Southampton to London Pipeline Project

Volume 6

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Appendix 7.12: Riparian Mammals Factual Report

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Southampton to London Pipeline Project

Esso Petroleum Company, Limited

Appendix 7.12: Riparian Mammal Factual Report

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Southampton to London Pipeline Project

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1 Introduction

1.1 Overview

1.1.1 Esso Petroleum Company, Limited (Esso) is making an application for development consent to replace 90km (56 miles) of its existing 105km (65 miles) aviation fuel pipeline that runs from the Fawley Refinery near Southampton, to the Esso West London Terminal storage facility in Hounslow. The replacement pipeline is 97km (60 miles) long, and within this report is referred to as 'the project'.

1.1.2 This Riparian Mammal Factual Report has been produced to support the application for development consent and the accompanying Environmental Statement (ES) under the Planning Act 2008.

1.1.3 Riparian mammals are those mammal species that inhabit and are associated with freshwater and estuarine habitats and those bordering terrestrial (i.e. riparian) habitats. This report focuses on the riparian mammals otter (*Lutra lutra*) and water vole (*Arvicola amphibius*) as legally protected and notable species (i.e. Species of Principal Importance in England as per Section 41 of the Natural Environment and Rural Communities Act 2006). As such, any reference to 'riparian mammals' is referring to otter and water vole only. Other riparian mammals (e.g. bank vole (*Myodes glareolus*), brown rat (*Rattus norvegicus*) and American mink (*Neovison vison*)) are discussed only where they are found during field survey; these species are not notable in the biodiversity context.

1.2 Legal Context

Otter

1.2.1 Otter are European Protected Species (EPS), fully protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and Schedule 2 of the Conservation of Habitats and Species Regulations 2017. The combined effect of this legislation makes it an offence to:

- deliberately kill, injure or capture otter;
- deliberately or recklessly disturb otter in a way which is likely to:
  - impair their ability to: survive, breed or reproduce, or rear or nurture their young, or, migrate; or
  - significantly affect the local distribution or abundance of otter.
- damage or destroy a breeding site or resting place.

1.2.2 A mitigation licence may be obtained from Natural England if works have the potential to affect the species in any of the ways listed above and if the 'three tests' are satisfied, as detailed in Regulation 55 of the Conservation of Habitats and Species Regulations 2017.

1.2.3 Otter are also listed as a Species of Principal Importance in England (i.e. a Priority Species) following guidance under Section 41 of the Natural Environment and Rural

Communities (NERC) Act 2006. This places a duty on all public bodies to have regard to the conservation of biodiversity in England whilst carrying out their normal functions (the biodiversity duty). This means that otter must be treated as a material consideration within the planning process.

Water Vole

1.2.4 Water vole are fully protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). This legislation makes it an offence to:

- intentionally kill, injure or take water vole;
- intentionally or recklessly damage, destroy or obstruct access to any structure or place used for shelter or protection by a water vole; and/or
- intentionally or recklessly disturb water vole occupying any structure or place used for shelter or protection.

1.2.5 A licence can be granted by Natural England allowing the intentional damage or destruction of burrows or displacement of water voles from their burrows for development projects. This licence will only be issued in relation to a development if there would be a conservation benefit for water voles.

1.2.6 The water vole is also listed as a Species of Principal Importance in England (i.e. a Priority Species) following guidance under Section 41 of the NERC Act 2006.

2 Methodology

2.1 Introduction

2.1.1 The survey methodology is based on that outlined in the project's Scoping Report (Esso, 2018). The methodology has also been informed by consultation and engagement with relevant consultees (e.g. Natural England (NE)), the results of desk studies, and professional judgement.

2.2 Desk Study

Data Search

2.2.1 A desk study involving the collection of existing protected and notable species records was undertaken within the study area (see Chapter 7 Biodiversity).

2.2.2 Recent records (recorded within the last 10 years) of otter and water vole and designated sites relating to otter and water vole were requested from Greenspace Information for Greater London (GiGL), Surrey Biodiversity Information Centre (SBIC) and Hampshire Biodiversity Information Centre (HBIC) between January and March 2018. Results were received from GiGL in January 2018 and results from HBIC were received in February 2018. No records from SBIC relating to protected species, including otter and water vole, have been received.

2.2.3 The Multi-Agency Geographic Information for the Countryside (MAGIC) website was reviewed between January and March 2018 to identify the locations of any granted

European Protected Species (EPS) mitigation licences with respect to otter within the study area.

2.2.4 Information held by the National Water Vole Database and Mapping Project was reviewed.

Desk-based Habitat Suitability Assessment

2.2.5 An initial desk-based study identified sites for further assessment. Watercourses or water bodies intersected by the project area were identified and assessed using aerial imagery and Geographical Information System (GIS) mapping. These images were used to locate potential survey areas for otter and water vole. Shortlisted sites consisted of:

- sites with recent or historic records of otter or water vole presence;
- sites with no recent or historic records of otter or water vole but with the potential to support these species (e.g. areas of sub-optimal habitat that are contiguous with known otter and water vole sites);
- sites that have the potential to support populations of otter and water vole due to the presence of suitable habitat (e.g. watercourses and water bodies with a suitable bank profile and adequate vegetation cover) likely to be affected by construction activity; and
- sites shortlisted for aquatic ecology surveys (Appendix 7.5 Aquatic Ecology Factual Report).

2.2.6 The desk-based study was later reviewed to include water bodies and watercourses being intersected by the proposed locations of haul routes, but not previously scoped in for survey under the methodology described in the Scoping Report (Esso, 2018). This comprised water bodies and watercourses that would be directly crossed by a haul route within the Order Limits.

2.2.7 Watercourses confirmed as being crossed by trenchless technology (i.e. auger bore or horizontal directional drilling (HDD)) were omitted from further surveys if no impact to riparian habitat would arise at those locations. At watercourses where the method of crossing in the Order Limits was unknown at the time of survey, a precautionary approach was taken and the watercourse was surveyed.

2.2.8 Each watercourse crossing point has been allocated a unique reference number with the prefix ‘WCX’.

2.3 Field Surveys

Habitat Suitability Assessments

2.3.1 Where access allowed, an assessment of relative suitability of habitats for otter and water vole was completed at all shortlisted crossing points within the project area, during 2018. This was used to categorise water bodies and watercourses as ‘unsuitable’, ‘sub-optimal’ or ‘optimal’ for otters and/or water voles. Factors considered during habitat assessments comprised:

- bank profile;

- bank substrate;
- water depth;
- shading;
- bankside vegetation; and
- channel vegetation.

2.3.2 Habitats that were assessed as being either sub-optimal or unsuitable for supporting water vole (e.g. heavily shaded watercourses/water bodies with little or no herbaceous bankside and in-channel vegetation, shallow-flat banks prone to flooding and unsuitable for burrowing) and otter (e.g. small, narrow watercourses/water bodies with limited or no waterside vegetation, scrub and old trees for the provision of shelter, and water heavily polluted and/or too shallow to be inhabited by fish) were scoped out of the assessment and were not subject to further surveys unless there was habitat connectivity to more suitable habitats or areas confirmed as having historic presence of these species.

2.3.3 This approach is considered proportionate given the localised and temporary nature of the proposed pipeline installation works.

Field Surveys

2.3.4 Following habitat suitability assessments, the remaining water bodies and watercourses were subject to field sign surveys. As far as practicable, surveys were undertaken in accordance with current good practice guidelines (e.g. Strachan *et al.,* 2011; Dean *et al*., 2016; Chanin, 2003).

2.3.5 Where land access permission allowed, water bodies and watercourses scoped in for field sign surveys were surveyed twice. In cases where no evidence of otter or water vole was recorded, and it was evident that the watercourse habitat does not change dramatically throughout the year, only one survey was conducted. See Annex A (Table A2) for results.

2.3.6 Where possible, in order to confirm presence or likely absence of otter and water vole during the field sign surveys, ecologists surveyed 200m upstream and 200m downstream of each water body and potential watercourse crossing. Where this was not possible, justification and an assessment of the constraint can be found in Annex A (Table A2).

2.3.7 Field surveyors looked for field signs of water vole and otter, as described in the *Water Vole Conservation Handbook* (Strachan *et al*., 2011) and *Monitoring the Otter* (Chanin, 2003). Examples of field signs of water vole include burrows, latrines, feeding stations, lawns and footprints. Examples of field signs of otter include holts, spraints, footprints, feeding remains, slides and couches.

2.3.8 Where water depth allowed, surveys were conducted by wading in-channel. Where water exceeded 0.2m, surveys were conducted by walking along the banks, thereby adhering to health and safety requirements.

2.3.9 Some watercourses scoped in for field sign surveys were identified as being crossed by trenchless technology as the design phase progressed. As these techniques would not impact upon otter or water vole habitat, these watercourses were omitted from further survey effort as this information became available.

2.3.10 Any field signs or incidental sightings of riparian mammals were recorded and mapped. Evidence of mink, foxes and cats were also recorded as these are predators of water vole (Jeffries, 2003).

2.3.11 All field surveys were undertaken by suitably experienced ecologists, and where possible, timed to avoid periods of high water levels or immediately following habitat management activities, as these can wash away or destroy field signs.

2.4 Survey Constraints

2.4.1 Historic records were requested from SBIC in January 2018. At the time of writing, no protected species records from SBIC have been received and so the results of field surveys and desk-study information from other sources have been used to confirm the presence or likely absence of riparian mammals within Surrey.

2.4.2 Surveys were not able to be completed at some watercourses being intersected by the Order Limits due to access not being obtained. These watercourses have been highlighted in Annex A (Table A1). However, 80% of watercourses being intersected by the Order Limits were subject to survey.

2.4.3 To address land access constraints, pre-construction surveys would be completed if existing baseline survey data need to be updated or supplemented (G33). This measure is included in the project's Register of Environmental Actions and Commitments (REAC) in Chapter 16 Environmental Management and Mitigation.

2.4.4 Good practice guidelines advise that two field sign surveys should be conducted between mid-April and the end of June, and between July and the end of September (Dean *et al*., 2016). Due to access constraints, all field sign surveys were undertaken between July and November. Where possible, and where deemed necessary, watercourses scoped in for field sign surveys were subject to two full surveys between these months, and unless stipulated, watercourses were visited at a time when vegetation was considered favourable to breeding otter and water vole. Therefore, the timing of field sign surveys is not considered to be a particular constraint.

2.4.5 Some watercourses scoped in for two field sign surveys were only subject to one survey. This was due to one or more of the following reasons:

- access constraints;
- health and safety constraints; and/or
- changes in the Order Limits.

2.4.6 Some watercourses subject to field sign surveys had areas of bank which were unable to be surveyed at all due to one or more of the following reasons:

- gradient of banks;

- invasive plant species;
- unstable ground;
- presence of wasp nests; and/or
- dense obstructing vegetation.

2.4.7 Where areas of inaccessible bank were found at field survey sites, the survey area was extended beyond the 200m study area. Adequate bank coverage was obtained at all watercourses/water bodies subject to survey. Therefore, this is not considered to be a particular constraint.

2.4.8 Otter are known to occupy territories over extensive areas, in which they follow a semi-nomadic existence moving from one holt to another to exploit seasonally available food sources (Chanin *et al*, 2003). Therefore, it is difficult to establish if otter do not frequent a site, as they may only be absent in the short term or be present only very infrequently. As pre-construction surveys would be completed if existing baseline survey data need to be updated or supplemented (G33), this is not considered to be particular constraint.

2.4.9 Annex A (Table A2) details constraints on a site-by-site basis.

3 Results

3.1 Desk Study

Data Search

3.1.1 The data searches confirmed the presence of otter and water vole within the study area. The desk study results are shown in Figure A7.12.1.

3.1.2 In Hampshire, one record of water vole on a tributary of the River Hamble to the west of Bishop's Waltham in Section A was returned. Eleven individual records of otter were returned in Hampshire, although these are focused on three locations: the River Hamble, north of Botley (Section A); the River Wey, near Alton (Section C); and the River Blackwater, near Farnborough (Section E).

3.1.3 For Surrey, no protected species records from SBIC have been received. A review of the National Water Vole Database and Mapping Project suggests that water vole have not been recorded in Surrey since 2008 (McGuire & Whitfield, 2017). The River Blackwater forms the boundary between Hampshire and Surrey and so the HBIC data suggests that otter is present in Surrey, at least within parts of the Blackwater catchment.

3.1.4 No records of otter or water vole were returned by GiGL. Bedfont Lakes Country Park Site of Metropolitan Importance (SMI) is approximately 420m to the east of the Order Limits. This SMI is a restored gravel extraction and land-fill site, now managed as a country park, which underwent reintroduction of water vole in 2002. However, the site is not connected to any water body/watercourse intersected by the Order Limits.

Desk-based Assessment

3.1.5 During a desk-based assessment of watercourse/water body crossing points, six watercourses were scoped out due to the unsuitability of habitat for otter and water vole. No field surveys were undertaken at these sites. Further information is provided in Annex A (Table A1).

Habitat Suitability Assessments

3.1.6 Over the course of the design evolution, 104 watercourses/water bodies were identified for Habitat Suitability Assessments. Of these:

- 88 watercourses/water bodies were subject to a Habitat Suitability Assessment;
- four watercourses were not surveyed as landowner permission was not permitted at the time (multiple requests made); and
- ten watercourses were identified as being crossed by trenchless technology and were ruled out of further survey effort.

3.1.7 Following further design evolution, 33 of the 88 watercourses and water bodies assessed for their potential to support otter and water vole would not be affected by the route.

3.1.8 The locations of watercourse crossing points are shown in Figure A7.12.1. A summary of the Habitat Suitability Assessment results is provided in Annex A (Table A1).

Field Surveys

3.1.9 Twenty-seven watercourses were scoped in for field surveys, of which 15 are intersected by the Order Limits.

3.1.10 Otter spraints and feeding remains were found in Cove Brook near Farnborough (Section E). However, following design evolution, this watercourse is not intersected by the Order Limits. As such, no signs of otter were recorded at any watercourse or water body to be intersected.

3.1.11 No signs of water vole were recorded at any watercourse/water body within the survey area.

3.1.12 See Figure A7.12.1 and Annex A (Table A2) for full riparian mammal survey results 2018.

4 Discussion

4.1 Otter

4.1.1 Historically, otters occurred over most of the UK (Joint Nature Conservation Committee (JNCC), 2010). There was a rapid decline in the range of the species during the 1960s and 1970s owing to increased levels of anthropogenic issues such as persecution, pollution and habitat loss (JNCC, 2010). However, recent national surveys suggest that the otter population is recovering well and recolonising areas of its former range (JNCC, 2010). The distribution of otter in 2018, for example, was found to be much larger than that reported in the 1995, particularly in England and Wales, with a 49% increase in the population size across Great Britain (Harris *et al*., 1995; Mathews *et al*., 2018).

4.1.2 No otter couches or holts were identified during field survey. All main river watercourses crossed by the Order Limits had the potential to support commuting and foraging otter. The minor watercourses had only limited potential to support otter, although the occasional presence of this species cannot be dismissed as otter are wide ranging animals.

4.2 Water Vole

4.2.1 Although water vole was thought to occur on all of the main river catchments in Hampshire in the 1990s (Jordan, 1998), population declines since have resulted in water vole being rare in Hampshire. Recent strategic reintroductions undertaken in Hampshire on the River Meon and Alver Valley, over 15km to the east of the route, have been undertaken to address this decline (McGuire and Whitfield, 2017).

4.2.2 The population size estimate of water voles across Great Britain as a whole was found to be substantially smaller in 2018 than in 1995 (Harris *et al*., 1995; Mathews *et al*., 2018). An estimate of water vole numbers in 1998 suggested a 78% decline since 1995, and an estimate of numbers in 2018 suggested a further 50% decrease since 1998 (Harris *et al*., 1995; Mathews *et al*., 2018).

4.2.3 The most recent water vole record from Surrey was submitted to the National Water Vole Database in 2008 (McGuire & Whitfield, 2017). There is concern that the species may be functionally extinct in the county (Surrey Wildlife Trust, 2018).

4.2.4 The desk study identified one record of water vole from 2009 on a tributary of the River Hamble (WCX 006) to the west of Bishop's Waltham (Section A). When surveyed, this watercourse was found to be sub-optimal for water vole and it is possible that the suitability and habitats present have changed since 2009. At the time of survey, the banks were heavily covered in Himalayan balsam and were of sub-optimal profile for burrowing.

4.2.5 No evidence of water vole was found during field survey at any watercourse surveyed with the habitats recorded being largely unsuitable or sub-optimal for this species. At locations where watercourse crossing points were unable to be surveyed, recent records and current survey data relating to nearby surveyed areas were reviewed. As such, water vole is considered to be absent within the Order

Limits and the riparian habitats within 200m to either side of all watercourse crossings.

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Annex A – Results

Table A1: Habitat Suitability Assessment Results

Crossing Point Reference	Intersected by Order Limits	Habitat Description	Scoped in/out of field survey	Date of Assessment	Constraints
WCX 002a	Yes – trenchless crossing	A 2m to 5m wide river (Ford Lake Stream) holding 0.5m to 1m of water. Heavily shaded but with steep earth banks and historic records nearby. Bankside vegetation comprising frequent trees, herbs and tall grass with occasional shrubs. No in-channel herbaceous vegetation.	In – otter and water vole	02/08/2018	n/a
WCX 002	No	A 2m to 5m wide river (Ford Lake Stream) holding 0.5m to 1m of water. Heavily shaded but with steep earth banks and historic records nearby. Bankside vegetation comprising frequent trees, shrubs, herbs, occasional tall grass and rare reeds. No in-channel herbaceous vegetation.	In – otter and water vole	02/08/2018	n/a
WCX 003	Yes	A heavily shaded drainage ditch, 1m wide and holding less than 0.5m water. Limited bankside vegetation with no in-channel herbaceous vegetation and poor connectivity.	Out	25/10/2018	n/a
WCX 004	No	A 1m wide heavily shaded dry drainage ditch offering no bankside vegetation and poor connectivity to the wider landscape.	Out	08/11/2018	n/a
WCX 005	Yes	A heavily shaded dry ditch with no banks. Unsuitable for otter and water vole.	Out	08/11/2018	n/a
WCX 006	Yes	A 1m wide ditch holding less than 0.5m of water and with limited bankside vegetation, comprising abundant Himalyan balsam, frequent shrubs, occasional tall grass and rare trees. Scoped in due to a recent water vole record nearby.	In – otter and water vole	24/07/2018	n/a
WCX 007	Yes	A heavily shaded 1m wide dry ditch, with dense scrub obstructing the channel. Exposed banks with limited	In – otter and water vole	24/07/2018	n/a

Crossing Point Reference	Intersected by Order Limits	Habitat Description	Scoped in/out of field survey	Date of Assessment	Constraints
		bankside vegetation but connected to a large water body when holding water.			
WCX 009	No	A dry 1m wide ditch, heavily shaded by conifer woodland. Banks completely exposed with little to no bankside vegetation.	Out	24/07/2018	n/a
WCX 010	Yes	A heavily shaded dry 1m wide ditch, with poor bankside vegetation.	Out	24/07/2018	n/a
WCX 011	Yes	A narrow 1m wide ditch, holding less than 0.5m water but with good steep banks for burrowing, good bankside vegetation comprising abundant herbs and shrubs, and in-channel herbaceous vegetation.	In – otter and water vole	22/08/2018	n/a
WCX 012	Yes	A 1m to 2m wide stream (Caker Stream) with a good diversity of layered vegetation on steep earth banks, and in-channel herbaceous vegetation.	In – otter and water vole	25/07/2018	n/a
WCX 013	Yes	A dry 1m wide ditch with well maintained, overly exposed banks with limited bankside vegetation and poor connectivity to the wider landscape.	Out	02/08/2018	n/a
WCX 014a	Yes	A 1m to 2m wide dry ditch with very steep banks and the potential to hold approximately 3m of water, although heavily shaded and with little or no bankside vegetation. Unsuitable for burrowing water vole.	In - otter	06/11/2018	n/a.
WCX 015	Yes	A dry drainage ditch, 1m wide, running between two mixed agricultural fields. Little bankside vegetation, with scrub obstructing the channel. Poor connectivity.	Out	07/11/2018	n/a.
WCX 016	Yes	A highway verge, adjacent to a busy main road. No evidence of any banks. Unsuitable for otter and water vole.	Out	07/11/2018	n/a
WCX 017	Yes	A 1m wide arable drainage ditch, very overgrown with scrub and heavily shaded along much of its length. Where not	Out	24/07/2018	n/a

Crossing Point Reference	Intersected by Order Limits	Habitat Description	Scoped in/out of field survey	Date of Assessment	Constraints
		heavily shaded with scrub, the banks are exposed with limited vegetation. Poor connectivity.			
WCX 018	Yes	A dry 1m wide drainage ditch surrounded by arable land. In-channel herbaceous vegetation, but lacking bankside vegetation other than rough grassland. It looks like it hasn't held water for a long time and offers no opportunities for foraging, breeding or resting otter, or for strategic spraint opportunities. However, due to good connectivity, the ditch was scoped in.	In – otter and water vole	24/07/2018	n/a
WCX 019	Yes – trenchless	n/a	n/a	n/a	n/a
WCX 020	Yes	A 1m wide ditch, holding less than 0.5m water but with some layered bankside vegetation and abundant herbs. Scoped in due to connectivity to a large water body (supporting large fish and offering steep earth banks with bankside vegetation) when holding enough water.	In – otter and water vole	24/07/2018	n/a
WCX 021	Yes	A 1m wide stream, holding less than 0.5m water and heavily shaded with poor bankside vegetation and limited connectivity to the wider landscape.	Out	02/08/2018	n/a
WCX 023	Yes	A 1m wide dry drainage ditch adjacent to a road which has been subject to recent management. Very exposed with limited bankside vegetation and poor connectivity to the wider landscape.	Out	07/11/2018	n/a
WCX 025	No	An active golf course drainage ditch, 1m wide with managed banks and lacking bankside vegetation. Banks comprise a combination of earth and artificially placed logs.	Out	07/11/2018	n/a
WCX 025a	Yes	A 1m wide ditch holding less than 0.5m of water, with shallow banks and limited bankside vegetation.	Out	07/11/2018	n/a

Crossing Point Reference	Intersected by Order Limits	Habitat Description	Scoped in/out of field survey	Date of Assessment	Constraints
WCX 26	Yes	A dry drainage ditch adjacent to a road. Heavily shaded with little bankside vegetation other than scrub and limited connectivity to the wider landscape.	Out	07/11/2018	n/a
WCX 027	Yes	Aerial imagery shows a narrow drainage ditch between arable/grazing fields and with limited connectivity to the wider landscape.	n/a	n/a	Landowner permission was not available at the time and so site could not be surveyed. Desk study information suggests likely otter and water vole absence.
WCX 029	Yes	A small, dry 1m wide ditch which looks like it hasn't held water for a long time. Immediately adjacent to a hardstanding access track. Banks very exposed. Poor connectivity. Unsuitable for otter and water vole.	Out	25/07/2018	n/a
WCX 030	Yes	A heavily shaded 1m wide dry drainage ditch, with limited bankside vegetation and limited connectivity to the wider landscape.	Out	15/11/2018	n/a
WCX 031	Yes – trenchless	n/a	n/a	n/a	n/a
WCX 032	Yes	A heavily shaded 1m wide ditch holding less than 0.5m water, with exposed banks, poor bankside vegetation, and limited connectivity to the wider landscape.	Out	16/10/2018	n/a
WCX 33	Yes	A dry 1m wide ditch with flat banks that offer no potential for burrowing water voles and increased chances of flooding should it hold water. Poor connectivity.	Out	25/07/2018	n/a
WCX 034	Yes	A dry, shallow and overly exposed ditch with limited bankside vegetation other than the rough grassland of the field in which it lies. Unsuitable for otter and water vole.	Out	25/07/2018	n/a
WCX 035	Yes	A 1m wide heavily shaded and dry drainage ditch with limited bankside vegetation and poor	Out	06/11/2018	n/a

Crossing Point Reference	Intersected by Order Limits	Habitat Description	Scoped in/out of field survey	Date of Assessment	Constraints
		connectivity to the wider environment.			
WCX 036	Yes	A heavily shaded drainage ditch adjacent to a busy road and with no bankside vegetation other than sparse fern. Much of banks flat. Unsuitable for otter and water vole.	Out	23/10/2018	n/a
WCX 038	Yes – trenchless	A 1m to 2m wide ditch on MOD land holding less than 0.5m of water, and adjacent to a public footpath with frequent dogwalkers. Banks almost entirely bracken and gorse. Shallow profile.	Out	25/07/2018	n/a
WCX 039	Yes – trenchless	A 1m wide ditch holding less than 0.5m of water. Banks predominately fern with no vegetation layering and overly exposed to predation. Within MOD land.	Out	25/07/2018	n/a
WCX 040	Yes – trenchless	A 2m to 5m wide stream (Gelvert Stream), holding no water and lacking diversity in bankside vegetation for food and protection. Heavily shaded. Bank profile flat in places.	Out	25/07/2018	n/a
WCX 041	Yes – trenchless	Basingstoke Canal. Banks a combination of undercut earth and concrete/flood mesh. Unsuitable for water vole. Suitable for foraging and commuting otter, with some places for strategic spraint opportunities.	In – otter	02/08/2018	n/a
WCX 043	Yes	No evidence of a watercourse/water body with banks or holding water at this location. Unsuitable for otter and water vole.	Out	08/11/2018	n/a
WCX 044	Yes	A 1m wide heavily shaded dry drainage ditch adjacent to a busy road. Channel overgrown with scrub, poor bankside vegetation and poor connectivity. Unsuitable for otter and water vole.	Out	08/11/2018	n/a
WCX 045	Yes	A 1m wide shaded drainage ditch running along a golf green and with bankside vegetation.	Out	23/10/2018	n/a

Crossing Point Reference	Intersected by Order Limits	Habitat Description	Scoped in/out of field survey	Date of Assessment	Constraints
WCX 047	Yes	A 1m to 2m wide polluted ditch holding less than 0.5m of water and with limited bankside vegetation. Exposed to disturbance from a busy road to the west, at which point it becomes culverted. Scoped in due to connectivity to the wider environment.	In – otter and water vole	25/07/2018	n/a
WCX 048a	No	A 1m to 2m wide brook (Cove Brook) holding 0.5m to 1m of water. Limited emergent and submerged vegetation, but with bankside layering in the form of frequent herbs, abundant shrubs, and frequent bankside trees. Suitable for large fish species and good connectivity to the wider environment.	In – otter and water vole	27/07/2018	n/a
WCX 048b	No	A 1m to 2m wide brook (Cove Brook) holding 0.5m to 1m of water. Stone slabs make up the first 0.5m of banks, resulting in poor bankside vegetation. Suitable for foraging otter and spraint marking. Sub-optimal for water vole but good connectivity to the wider environment.	In – otter and water vole	27/07/2018	n/a
WCX 048c	Yes – trenchless	A 1m to 2m wide brook (Cove Brook), holding 0.5m to 1m of water and with steep earth banks offering burrowing potential. Bankside vegetation consists of frequent herbs and shrubs, with occasional in-channel emergent vegetation. Strategic spraint opportunities for otter. Good connectivity to the wider environment.	In – otter and water vole	27/07/2018	n/a
WCX 049	Yes	A heavily shaded dry pond with bare flat banks and poor connectivity. Unsuitable for otter and water vole.	Out	23/10/2018	n/a
WCX 051	Yes - trenchless	A 5m to 10m wide river (River Blackwater) with good steep earth banks for burrowing, although limited bankside vegetation in parts due to Himalayan Balsam (*Impatiens glandulifera*). Fast-flowing in places. Suitable for large fish species and strategic spraint opportunities for otter. Good	In – otter and water vole	30/07/2018	n/a

Crossing Point Reference	Intersected by Order Limits	Habitat Description	Scoped in/out of field survey	Date of Assessment	Constraints
		connectivity to the wider environment.			
WCX 055	Yes - trenchless	Frimley Hatches/Blackwater Valley. A large area holding water with swamp vegetation, including a reedbed. Landowner permission to survey the site was not available until November 2018, and was subject to health and safety constraints. However, personal communication with the Blackwater Valley Countryside Trust and Blackwater Valley Countryside Partnership strongly suggests that water vole are absent, despite suitable habitat being present.	In – water vole	21/11/2018	n/a
WCX 058a	Yes	Aerial imagery shows this watercourse is located within a woodland and is heavily shaded. Adjacent to railway line.	n/a	n/a	Landowner permission was not available at the time and so site could not be surveyed. Desk study information suggests likely water vole absence although otter have been recorded on the nearby River Blackwater.
WCX 058b	No	Aerial imagery shows this watercourse is located on the edge of a woodland, within business park. Runs parallel to car park and beneath Frimley Green Road.	n/a	n/a	
WCX 058c	Yes	No water body at this location. Likely culverted under road.	Out – desk-based	n/a	n/a
WCX 058d	Yes	Aerial imagery shows this watercourse is located within a woodland and is heavily shaded. Adjacent to a railway line.	n/a	n/a	A new crossing point in the Order Limits and as such was not subject to survey during 2018.
WCX 060b	No	A 1m wide dry ditch, heavily shaded and with bare and exposed banks. Poor connectivity.	Out	02/08/2018	n/a
WCX 061	No	A 1m wide dry ditch heavily shaded and with exposed bare banks and poor connectivity to the wider environment. Unsuitable for otter and water vole.	Out	02/08/2018	n/a

Crossing Point Reference	Intersected by Order Limits	Habitat Description	Scoped in/out of field survey	Date of Assessment	Constraints
WCX 063	Yes	A highways drainage ditch, adjacent to a busy main road and with poor connectivity to the wider landscape.	Out	07/11/2018	n/a
WCX 064	Yes	A 1m wide dry drainage ditch on a golf course, with shallow banks, no in-channel vegetation, and limited bankside vegetation. Poor connectivity.	Out	15/11/2018	n/a
WCX 065	Yes	A 1m wide dry drainage ditch on a golf course, with poor connectivity to the wider environment.	Out	15/11/2018	n/a
WCX 066	Yes – trenchless	A 2m to 5m wide river (Halebourne) offering steep earth banks for burrowing, although with dominant bankside Himalayan balsam. Suitable for large fish species. Good connectivity to the wider environment.	In – otter and water vole	26/07/2018	n/a
WCX 067	Yes	A 1m to 2m polluted ditch, holding approximately 0.5m of water but with silty substrate. Located in an area of machinery operation and earthworks, in a clearing between two woodland areas.	In	08/01/2019	n/a
WCX 068	Yes	Shallow ditch within woodland, no in-channel vegetation. Connects to WCX 068a.	In	08/01/2019	
WCX 068a	Yes	Runs along boundary of horse fields with wooden fencing either side. In-channel vegetation includes bulrushes and reeds but limited opportunity for burrowing in banks. Connects to River Halebourne.	In	08/01/2019	
WCX 070	Yes	A 1m to 2m polluted brook, heavily shaded and holding less than 0.5m of water. Situated between two active polo club grounds. Bankside vegetation dominated by Himalayan Balsam and scrub.	Out	26/07/2018	n/a
WCX 073	Yes – trenchless	A 1m to 2m wide ditch holding less than 0.5m of water and connected in two parts under a public footpath. Banks comprising earth and clay, with	Out	26/07/2018	n/a

Crossing Point Reference	Intersected by Order Limits	Habitat Description	Scoped in/out of field survey	Date of Assessment	Constraints
		some exposed and flat bare banks. Heavily shaded by willow.			
WCX 076	Yes – trenchless	A heavily shaded, dry, 1m to 2m wide ditch connected in two parts under a public footpath. Flat to shallow banks.	Out	27/07/2018	n/a
WCX 077	Yes – trenchless	A dry, 1m to 2m wide, managed golf course ditch with poor bankside vegetation and poor connectivity to the wider environment.	Out	28/09/2018	n/a
WCX 078	No	A dry, 1m to 2m wide, golf course ditch, heavily shaded and with shallow exposed banks with no bankside vegetation other than scrub. Poor connectivity. Unsuitable for otter and water vole.	Out	28/09/2018	n/a
Pond 078 C	Yes	A small 5m by 5m temporary water body by a bridleway, heavily shaded and with flat banks. Unsuitable for otter and water vole.	Out	30/04/2018	n/a
WCX 079	Yes	A dry 1m to 2m wide golf course ditch, heavily shaded and with shallow exposed banks with no bankside vegetation other than scrub. Poor connectivity. Unsuitable for otter and water vole.	Out	28/09/2018	n/a
WCX 079a	Yes	A narrow golf course ditch with poor connectivity and limited bankside vegetation. Unsuitable for otter and water vole.	Out – desk-based	n/a	n/a
WCX 079b	Yes	A narrow golf course ditch with poor connectivity and limited bankside vegetation. Unsuitable for otter and water vole.	Out – desk-based	n/a	n/a
WCX 080	Yes	A dry 1m wide golf course ditch with exposed banks and no bankside vegetation other than short managed amenity grassland. Running across an active golf course. Unsuitable for otter and water vole.	Out	28/09/2018	n/a
WCX 081	Yes	A dry 1m wide golf course ditch with exposed banks, no bankside vegetation, and poor connectivity to the wider	Out	28/09/2018	n/a

Crossing Point Reference	Intersected by Order Limits	Habitat Description	Scoped in/out of field survey	Date of Assessment	Constraints
		environment. Unsuitable for otter and water vole.			
WCX 082	Yes	A dry 1m wide golf course ditch with flat banks and poor connectivity. Unsuitable for otter and water vole.	Out	28/09/2018	n/a
WCX 083	Yes	A dry 1m wide golf course with exposed banks and no bankside vegetation. Poor connectivity. Unsuitable for otter and water vole.	Out	28/09/2018	n/a
WCX 084	No	A dry 1m wide drainage ditch with shallow banks and poor bankside vegetation. Poor connectivity to the wider environment. Unsuitable for otter and water vole.	Out	09/11/2018	n/a
WCX 085	No	A 1m wide ditch holding less than 0.5m of water and located between two heavily grazed fields. Limited bankside vegetation, with shallow banks and limited connectivity.	Out	15/11/2018	n/a
WCX 085a	Yes – trenchless	n/a	n/a	n/a	n/a
WCX 086	Yes – trenchless	n/a	n/a	n/a	n/a
WCX 086a	No	A dry 1m wide field ditch heavily shaded with shallow banks and limited bankside vegetation.	Out	15/11/2018	n/a
WCX 087	Yes	A dry ditch between horse-grazed fields completely overgrown with scrub and with no visible banks. Unsuitable for otter and water vole.	Out	03/08/2018	n/a
WCX 088	No	A heavily shaded dry 1m to 2m wide ditch with flat-shallow banks and limited bankside vegetation other than common nettles and ground ivy. Recent management on the northeastern bank with tree removal and management of scrub.	Out	03/08/2018	n/a
WCX 089	No	A dry 1m to 2m wide ditch with flat-shallow banks and bankside vegetation limited to bramble and common nettles. Unsuitable for otter and water vole.	Out	03/08/2018	n/a

Crossing Point Reference	Intersected by Order Limits	Habitat Description	Scoped in/out of field survey	Date of Assessment	Constraints
WCX 090	No	A dry 1m to 2m wide ditch with shallow banks and limited bankside vegetation. Heavily shaded by broadleaf woodland.	Out	03/08/2018	n/a
WCX 091	No	A dry 1m to 2m wide shaded ditch with shallow banks and limited bankside vegetation other than scrub.	Out	03/08/2018	n/a
WCX 092	Yes	A dry, heavily shaded, 1m to 2m wide ditch overgrown with scrub.	Out	03/08/2018	n/a
WCX 092a	Yes	A small ditch along the boundary of field pasture and a public cycle path. Very shaded by mature trees and looks like it could dry out in periods of hot weather. Bankside vegetation mainly bramble scrub, and no in-channel vegetation.	Out	08/01/2019	A new crossing point within the Order Limits and therefore not subject to survey during 2018.
WCX 093	Yes	A 1m to 2m wide golf course ditch holding 0.5m to 1m of water. Abundant emergent in-channel vegetation and frequent macrophytes, with occasional bankside reeds and frequent shrubs and herbs. Steep banks for burrowing.	In – water vole	24/10/2018	n/a
WCX 093a	Yes – trenchless	Aerial imagery shows this watercourse is located in a shaded area behind a housing estate.	n/a	n/a	n/a
WCX 094	Yes	A 1-2m wide ditch on the boundary of a golf course. Heavily shaded by mature trees. Bank is steep with some grassy vegetation. Watercourse continues beneath railway line.	n/a	n/a	New crossing points within the Order Limits and therefore not subject to survey during 2018.
WCX 094a	Yes	A 1-2m wide ditch on the boundary of a golf course. Heavily shaded by mature trees. Bank is steep with some grassy vegetation. Watercourse continues beneath railway line.	n/a	n/a	
WCX 095	Yes – trenchless	A 2m to 5m wide section of the Chertsey Bourne, holding 1m to 2m of water and with steep earth banks. Abundant Himalayan Balsam on the northwestern bank limiting bankside vegetation. Sub-optimal but scoped in due to good connectivity.	In – otter and water vole	26/07/2018	n/a

Crossing Point Reference	Intersected by Order Limits	Habitat Description	Scoped in/out of field survey	Date of Assessment	Constraints
WCX 096b	Yes – trenchless	The River Thames, passing through Chertsey Meads.	n/a	n/a	n/a
WCX 098	Yes	Aerial imagery shows this watercourse follows a hedgerow along the boundary of a quarry and arable fields.	n/a	n/a	Landowner permission was not available at the time and so site could not be surveyed. Desk study information suggests likely otter and water vole absence.
WCX 100	Yes – trenchless	A 2m to 5m wide river (River Ash) holding 0.5m to 1m of water. Steep banks with some emergent and in-channel herbaceous vegetation and frequent bankside shrubs and herbs. Large and small fish species observed in water, with strategic spraint opportunities for otter. Well connected.	In – otter and water vole	30/08/2018	n/a
WCX 101	No	A 1m to 2m wide dry ditch completely shaded with little or no bankside vegetation and shallow banks. Unsuitable for otter and water vole.	Out	03/08/2018	n/a
WCX 102b	No	A watercourse 2m to 5m wide and holding 0.5m to 1m of water, with steep earth banks and bankside vegetation. Good connectivity to other watercourses/water bodies.	In – otter and water vole	03/08/2018	n/a
WCX 102c	No	A 10m to 20m wide canal with concrete banks. Suitable for foraging/commuting otter. Good connectivity downstream to the wider environment.	In – otter	03/08/2018	n/a
WCX 102d	Yes – trenchless	A man-made canal approximately 8m wide, connected to a water treatment works. No in-channel vegetation and no burrowing potential due to concrete banks. Bankside vegetation is amenity grass. No shade.	n/a	n/a	n/a
WCX 104b	No	A 2m to 5m wide river, holding less than 0.5m of water and with steep earth banks. Suitable for large species of fish and with bankside vegetation consisting of abundant trees, occasional	In – otter and water vole	24/10/2018	n/a

Crossing Point Reference	Intersected by Order Limits	Habitat Description	Scoped in/out of field survey	Date of Assessment	Constraints
		shrubs and frequent herbs. Some emergent vegetation.			
WCX 104f	Yes – trenchless	A man-made canal with vertical concrete sides. No burrowing potential, no in-channel vegetation and no shading.	n/a	n/a	n/a
WCX 105	Yes – trenchless	Aerial imagery shows this watercourse is located within a recreational park and is heavily shaded.	n/a	n/a	n/a
WCX 106	Yes	No water body at this location. Likely culverted under road.	Out – desk-based	n/a	n/a
WCX 107	No	A 1m wide drainage ditch on a golf course, holding less than 0.5m of water and with bare banks. Poor connectivity. Unsuitable for otter and water vole.	Out	24/10/2018	n/a
WCX 108	Yes	A 1m wide overly exposed drainage ditch holding less than 0.5m of water and situated on a golf course. Polluted and with limited bankside vegetation. Poor connectivity. Unsuitable for otter and water vole.	Out	24/10/2018	n/a
WCX 111	Yes	A 1m wide dry ditch with bare banks to the east, and bankside vegetation to the west limited to common nettle and scrub. Banks comprising earth and artificially placed logs. Scoped in due to connectivity to a large water body, when holding water.	In – otter and water vole	23/08/2018	n/a
WCX 112	Yes	A 1m wide dry drainage ditch with no bankside vegetation other than short amenity grassland. Unsuitable for otter and water vole.	Out	23/10/2018	n/a
WCX 113	Yes	Aerial imagery shows this ditch is located between arable fields and has limited connectivity to the wider landscape.	n/a	n/a	Landowner permission was not available at the time and so site could not be surveyed. Desk study information suggests likely otter and water vole absence.

Crossing Point Reference	Intersected by Order Limits	Habitat Description	Scoped in/out of field survey	Date of Assessment	Constraints
WCX 114	Yes	A ditch between arable fields with limited connectivity to the wider landscape.	Out – desk-based	n/a	n/a
WCX 115	Yes	A drainage ditch running across an active golf course with poor connectivity to the wider landscape.	Out – desk-based	n/a	n/a
WCX 116	Yes – trenchless	n/a	n/a	n/a	n/a
Pond 194a	Yes	An area of flooded amenity grassland in the middle of an active golf course, with no banks and poor connectivity. Unsuitable for otter and water vole.	Out	13/03/2018	n/a

Table A2: Riparian Mammal Field Sign Survey Results

Watercourse Crossing (Figure A7.12.1)	Intersected by Order Limits	Number of Surveys	Reasoning for Number of Surveys	Date of Field Survey	Metadata	Water Vole Evidence	Otter Evidence	Other	Constraints	Importance of Constraint(s)
WCX 002a	Yes - trenchless	1	Trenchless technique proposed	25/09/2018	14°C, dry, wind speed 2, cloud cover 25%	None	None	None	Approximately 50m upstream of survey area could not be surveyed as watercourse crossed into a land parcel with no granted access.	Trenchless technique proposed
WCX 002	No	1	Not intersected by the Order Limits	25/09/2018	14°C, dry, wind speed 2, cloud cover 25%	None	None	Rat footprints and feeding station	None	n/a
WCX 006	Yes	2	n/a	26/09/2018	17°C, dry, wind speed 1, cloud cover 40%	None	None	None	Both surveys were carried out bankside due to boggy conditions. However, dense and dominant Himalayan Balsam along the banks limited survey effort on both occasions.	The watercourse itself is sub-optimal, being heavily shaded with some shallow banks and some bare banks in the absence of Himalayan Balsam. It is considered unlikely that water voles would burrow at this location, and as such it is not considered to be a particular constraint.
				25/10/2018	9°C, dry, wind speed 2, cloud cover 100%	None	None	None		
WCX 007	Yes	1		26/09/2018	20°C, dry, wind speed 1,	None	None	Rat burrow	Western side of crossing point obstructed by	Banks in this area were unsuitable for

Watercourse Crossing (Figure A7.12.1)	Intersected by Order Limits	Number of Surveys	Reasoning for Number of Surveys	Date of Field Survey	Metadata	Water Vole Evidence	Otter Evidence	Other	Constraints	Importance of Constraint(s)
			Health and safety constraints		cloud cover 5%				dense scrub across the channel.	burrowing and heavily shaded.
									Only subjected to one field sign survey due to cows and calves posing a health and safety constraint.	Scoped in for its connectivity to a large water body, but the ditch itself was sub-optimal with no evidence of otter or water vole during the first survey.
WCX 011	Yes	2	n/a	22/08/2018	23°C, dry, wind speed 1, cloud cover 100%	None	None	Feeding station – not water vole.	Very steep banks and two wasp nests to the south of the crossing point resulted in approximately 30% of the survey area being surveyed from the banks.	Banks could still be adequately seen.
				16/10/2018	14°C, dry, wind speed 1, cloud cover 100%	None	None	Rat feeding station; water shrew (*Neomys fodiens*) burrow; feeding station (not water vole)	Very steep banks to the south of the crossing point. Approximately 25% of watercourse surveyed from the banks.	Banks could still be adequately seen.
WCX 012	Yes	2	n/a	22/08/2018	23°C, dry, wind	None	None	Two rat burrows and	Very dense vegetation in the	Banks could still be adequately seen.

Watercourse Crossing (Figure A7.12.1)	Intersected by Order Limits	Number of Surveys	Reasoning for Number of Surveys	Date of Field Survey	Metadata	Water Vole Evidence	Otter Evidence	Other	Constraints	Importance of Constraint(s)
					speed 1, cloud cover 100%			a rat feeding station	channel and steep banks. Approximately 40% of watercourse surveyed from banks.	
				16/10/2018	14°C, dry, wind speed 1, cloud cover 100%	None	None	Rat burrows	Very dense vegetation in the channel and steep banks. Holding water (previously dry), deep in places. Approximately 50% of watercourse surveyed from banks.	Banks could still be adequately seen.
WCX 014a	Yes	1	Access restrictions	06/11/2018	14°C, dry, wind speed 1, cloud cover 100%	None	None	Old rat burrow with connected runs	Only subject to one survey due to access constraints.	Evident that the watercourse does not change dramatically between seasons. One survey is therefore considered adequate to confidently predict the likely absence of otter and water vole at this location.

Watercourse Crossing (Figure A7.12.1)	Intersected by Order Limits	Number of Surveys	Reasoning for Number of Surveys	Date of Field Survey	Metadata	Water Vole Evidence	Otter Evidence	Other	Constraints	Importance of Constraint(s)
WCX 018	Yes	1	Scoped out of second survey	24/07/2018	27°C, dry, wind speed 2, cloud cover 50%	None	None	None	Heavily obstructed by unmanaged grassland bordering arable fields. Surveyed from banks only.	Initially scoped in for its connectivity but the ditch itself was sub-optimal for otter (a dry 1m wide ditch between arable fields with limited bankside vegetation diversity) and water vole and it was evident that the watercourse does not change considerably across the seasons.
WCX 020	Yes	2	N/A	22/08/2018	20°C, dry, wind speed 1, cloud cover 100%	None	None	Rat burrows, footprints and feeding station	Boggy conditions meant that approximately 50% of both surveys had to be carried out from the banks.	Banks could still be checked for burrowing evidence and otter and water vole field signs.
				26/10/2018	8°C, dry, wind speed 2, cloud cover 20%	None	None	Rat burrows		
WCX 111	Yes	2	N/A	23/08/2018	16°C, dry, wind speed 1, cloud cover 20%	None	None	None	n/a	n/a
				25/10/2018	11°C, dry, wind	None	None	None	n/a	n/a

Watercourse Crossing (Figure A7.12.1)	Intersected by Order Limits	Number of Surveys	Reasoning for Number of Surveys	Date of Field Survey	Metadata	Water Vole Evidence	Otter Evidence	Other	Constraints	Importance of Constraint(s)
					speed 1, cloud cover 20%					
WCX 041	Yes	1	Trenchless technique proposed	02/08/2018	28ºC, dry, wind speed 0, cloud cover 0%.	None	None	None	Surveyed from banks only due to water exceeding 0.2m.	Trenchless technique proposed
WCX 047	Yes	1	Access constraints	23/10/2018	14ºC, dry, wind speed 1, cloud cover 0%	None	None	None	Watercourse only surveyed once due to access constraints.	The watercourse itself is sub-optimal for otter and water vole (being a 1m to 2m wide polluted ditch holding less than 0.5m of water, with limited bankside vegetation and exposed to disturbance from a busy road to the west, at which point it becomes culverted) and was initially scoped in for connectivity only. No signs of otter and water vole were found during the first survey.
WCX 048a	No	2	N/A	29/08/2018	18ºC, dry, wind speed 0, cloud cover 40%	None	None	1 x signal crayfish (*Pacifastacus leniusculus*) and 1 x	Approximately 10% of both surveys had to be carried out from the banks due to	Not intersected by the Order Limits.

Watercourse Crossing (Figure A7.12.1)	Intersected by Order Limits	Number of Surveys	Reasoning for Number of Surveys	Date of Field Survey	Metadata	Water Vole Evidence	Otter Evidence	Other	Constraints	Importance of Constraint(s)
								feeding station (not water vole)	water exceeding a depth of 0.2m.	
				18/10//2018	16ºC, dry, wind speed 2, cloud cover 40%	None	None	None		
WCX 048b	No	2	N/A	23/08/2018	16ºC, dry, wind speed 1, cloud cover 70%	None	A semi-fresh intact otter spraint	None	None	N/A
				18/10/2018	16ºC, dry, wind speed 2, cloud cover 40%	None	None	None	None	
WCX 048c	Yes - trenchless	2	N/A	23/08/2018	16ºC, dry, wind speed 1, cloud cover 70%	None	Feeding remains x 2 (signal crayfish) and an old, dry fragmented otter spraint.	Small mammal burrows – likely rat.	Approximately 50% of the watercourse had to be surveyed from the banks (on both surveys) due to water exceeding 0.2m.	Trenchless technique proposed
				17/10/2018	14ºC, scattered showers, wind speed 1, cloud	None	Feeding remains (signal crayfish)	Rat droppings and footprints		

Watercourse Crossing (Figure A7.12.1)	Intersected by Order Limits	Number of Surveys	Reasoning for Number of Surveys	Date of Field Survey	Metadata	Water Vole Evidence	Otter Evidence	Other	Constraints	Importance of Constraint(s)
					cover 100%					
WCX 051	Yes - trenchless	2	N/A	29/10/2018	9ºC, dry, wind speed 1, cloud cover 15%.	None	None	None	Very steep banks and water exceeding 0.2m depth meant approximately 80% of both surveys had to be carried out from the banks.	Banks could still be viewed due to limited bankside vegetation and all likely places for sprainting otter could be checked from the channel.
				21/11/2018	6ºC, dry, wind speed 1, cloud cover 20%.	None	None	None		
WCX 055 (Blackwater Valley)	Yes	None	H&S and land access restrictions	21/11/2018	n/a	n/a	n/a	n/a	Could not be surveyed due to deep, boggy conditions.	This is not considered to be a particular constraint as personal communication with the Blackwater Valley Countryside Trust and Blackwater Valley Countryside Partnership strongly suggests that water vole are absent, despite suitable habitat being present. This is supported by McGuire & Whitfield (2017).

Watercourse Crossing (Figure A7.12.1)	Intersected by Order Limits	Number of Surveys	Reasoning for Number of Surveys	Date of Field Survey	Metadata	Water Vole Evidence	Otter Evidence	Other	Constraints	Importance of Constraint(s)
WCX 066	Yes, but HDD construction technique proposed	1	Trenchless technique proposed	27/09/2018	21°C, dry, wind speed 1, cloud cover 0%.	None	None	Rat prints, water shrew prints and old water shrew burrow	Most of watercourse had to be surveyed from the banks due to deep water.	Trenchless technique proposed
WCX 067	Yes	1	Timing and land access restrictions	08/01/2019		None	None	None	Most of watercourse had to be surveyed from the banks due to deep water.	Banks could still be checked for burrowing evidence and otter and water vole field signs.
WCX 068	Yes	1	Timing and land access restrictions	26/02/2019		None	None	None	None	n/a
WCX 068a	Yes	1	Timing and land access restrictions	26/02/2019		None	None	None	None	n/a
WCX 093	Yes	1	Timing restrictions	24/10/2018	19°C, dry, wind speed 2, cloud cover 90%.	None	None	None	None	n/a
WCX 095	Yes – trenchless	1	Trenchless technique proposed	31/08/2018	14°C, dry, wind speed 1, cloud cover 10%.	None	None	Rat footprints	Surveyed from banks due to deep, silty water.	Trenchless technique proposed
WCX 100	Yes - trenchless	2	N/A	30/08/2018	16°C, dry, wind speed 1,	None	None	Rat footprints	The survey area extended approximately 15m downstream,	Trenchless technique proposed

Watercourse Crossing (Figure A7.12.1)	Intersected by Order Limits	Number of Surveys	Reasoning for Number of Surveys	Date of Field Survey	Metadata	Water Vole Evidence	Otter Evidence	Other	Constraints	Importance of Constraint(s)
					cloud cover 60%				at which point the watercourse becomes culverted under a main road. However, the survey area was extended upstream (within more optimal habitat).	
									Approximately 75% of both surveys had to be carried out from the banks, due to water depth exceeding 0.2m and/or deep silt in the channel.	
				18/10/2018	16ºC, dry, wind speed 2, cloud cover 40%	None	None	Rat droppings and footprints	Approximately 75% of both surveys had to be carried out from the banks, due to water depth exceeding 0.2m and/or deep silt in the channel.	Trenchless technique proposed
WCX 102b	No	1	Not intersected by the Order Limits	30/08/2018	16ºC, dry, wind speed 1, cloud cover 10%	None	None	Feeding station (not a water vole)	Survey had to be conducted from banks due to deep silt in the channel, however	Not intersected by the Order Limits.

Watercourse Crossing (Figure A7.12.1)	Intersected by Order Limits	Number of Surveys	Reasoning for Number of Surveys	Date of Field Survey	Metadata	Water Vole Evidence	Otter Evidence	Other	Constraints	Importance of Constraint(s)
									approximately 50% of banks unable to be surveyed due to dense and obstructing vegetation.	
WCX 102c	No	1	Not intersected by the Order Limits	30/08/2018	16ºC, dry, wind speed 1, cloud cover 10%	None	None	None	Watercourse only extended approximately 15m upstream from the crossing point.	Not intersected by the Order Limits.
WCX 104b	No	1	Not intersected by the Order Limits	24/10/2018	19ºC, dry, wind speed 2, cloud cover 90%.	None	None	None	All of survey had to be conducted from the banks due to water and silt exceeding 0.2m, however much of banks obstructed by dense vegetation.	Not intersected by the Order Limits.

Figure

Figure A7.12.1 Riparian Mammal Desk Study and Field Survey Results

N

Section A

Section B

Section C

Section D

Section E

Section F

Section G

Section H

0 2.5 5 10 Kilometres

Legend

- Order Limits
- Order Limits 1km study area
- Trenchless crossing
- Section break
- Section break

Watercourse crossing point

- Scoped in for field surveys
- Scoped out of field surveys
- Not surveyed
- Pond scoped out of field sign surveys

Hampshire Biodiversity Information Centre historic records

- Otter
- Water vole

Otter field sign

- Feeding remains
- Spraint
- Bedfont Lakes Country Park Site of Metropolitan Importance (SMI)

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APFP Reg. (2009) 5(2)(l)

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Legend

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- Order Limits 1km study area
- Trenchless crossing
- Section break
- Section break

Watercourse crossing point

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Hampshire Biodiversity Information Centre historic records

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Otter field sign

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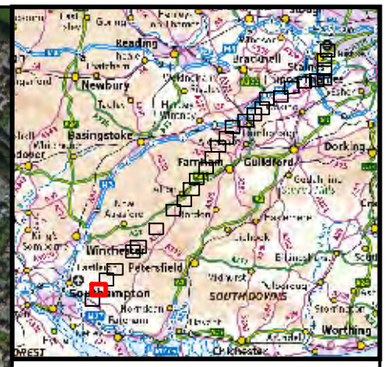

Legend

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- Order Limits 1km study area
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- Section break
- Section break

Watercourse crossing point

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Hampshire Biodiversity Information Centre historic records

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Otter field sign

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Legend

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Watercourse crossing point

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Otter field sign

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Legend

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Watercourse crossing point

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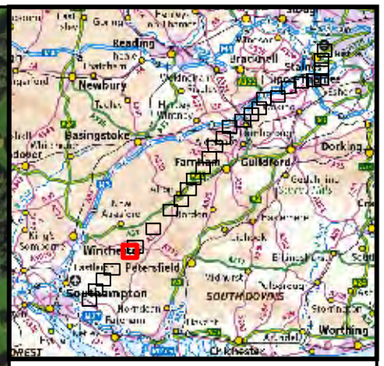

Legend

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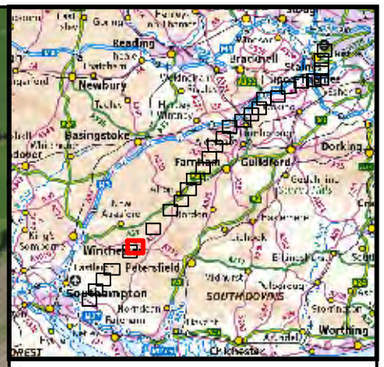

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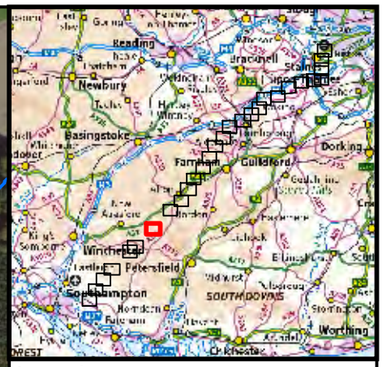

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Legend

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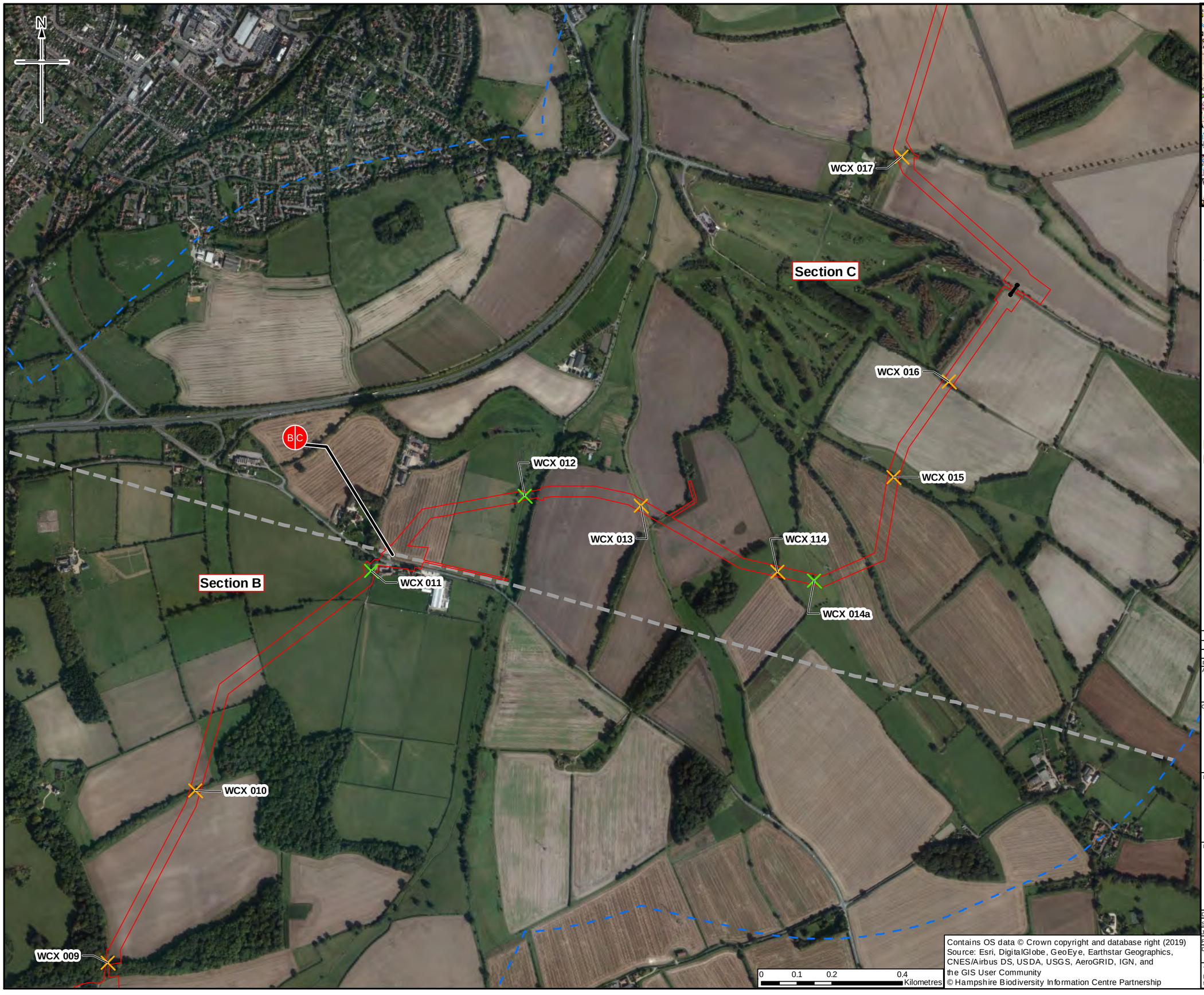

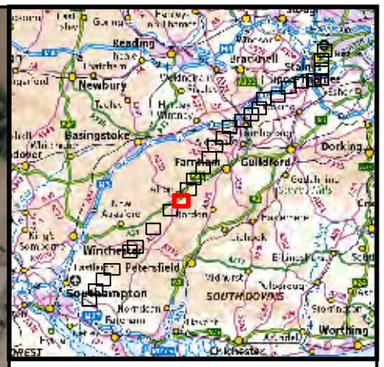

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Otter field sign

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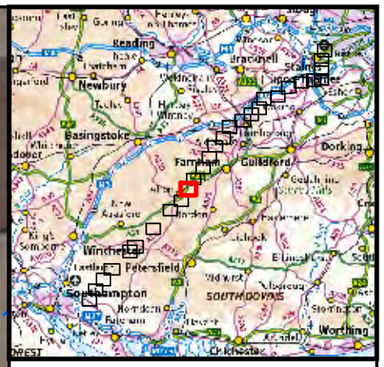

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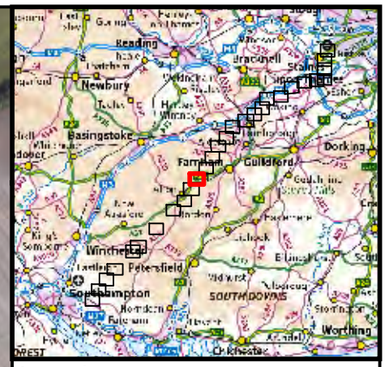

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Legend

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- Order Limits 1km study area
- Trenchless crossing
- Section break
- Section break

Watercourse crossing point

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Otter field sign

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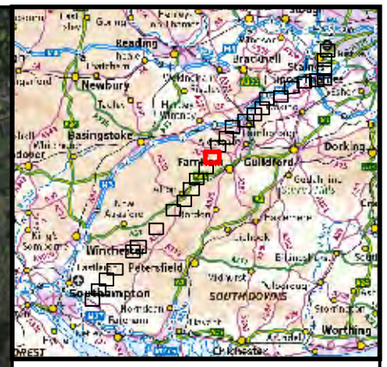

Legend

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- Section break
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Watercourse crossing point

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Hampshire Biodiversity Information Centre historic records

- Otter
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Otter field sign

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N

WCX 036

WCX 035

Pond 78c

WCX 034

WCX 33

Section D

WCX032

WCX031

WCX 030

WCX 029

WCX 027

0 0.1 0.2 0.4 Kilometres

Legend

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- Order Limits 1km study area
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- Section break
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Watercourse crossing point

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Hampshire Biodiversity Information Centre historic records

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Otter field sign

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ENVIRONMENTAL STATEMENT
RIPARIAN MAMMAL - DESK STUDY AND FIELD SURVEY RESULTS
APFP Reg. (2009) 5(2)(l)

Drawing Status	For Issue	
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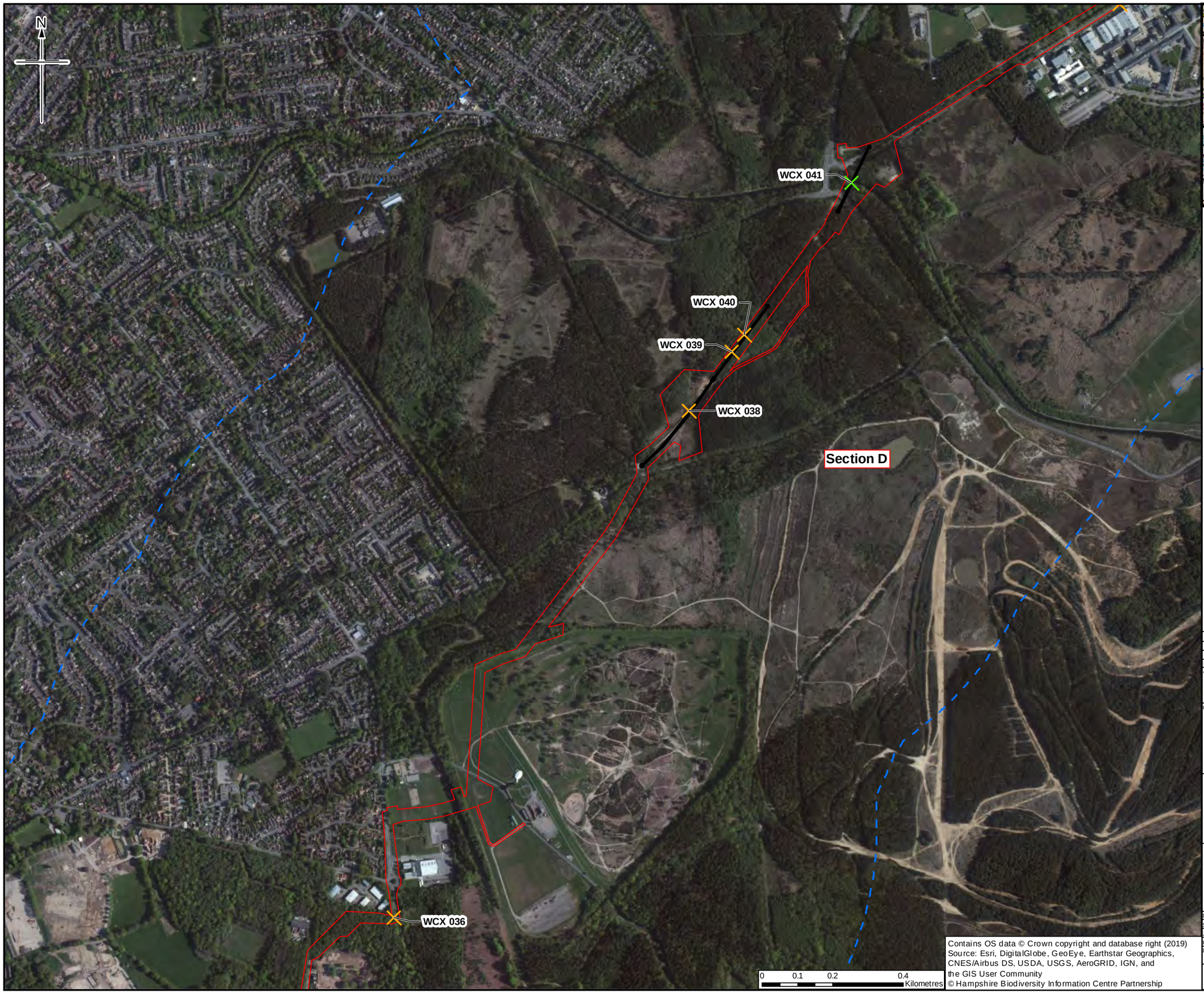
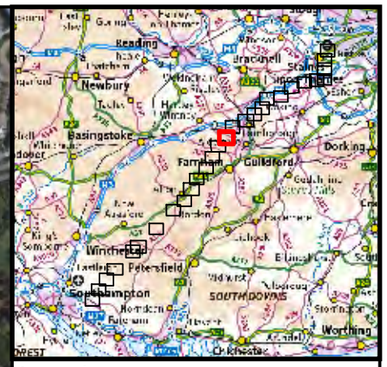
ProjectWise No.	B232300-JAC-000-ENV-DRG-001074	
Drawing number	Figure A7.12.1 Sheet 14 of 28	Rev 0





Legend

- Order Limits
- Order Limits 1km study area
- Trenchless crossing
- Section break
- Section break

Watercourse crossing point

- Scoped in for field surveys
- Scoped out of field surveys
- Not surveyed
- Pond scoped out of field sign surveys

Hampshire Biodiversity Information Centre historic records

- Otter
- Water vole

Otter field sign

- Feeding remains
- Spraint
- Bedfont Lakes Country Park Site of Metropolitan Importance (SMI)

Sheet displays part of Section D

Rev.	Rev. Date	Purpose of revision	Orig/Dwn	Checkd	Rev'd	Apprv'd
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Southampton to London Pipeline Project

Drawing title

ENVIRONMENTAL STATEMENT
RIPARIAN MAMMAL - DESK STUDY
AND FIELD SURVEY RESULTS
APFP Reg. (2009) 5(2)(l)

Drawing Status	For Issue		
Scale	1:10,000 @ A3	DO NOT SCALE	
Jacobs No.	B2325300		
ProjectWise No.	B2325300-JAC-000-ENV-DRG-001074		
Drawing number	Figure A7.12.1 Sheet 15 of 28	Rev	0

Legend

- Order Limits
- Order Limits 1km study area
- Trenchless crossing
- Section break
- Section break

Watercourse crossing point

- Scoped in for field surveys
- Scoped out of field surveys
- Not surveyed
- Pond scoped out of field sign surveys

Hampshire Biodiversity Information Centre historic records

- Otter
- Water vole

Otter field sign

- Feeding remains
- Spraint
- Bedfont Lakes Country Park Site of Metropolitan Importance (SMI)

Sheet displays parts of Section D and Section E

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Drawing title

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AND FIELD SURVEY RESULTS
APFP Reg. (2009) 5(2)(l)

Drawing Status	For Issue	
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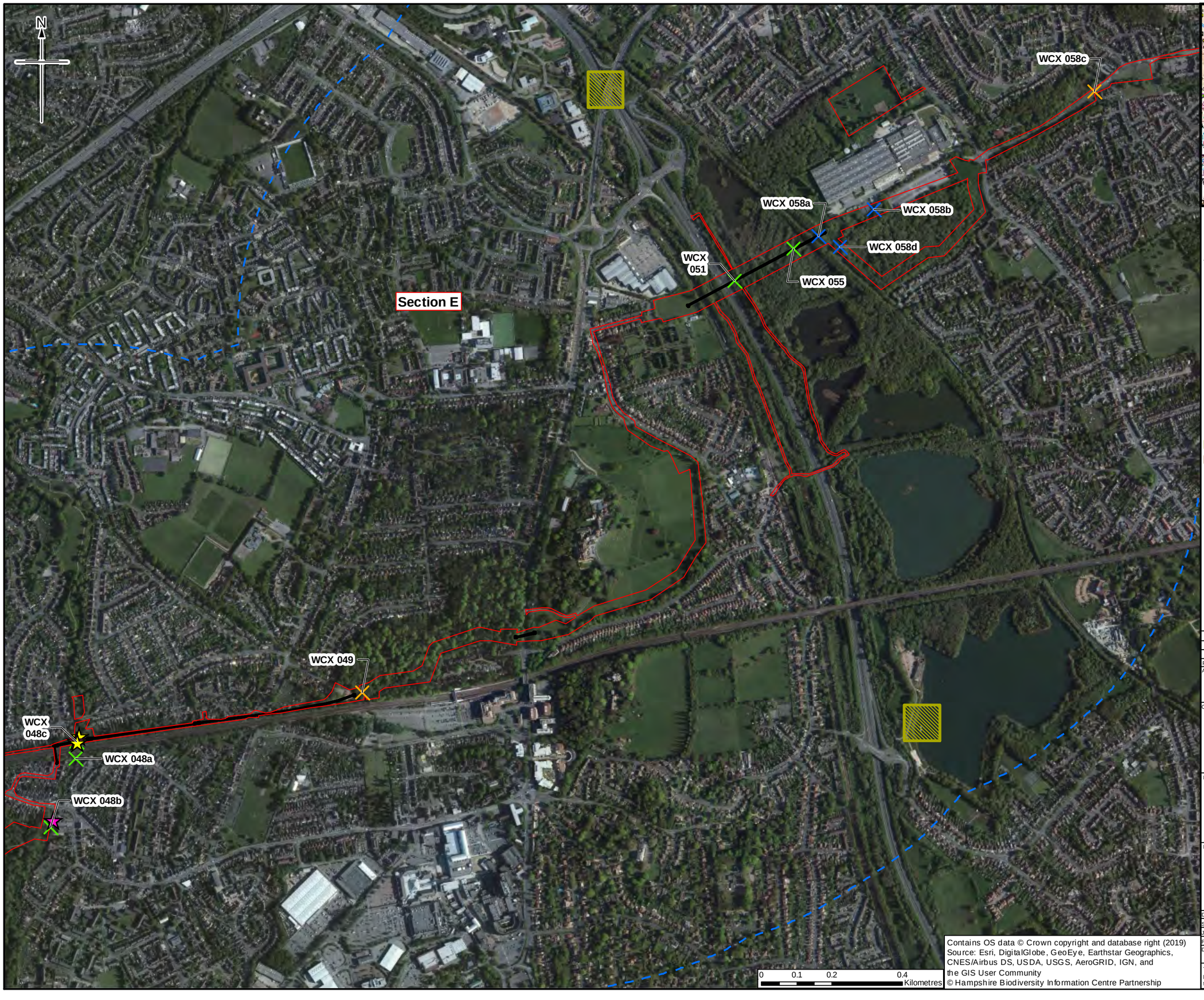
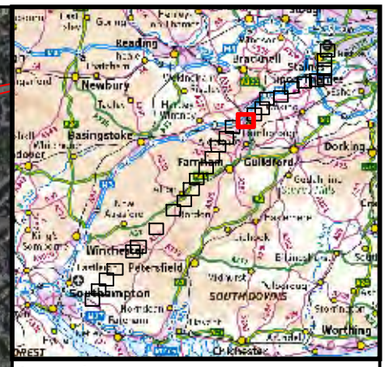
Drawing number	Figure A7.12.1 Sheet 16 of 28	Rev 0





Legend

- Order Limits
- Order Limits 1km study area
- Trenchless crossing
- Section break
- Section break

Watercourse crossing point

- Scoped in for field surveys
- Scoped out of field surveys
- Not surveyed
- Pond scoped out of field sign surveys

Hampshire Biodiversity Information Centre historic records

- Otter
- Water vole

Otter field sign

- Feeding remains
- Spraint
- Bedfont Lakes Country Park Site of Metropolitan Importance (SMI)

Sheet displays part of Section E

Rev.	Rev. Date	Purpose of revision	Orig/Dwn	Checkd	Rev'd	Apprv'd
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Drawing title

ENVIRONMENTAL STATEMENT
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AND FIELD SURVEY RESULTS
APFP Reg. (2009) 5(2)(l)

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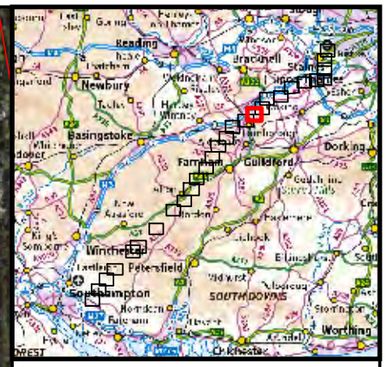
Drawing number	Figure A7.12.1 Sheet 17 of 28	Rev 0



Legend

- Order Limits
- Order Limits 1km study area
- Trenchless crossing
- Section break
- Section break

Watercourse crossing point

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Hampshire Biodiversity Information Centre historic records

- Otter
- Water vole

Otter field sign

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ENVIRONMENTAL STATEMENT
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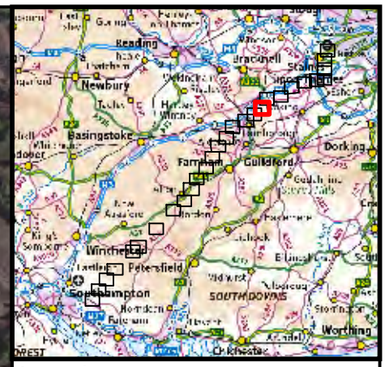
ProjectWise No.	B2325300-JAC-000-ENV-DRG-001074	
Drawing number	Figure A7.12.1 Sheet 18 of 28	Rev 0



Legend

- Order Limits
- Order Limits 1km study area
- Trenchless crossing
- Section break
- Section break

Watercourse crossing point

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Hampshire Biodiversity Information Centre historic records

- Otter
- Water vole

Otter field sign

- Feeding remains
- Spraint
- Bedfont Lakes Country Park Site of Metropolitan Importance (SMI)

Sheet displays parts of Section E and Section F

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ProjectWise No.	B2325300-JAC-000-ENV-DRG-001074	
Drawing number	Figure A7.12.1 Sheet 19 of 28	Rev 0

Legend

- Order Limits
- Order Limits 1km study area
- Trenchless crossing
- Section break
- Section break

Watercourse crossing point

- Scoped in for field surveys
- Scoped out of field surveys
- Not surveyed
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Hampshire Biodiversity Information Centre historic records

- Otter
- Water vole

Otter field sign

- Feeding remains
- Spraint
- Bedfont Lakes Country Park Site of Metropolitan Importance (SMI)

Sheet displays part of Section F

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RIPARIAN MAMMAL - DESK STUDY
AND FIELD SURVEY RESULTS
APFP Reg. (2009) 5(2)(l)

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Jacobs No.	B2325300	
ProjectWise No.	B2325300-JAC-000-ENV-DRG-001074	
Drawing number	Figure A7.12.1 Sheet 20 of 28	Rev 0

Legend

- Order Limits
- Order Limits 1km study area
- Trenchless crossing
- Section break
- Section break

Watercourse crossing point

- Scoped in for field surveys
- Scoped out of field surveys
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Hampshire Biodiversity Information Centre historic records

- Otter
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Otter field sign

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AND FIELD SURVEY RESULTS
APFP Reg. (2009) 5(2)(l)

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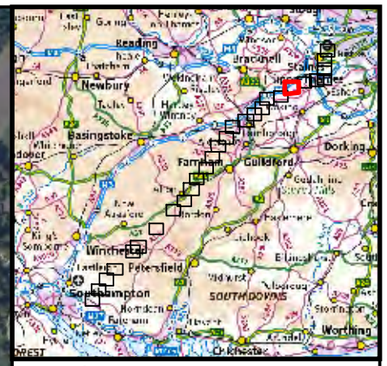
Drawing number	Figure A7.12.1 Sheet 21 of 28	Rev 0



Legend

- Order Limits
- Order Limits 1km study area
- Trenchless crossing
- Section break
- Section break

Watercourse crossing point

- Scoped in for field surveys
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Hampshire Biodiversity Information Centre historic records

- Otter
- Water vole

Otter field sign

- Feeding remains
- Spraint
- Bedfont Lakes Country Park Site of Metropolitan Importance (SMI)

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AND FIELD SURVEY RESULTS
APFP Reg. (2009) 5(2)(l)

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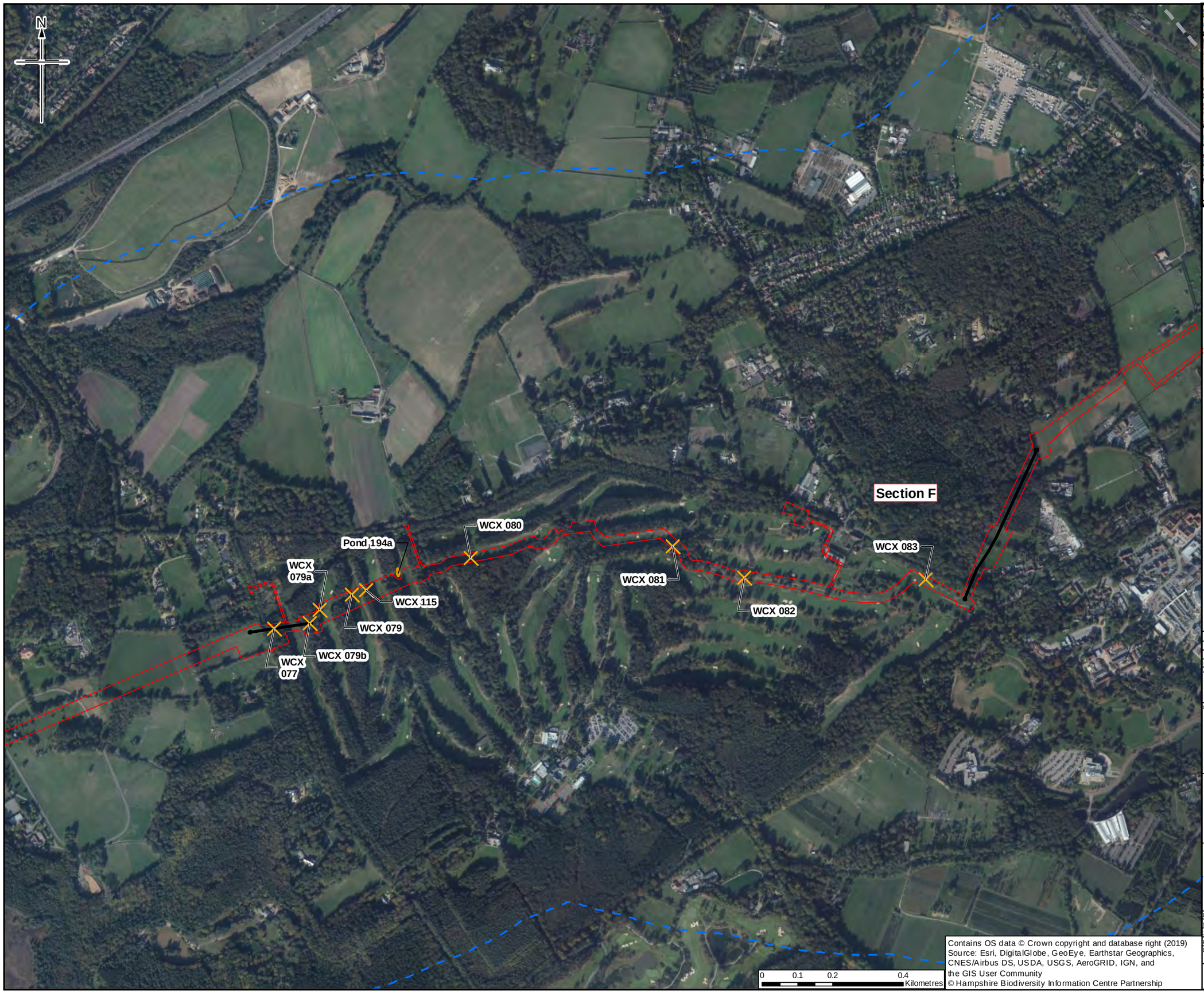
Drawing number	Figure A7.12.1 Sheet 22 of 28	Rev 0



Legend

- Order Limits
- Order Limits 1km study area
- Trenchless crossing
- Section break
- Section break

Watercourse crossing point

- Scoped in for field surveys
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Hampshire Biodiversity Information Centre historic records

- Otter
- Water vole

Otter field sign

- Feeding remains
- Spraint
- Bedfont Lakes Country Park Site of Metropolitan Importance (SMI)

Sheet displays part of Section F

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Drawing title
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RIPARIAN MAMMAL - DESK STUDY
AND FIELD SURVEY RESULTS
APFP Reg. (2009) 5(2)(l)

Drawing Status	For Issue	
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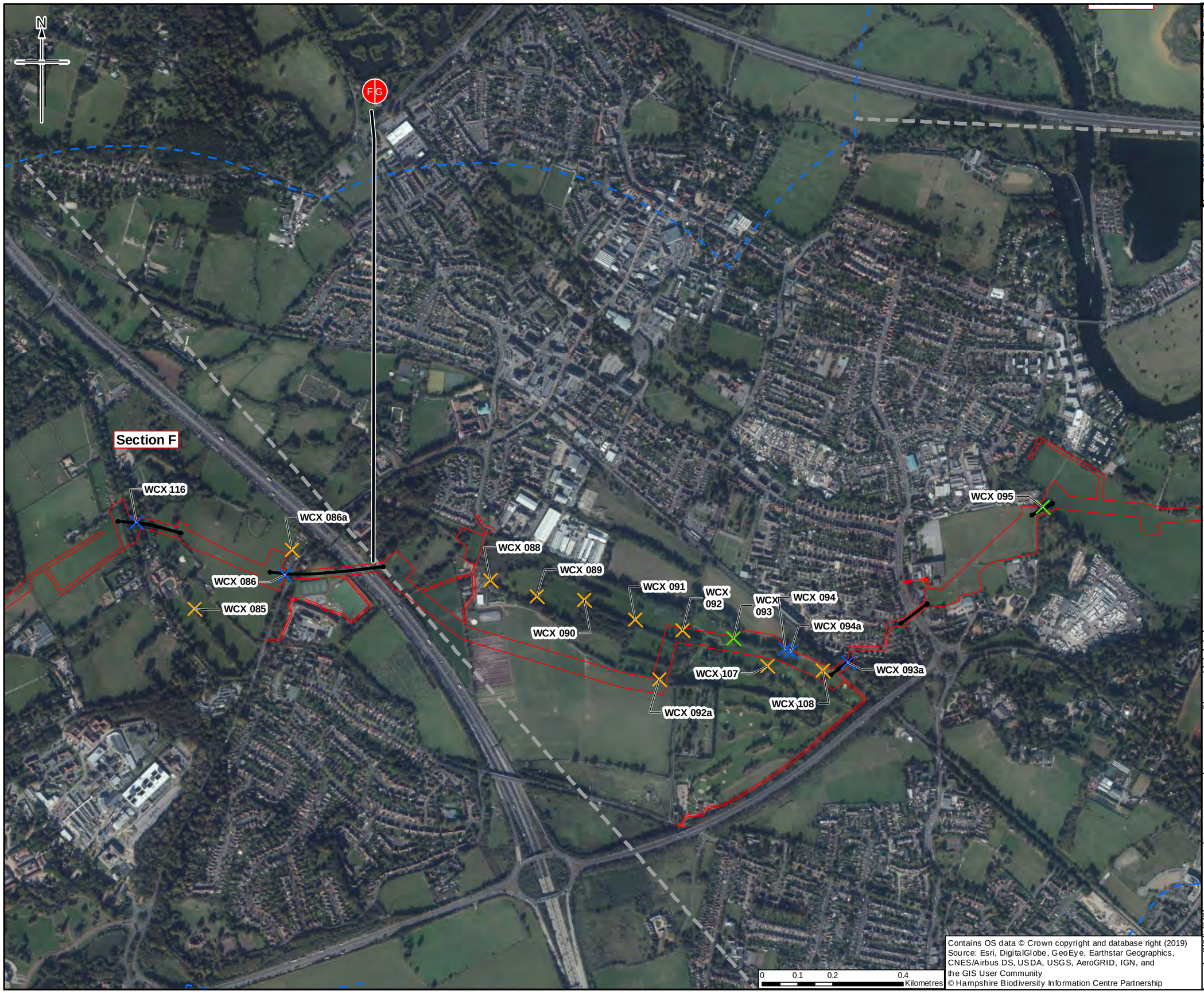
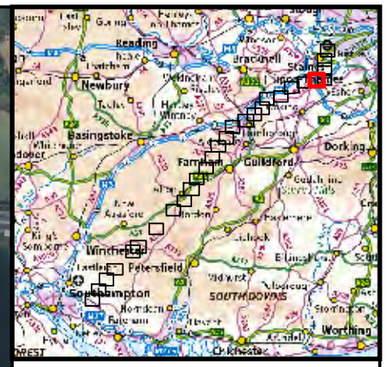
ProjectWise No.	B2325300-JAC-000-ENV-DRG-001074	
Drawing number	Figure A7.12.1 Sheet 23 of 28	Rev 0





Legend

- Order Limits
- Order Limits 1km study area
- Trenchless crossing
- Section break
- Section break

Watercourse crossing point

- Scoped in for field surveys
- Scoped out of field surveys
- Not surveyed
- Pond scoped out of field sign surveys

Hampshire Biodiversity Information Centre historic records

- Otter
- Water vole

Otter field sign

- Feeding remains
- Spraint
- Bedfont Lakes Country Park Site of Metropolitan Importance (SMI)

Sheet displays parts of Section F and Section G

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Drawing title

ENVIRONMENTAL STATEMENT
RIPARIAN MAMMAL - DESK STUDY AND FIELD SURVEY RESULTS
APFP Reg. (2009) 5(2)(l)

Drawing Status	For Issue	
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Jacobs No.	B2325300	
ProjectWise No.	B2325300-JAC-000-ENV-DRG-001074	
Drawing number	Figure A7.12.1 Sheet 24 of 28	Rev 0

Legend

- Order Limits
- Order Limits 1km study area
- Trenchless crossing
- Section break
- Section break

Watercourse crossing point

- Scoped in for field surveys
- Scoped out of field surveys
- Not surveyed
- Pond scoped out of field sign surveys

Hampshire Biodiversity Information Centre historic records

- Otter
- Water vole

Otter field sign

- Feeding remains
- Spraint
- Bedfont Lakes Country Park Site of Metropolitan Importance (SMI)

Sheet displays parts of Section G and Section H

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RIPARIAN MAMMAL - DESK STUDY
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APFP Reg. (2009) 5(2)(l)

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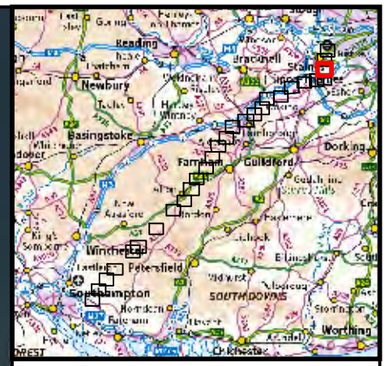

Legend

- Order Limits
- Order Limits 1km study area
- Trenchless crossing
- Section break
- Section break

Watercourse crossing point

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Hampshire Biodiversity Information Centre historic records

- Otter
- Water vole

Otter field sign

- Feeding remains
- Spraint
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Sheet displays part of Section H

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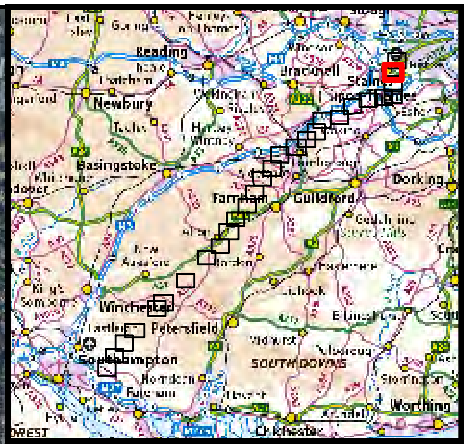
Drawing number	Figure A7.12.1 Sheet 26 of 28	Rev 0



Legend

- Order Limits
- Order Limits 1km study area
- Trenchless crossing
- Section break
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Watercourse crossing point

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Hampshire Biodiversity Information Centre historic records

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Otter field sign

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- Spraint

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Drawing number	Figure A7.12.1 Sheet 27 of 28	Rev 0

Legend

- Order Limits
- Order Limits 1km study area
- Trenchless crossing
- Section break
- Section break

Watercourse crossing point

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Otter field sign

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