

Lower Thames Crossing
6.3 Environmental Statement
Appendices
Appendix 8.13 – Other
Mammals

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Lower Thames Crossing

6.3 Environmental Statement Appendices

Appendix 8.13 – Other Mammals

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1 Introduction

- 1.1.1 This document presents the results of the desk study and field surveys for terrestrial mammals listed within section 41 of the Natural Environment and Rural Communities Act 2006, carried out between 2017 and 2020, to inform the Environmental Impact Assessment of the A122 Lower Thames Crossing (the Project).
- 1.1.2 There are three terrestrial mammal species relevant to this report that are listed under section 41 of the Natural Environment and Rural Communities Act 2006 found within Kent and Essex, which have the potential to be affected by the Project: brown hare *Lepus europaeus*; harvest mouse *Micromys minutus*; and Western European hedgehog *Erinaceus europaeus* (subsequently referred to as ‘hedgehog’). Other notable mammal species that are relevant to the Project, including bats, dormouse *Muscardinus avellanarius*, water vole *Arvicola amphibius*, otter *Lutra lutra* and badger *Meles meles* are considered separately within other technical appendices of Chapter 8: Terrestrial Biodiversity of the Environmental Statement (Application Document 6.1).
- 1.1.3 Although the polecat *Mustela putorius* has been expanding its range back into southern Kent and northern Essex according to surveys by the Vincent Wildlife Trust (Croose, 2016), the desk study found no records within 2km of the Project. With the lack of desk study records, and the distance between the Vincent Wildlife Trust records (Croose, 2016) and the Project, it is not considered that the polecat could be affected by the Project. Therefore, the polecat is not considered further within this appendix.

2 Legislation and conservation status

2.1 Legislation

- 2.1.1 Section 40 of the Natural Environment and Rural Communities Act 2006 places a legal obligation on public bodies in England to have regard to particular species (and habitats) which are of the greatest conservation importance while carrying out their functions. The species concerned are listed under section 41 of this act and are referred to as ‘Section 41 species of principal importance for the purpose of conserving biodiversity’.
- 2.1.2 Hedgehog and brown hare are both protected from being killed or taken by certain methods. Hedgehog is listed on Schedule 6 of the Wildlife and Countryside Act 1981 (as amended). As game species, hare is protected under the Hares Preservation Act 1892, the Game Act 1831 and the Ground Game Act 1880.
- 2.1.3 Brown hare are a priority species in the Essex (Essex Biodiversity Project, 2011) and Thurrock (Thurrock Council, 2006) Biodiversity Action Plans (BAPs). Hedgehog is also a priority species in the Thurrock BAP.

2.2 Conservation status

Brown hare

- 2.2.1 The brown hare used to be common and widespread throughout lowland Britain, but they have become more sporadically distributed and less abundant where they do occur (Wheeler *et al.*, 2012). The UK BAP species plan for brown hare (Joint Nature Conservation Committee, 2010a), stated that the current population was believed to be 20% of the 1880 total. Macdonald and Burnham (2011) indicated no recent change in the brown hare population. According to the National Gamebag Census, commissioned by the Game and Wildlife Trust (Aebischer *et al.*, 2011), the annual count of individual hare shot increased by 59% between 1984 and 2009. In the Review of the Population and Conservation Status of British Mammals, Mathews *et al.* (2018) suggest a stable population.
- 2.2.2 Reasons for past declines in populations of brown hare are not fully understood but are likely to be mainly related to agricultural intensification, although other factors such as predation, disease and shooting may play a role. Possible increases in numbers either side of 2000 may be attributed to the introduction of agri-environmental and set-aside schemes in the 1980s (Aebischer *et al.*, 2011).
- 2.2.3 However, recent reports (2018) in the east of England suggest ‘*over the past month, landowners, farmers and members of the public [in Norfolk and Suffolk] have been in contact to report sightings of obviously sick and dead hares*’ (Harvey, 2019). Unexplained sudden deaths have also been reported the length and breadth of the UK, and they have presented a range of symptoms (Scottish Association for Country Sports, 2018). It has been confirmed that RHDV2 (rabbit haemorrhagic disease type 2) has jumped from rabbits to brown hare, although it is not yet known if this is the cause of the sudden deaths (Scottish Association for Country Sports, 2019).

- 2.2.4 South of the River Thames, in Kent, numbers of hare have declined dramatically and the distribution in the county is now limited. They are found within five natural areas: Greater Thames Estuary; High and Low Wealds; the North Downs; and Romney Marshes (Kent Biodiversity Partnership, 2011).
- 2.2.5 North of the River Thames, hares are present in all districts of Essex, with good numbers recorded in the 1990s in the north-west and in coastal areas (Essex Biodiversity Project, 2011); the species is described as widely distributed throughout Essex (Dobson, 1999, cited in Dobson and Tansley, 2014). The species was once much more abundant, and the area with the most noticeable decline is south Essex. A questionnaire survey in 2004 of local farm owners, to find out more about the status and distribution of brown hare in Essex, revealed that numbers were found to be increasing on 25 farms, decreasing on nine farms and stable on 12 farms, with the population dynamics being unknown on three farms (Essex Biodiversity Project, 2011).

Harvest mouse

- 2.2.6 Nationally, harvest mouse is considered to be a declining species, subject to an approximately 71% decline between 1979 and 1997 (Joint Nature Conservation Committee, 2010b). Mathews *et al.* (2018) suggest that populations are declining; with changes in habitat management and agricultural methods are thought to be the main cause for the loss of populations from certain areas.
- 2.2.7 South of the River Thames, the cluttered distribution pattern of harvest mouse in Kent (Young *et al.*, 2015) shows no records near the Order Limits, but Young *et al.* conclude that harvest mouse is widespread in Kent. North of the River Thames in Essex, the species was described as common (Dobson and Tansley, 2014), with records from 42% of tetrads¹ in Essex.

Hedgehog

- 2.2.8 Nationally, hedgehog is considered to be a declining species and has been subject to an approximate 20% decline over four years (2001 to 2005). This was equivalent to a greater than 50% decline over 25 years, so they were added to the UK BAP species review in 2007 (Joint Nature Conservation Committee, 2010c). Population estimates indicated a population decline from approximately 30 million in the 1950s to 1.5 million in 1995 (Macdonald and Burnham, 2011), and road casualty counts carried out between 1990 and 2001 suggest they declined by as much as half in that decade alone. The 10-year trend in 2011 indicated no statistical decline in England but did note that populations of their main predator (badger) continued to increase. Mathews *et al.* (2018) suggest that populations are declining.
- 2.2.9 Nationally, threats to hedgehog (Mathews *et al.*, 2018) include changes in agricultural practice and possibly pesticide use, anthropogenic influences such as vehicle collisions and loss of nesting habitat, and predation and possible competitive exclusion by badgers.
- 2.2.10 South of the River Thames in Kent, distribution maps show a wide distribution for hedgehogs (Young *et al.*, 2015). North of the River Thames in Essex, distribution maps show a wide distribution for this species (Dobson and Tansley, 2014).

¹ A tetrad is a 2km x 2km square

3 Background ecology

3.1 Brown hare

3.1.1 In Britain, brown hare is usually associated with lowland pasture and arable farmland, feeding mainly on grasses and herbs as well as agricultural crops (Wheeler *et al.*, 2012). They are widespread on low ground in England, Wales and Scotland. Woods and hedgerows also provide daytime shelter, particularly in winter. This species requires a suitable sequence of food sources and cover types throughout the year and, on farmland, are highly dependent on the agricultural cycle. Annual home ranges vary between 20ha and 90ha, though they may commute 1.7km between feeding and resting sites (Wheeler *et al.*, 2012).

3.2 Harvest mouse

3.2.1 Harvest mouse occupy a wide range of habitats and are found in rough and tussocky grassland, ungrazed and uncut meadows, reedbeds and riparian margins, and the rank grassland associated with young plantations (Bullion, 2012); they are rarely present in cereal crops or mature woodland. They are found in England from central Yorkshire southwards. Population density of harvest mouse varies with habitat, with the highest density in reedbeds (20–50 per hectare) and lowest in cereal fields (0.05–0.4 per hectare) (Leach, 1990), but it is extremely difficult to say with any level of certainty (Mathews *et al.*, 2018).

3.3 Hedgehog

3.3.1 Hedgehogs are present in a wide variety of habitat types, including grasslands, forests and suburban areas (Morris, 2012), although they are increasingly associated with urban areas and often observed in gardens and amenity grasslands (Mathews *et al.*, 2018). They are widely distributed throughout the UK (Mathews *et al.*, 2018). They require a secure winter site for nesting, and this is a crucial factor in their distribution and habitat use. The lack of materials to make such nests may explain why they are rare or absent in conifer woodland, marshy areas, heathland and moorland, and open habitats such as arable fields. Males may travel 3km or more in a night and have a home range of 50ha or more in the summer; females normally travel up to 1km per night with a home range of approximately 10ha (Morris, 2012).

4 Methodology

4.1 Desk study

- 4.1.1 A desk study, carried out in 2020 and subsequently updated in 2022, considered all records of protected or otherwise notable species from 2007 to present within 2km of the Order Limits. Records were requested from Kent & Medway Biological Records Centre (2022), Essex Wildlife Trust Biological Records Centre (2020), Essex Field Club (2022) and Greenspace Information for Greater London (2022).

4.2 Brown hare

- 4.2.1 Field surveys for brown hare were carried out during bird transect and vantage point surveys on land within the Order Limits plus a 50m buffer, between April 2017 and March 2019; see Appendix 8.7: Ornithology (Application Document 6.3). A total of 1,106 bird surveys were carried out at 60 different transects or vantage point locations. Any sightings of hare during these surveys were recorded using an iPad with ArcGIS Collector software. Locations of the bird transects and vantage point surveys are shown on Figure 8.10 (Application Document 6.2).

4.3 Harvest mouse

- 4.3.1 Desk study data, aerial maps and habitat data from the Extended Phase 1 Habitat Survey (see Appendix 8.2: Plants and Habitats (Application Document 6.3) for more details) were reviewed to see which areas needed to be further assessed for harvest mice. A total of 86 transect areas that have the potential to support harvest mice were identified as requiring field surveys within, and up to 50m from, the Order Limits.
- 4.3.2 Each transect area was subjected to a transect survey by two ecologists, at least one of which had experience carrying out harvest mouse surveys, looking for characteristic harvest mouse nests. Methodologies followed those described in Bullion (2012). Surveys were carried out in October 2018 to minimise any disturbance to breeding individuals.
- 4.3.3 Each transect was at least 200m long, and nests were searched for within a 2m-wide strip. A description of the overall habitat type and level of habitat connectivity was recorded for each transect, with any nest found being described, photographed and mapped using an iPad with ArcGIS Collector software. Weather data for each transect was also recorded.

4.4 Hedgehog

- 4.4.1 Desk study records suggest hedgehogs are widely distributed across the Order Limits, so no specific surveys for this species were carried out. Extended Phase 1 Habitat Survey data was examined to assess the suitability of different habitat categories to the south and north of the River Thames for hedgehog, based on an understanding of their ecological requirements. Habitat types were categorised as good, moderate, poor and not available (N/A) for hedgehog.

5 Results

5.1 Brown hare

- 5.1.1 There are no recent desk study records of brown hare within 2km of the Order Limits south of the River Thames. North of the River Thames, there was one non-designated site that had brown hare on the designation: Fairplay Farm Site of Importance for Nature Conservation (SINC). North of the river there were 12 brown hares recorded within 2km of the Order Limits.
- 5.1.2 Brown hares were recorded in low numbers during field surveys carried out from April 2017 to March 2019. Six brown hares were recorded, all of which were to the north of the River Thames. Two of the records were within open mosaic habitat on previously developed land next to Tilbury Power Station (one of which was within the Order Limits), one was recorded in an arable field to the west of East Tilbury, and the remaining three were recorded in arable fields north of the A13: one immediately west of Baker Street (which was within the Order Limits) and the other two north-west of Orsett (which were both outside of the Order Limits). No brown hares were observed to the south of the River Thames.

5.2 Harvest mouse

- 5.2.1 There are no recent desk study records of harvest mouse within 2km of the Order Limits south of the River Thames. North of the River Thames, there was one non-designated site which has harvest mouse on the designation: Fairplay Farm SINC. North of the river there were six records within 2km of the Order Limits. One record provided by Essex Field Club (2022) was located within the Order Limits.
- 5.2.2 Eighty-six harvest mouse transects were carried out between 16 October 2018 and 1 November 2018 in areas identified in the desk study and the Extended Phase 1 Habitat Survey as requiring further assessment, namely within a mix of arable field margins, lowland wetland, reedbed and rough grassland habitats (see Figure 8.31: Other Mammals Survey Results (Application Document 6.2)).
- 5.2.3 Seventeen harvest mouse transects were carried out south of the River Thames. Of these, eight contained suitable habitat, four contained suboptimal habitat, and five were unsuitable for harvest mice. Of the eight transects containing suitable harvest mice habitat, four had moderate connectivity to adjacent suitable habitat, and four had low connectivity. There were no harvest mice nests recorded during these transects.
- 5.2.4 North of the River Thames, 69 harvest mouse transects were carried out. Fifty transects contained suitable harvest mouse habitat. Of these, 16 had high connectivity to adjacent suitable habitat, 29 had moderate connectivity and five had low connectivity. Eighteen transects contained sub-optimal habitat, although of these, nine had high connectivity to suitable adjacent habitat and six had moderate connectivity. One transect contained unsuitable habitat for harvest mice. Fourteen harvest mouse nests were found along seven transects; three transects with suitable habitat and four transects with sub-optimal habitat. Harvest mouse nests were found along 10% of transects with either suitable or sub-optimal habitat; see Table 5.1 and Figure 8.31: Other Mammals Survey Results (Application Document 6.2). Seven of these nests were located within the Order Limits (nests found on transects 21, 55 and 62).

Table 5.1 Harvest mouse field survey results

Transect No.	Habitat description	Connectivity	Nest No.	Notes
2	Sub-optimal – rough grassland with scrub	High	1	Well-formed nest on the edge of scrub
			2	Nest on edge of scrub
4	Sub-optimal – rough grassland with scrub	High	1	Nest on edge of scrub
			2	Nest on edge of scrub
5	Sub-optimal – rough grassland with scrub	High	1	Small nest about baseball size consisting of woven grass and leaves.
8	Sub-optimal – rough grassland with scrub	High	1	Nest in long grass
			2	Very exposed nest
21	Suitable – arable field margin	High	1	Nest on edge of hedge
			2	None
			3	Nest quite hidden, incomplete/falling apart
			4	Well-formed nest in field margin outside of hedge
			5	Nest quite exposed
55	Suitable – arable field margin	Moderate	1	Probably from previous year
62	Suitable – arable field margin	High	1	7cm diameter

5.2.5 In addition to these nests found on dedicated harvest mouse surveys, three incidental records were also recorded, two of which were within the Order Limits. One nest was recorded within the Order Limits in dense reed during water vole surveys in September 2017. This nest was found within a ditch running through arable land to the north of the River Thames. One nest was found on an access track within the Order Limits south of Muckingford Road, adjacent to transect 27. The final nest was located outside the Order Limits within a tree cavity east of Linford, adjacent to transect 35. See Figure 8.31: Other Mammals Survey Results (Application Document 6.2).

5.3 Hedgehog

5.3.1 The desk study revealed that, since 2012, there were 13 hedgehog records within 2km of the Order Limits south of the River Thames. North of the River Thames, there were 181 hedgehog records within 2km of the Order Limits.

5.3.2 Table 5.2 summarises the areas of the different Phase 1 habitat type of the Order Limits south of the River Thames. Table 5.3 summarises this information for north of the River Thames, categorised as good, moderate, poor or not available for hedgehog within 50m

Table 5.2 Phase 1 habitat (south of the River Thames) categorised by suitability for hedgehogs

Phase 1 habitat	Size	Hedgehog suitability
Semi-natural broadleaved woodland	23.81ha	Good
Plantation broadleaved woodland	44.66ha	Good
Plantation mixed woodland	0.48ha	Good
Dense/continuous scrub	5.3ha	Good
Recently felled broadleaved woodland	0.28ha	Good
Semi-improved neutral grassland	20.4ha	Moderate
Unimproved calcareous grassland	0.19ha	Good
Semi-improved calcareous grassland	2.07ha	Moderate
Improved grassland	21.12ha	Moderate
Poor semi-improved grassland	57.43ha	Moderate
Continuous bracken	0.16ha	Moderate
Tall ruderal	5.55ha	Good
Swamp	0.38ha	N/A
Marginal vegetation	1.09km	Poor
Standing water	1.26ha	N/A
Running water	0.27ha	N/A
Intertidal mud/sand	0.18ha	N/A
Intertidal shingle/cobbles	0.17ha	N/A
Dense/continuous saltmarsh	0.05ha	N/A
Hardstanding	61.96ha	N/A
Artificial spoil	0.15ha	N/A
Arable	249.01ha	Moderate
Amenity grassland	38.82ha	Moderate
Ephemeral/short perennial	0.87ha	Moderate
Introduced shrub	0.13ha	Moderate
Sea wall	0.15km	Poor
Buildings	0.97ha	N/A
Bare ground	5.05ha	N/A
Open Mosaic Habitats	4.44	Good
Coastal and floodplain grazing marsh	15.02	Moderate
Other	2.21	N/A
Total	562.18	

Table 5.3 Phase 1 habitat (north of the River Thames) categorised by suitability for hedgehogs

Phase 1 habitat	Hectares	Hedgehog suitability
Semi-natural broadleaved woodland	16.27ha	Good
Plantation broadleaved woodland	80.08ha	Good
Plantation coniferous woodland	0.08ha	Poor
Plantation mixed woodland	0.44ha	Good
Dense scrub	30.87ha	Good
Grassland – Acid – Semi-improved	0.53ha	Moderate
Unimproved neutral grassland	0.25ha	Good
Semi-improved neutral grassland	54.73ha	Moderate
Improved grassland	42.40ha	Moderate
Marshy grassland	0.05ha	Poor
Poor semi-improved grassland	71.58ha	Moderate
Tall ruderal	12.16ha	Good
Tall herb and fern other non-ruderal	0.04ha	Good
Swamp	1.23ha	N/A
Standing water	8.87ha	N/A
Running water	4.57ha	N/A
Intertidal mud/sand	13.07ha	N/A
Dense/continuous saltmarsh	0.39ha	N/A
Shingle above high tide	0.02ha	N/A
Hardstanding	128.59ha	N/A
Quarry	0.69ha	Poor
Artificial spoil	2.93ha	N/A
Refuse-tip	0.19ha	Poor
Arable land	923.03ha	Moderate
Amenity grassland	12.03ha	Moderate
Ephemeral/short perennial	4.5ha	Moderate
Introduced shrub	0.21ha	Moderate
Caravan site	1.33ha	Poor
Sea Wall	0.36km	Poor
Bare ground	14.28ha	N/A
Open Mosaic Habitat	126.13	Good
Other	9.77ha	N/A
Total	1561.15	

- 5.3.3 South of the River Thames, 84.71ha (15%) of the habitats were categorised as ‘good’ for hedgehogs and 405.03ha (72%) were categorised as ‘moderate’ for hedgehogs.
- 5.3.4 North of the River Thames, 266.24ha (17%) of the habitats were categorised as ‘good’ for hedgehogs and 1,066.61ha (68%) were categorised as ‘moderate’ for hedgehogs.

6 Limitations and assumptions

- 6.1.1 The dataset for ‘other mammals’ is considered to be sufficiently robust and representative to inform the baseline conditions of the study area. The precautionary principle has been applied when interpreting the data, and so there are not expected to be any significant limitations to the dataset that may affect the conclusions drawn within this appendix.

6.2 Changes to the Project Order Limits

- 6.2.1 Changes to the Order Limits occurred after the field surveys that were used to inform this report were completed.
- 6.2.2 Field surveys for brown hare were originally carried out during bird transect and vantage point surveys on land within the Order Limits plus a 50m buffer. Given this buffer, the fact that brown hares were only recorded in low numbers north of the River Thames, and from reviewing the habitat within the amended Order Limits, the changes to the Order Limits are considered to have no implications on the conclusions drawn within this report regarding brown hare.
- 6.2.3 Harvest mouse surveys were originally carried out in suitable habitat within the Order Limits plus a 50m buffer, before the final extent of the Order Limits was confirmed. Given this buffer, the fact that north of the River Thames harvest mouse nests were only found in 10% of the transects with suitable or sub-optimal habitat, and from reviewing the habitat within the amended Order Limits, then the change to the Order Limits is considered to have no implication on harvest mouse north of the River Thames. Since no survey or desk study records of harvest mouse within the Order Limits to the south of the River Thames were identified, the change to the Order Limits is not considered to materially alter the conclusions drawn within this report regarding harvest mouse to the south of the River Thames.
- 6.2.4 The calculations of ‘good’, ‘moderate’ and ‘poor’ habitat for hedgehog were based on the final Order Limits. Any gaps in Extended Phase 1 Habitat Survey data coverage have been satisfied through aerial photo interpretation (for full details of the methodology, please refer to Appendix 8.2: Plants and Habitats (Application Document 6.3)). The change to the Order Limits is therefore not considered to materially alter the conclusions drawn within this report regarding hedgehog.

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