10, Ecology and Nature Conservation: Criteria for Impact Assessment and through consultation with the SEB, as appropriate. ² This includes the policies and legislation that are relevant to the resource. ³ These terms are defined in HD 44/09 ⁴ The description of the resource may be related to relevant published evaluation criteria such as SSSI selection criteria (JNCC, 1998). ⁵ These are the changes to the resource that would occur as a result of the impact.</p>				

Appendices

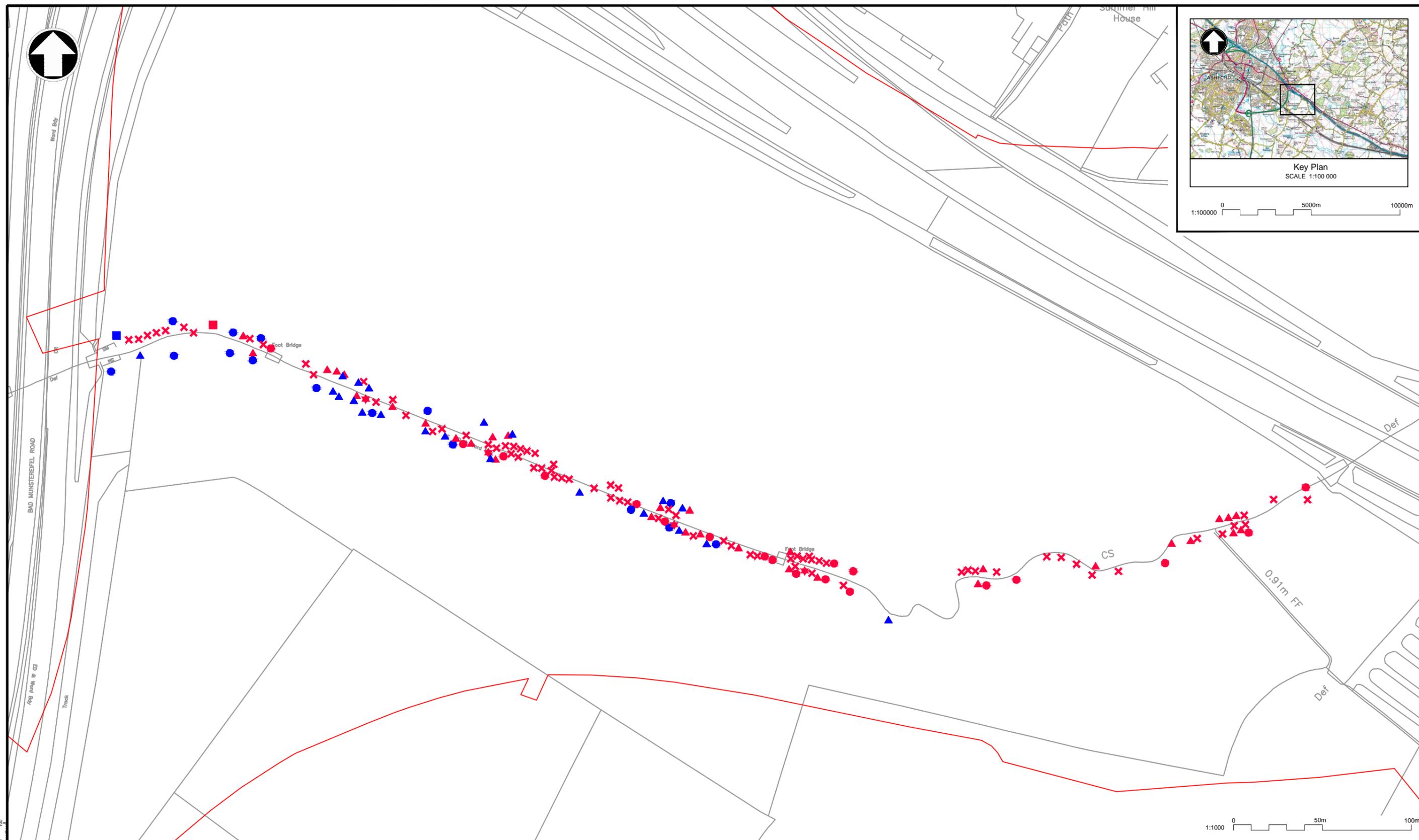
Appendix A. Survey Results _____ 36

Appendix A. Survey Results



Key Plan
SCALE 1:100 000

1:100000 0 5000m 10000m



KEY:
WATER VOLE EVIDENCE IDENTIFIED

SEPTEMBER:	MAY:
▲ LATRINE	▲ LATRINE
★ FEEDING REMAINS	★ FEEDING REMAINS
● FOOTPRINTS	● FOOTPRINTS
× BURROWS	× BURROWS
■ RUN	■ RUN

Project Title					
M20 JUNCTION 10A					
Drawing Title					
COMBINED WATER VOLE SURVEY RESULTS					
Drawing Status					
DCO SUBMISSION (TR010006)					
Scale	Designed	Drawn	Checked	Authorised	
NTS	NN	RW	AH	GH	
Original Size	Date	Date	Date	Date	
A1	JUNE 16	JUNE 16	JUNE 16	JUNE 16	
Drawing Number					Revision
HA514442-MMGJV-GEN-SMW-DE-Z-60823					A

A	06/16	DCO SUBMISSION	DL	AH	GH
REV.	DATE	AMENDMENT DETAILS	ORIG	CHKD	APPD

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