

Southampton to London Pipeline Project

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Southampton to London Pipeline Project

Esso Petroleum Company, Limited

Appendix 7.5: Aquatic Ecology Factual Report

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1 Introduction

- 1.1.1 Esso Petroleum Company, Limited (Esso) is making an application for development consent to replace 90km (56 miles) of its existing 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 is referred to as 'the project' within this appendix.
- 1.1.2 This Aquatic Ecology Factual Report has been produced to support the application for development consent and the accompanying Environmental Statement (ES) under the Planning Act 2008.

2 Methodology

2.1 Desk Study

- 2.1.1 A desk study was undertaken as per the methodology below. Requests for existing available data were made to obtain ecological information about watercourses crossed by the pipeline from the following sources:

Environment Agency

- 2.1.2 The Environment Agency undertakes routine monitoring of watercourses for a diverse range of reasons. Historic monitoring data (1995-2018) were requested from the Environment Agency for watercourses crossed by the Order Limits and those within 2km of it on the 19 April 2018. These comprised fish and macroinvertebrate data, as well as macrophyte, phytobenthos (diatom), invasive non-native species, and protected or notable species (Environment Agency, 2018). Freshwater fish data were obtained through the data.gov.uk website on the 6 February 2018, which provides routine fish monitoring data from the Environment Agency.

Local Record Centres

- 2.1.3 Data requests for biological records were made to:
- Hampshire Biodiversity Information Centre (HBIC) – returned February 2018;
 - Greenspace Information for Greater London (GiGL) – returned January 2018; and
 - Surrey Biodiversity Information Centre (SBIC).
- 2.1.4 At the time of writing no species information has been returned by SBIC.

Online Data Review

- 2.1.5 An online search for relevant data was undertaken between February and April 2018. This review included local interest groups (such as local biodiversity recorders and angling clubs) which may produce freely available data. Incidental data were obtained from the public areas of the following organisation and groups websites:
- Thames Angling Conservancy;



- Chertsey angling reports; and
- Basingstoke Canal Angling Association.

2.2 Consultation With the Environment Agency

2.2.1 The Environment Agency has been engaged throughout the pre-application process and has provided the following information through consultation:

- detailed advice letter: Southampton to London Pipeline Project – review of environmental survey strategy;
- fish monitoring results for Sussex and South Downs Region (2013, 2014 and 2015); and
- advice on the sensitivity of particular crossing points and species of interest through consultation meetings with the Environment Agency (3 July and 6 September 2018).

2.3 Field Surveys

2.3.1 The survey methodology described below is based on the methodology described in the Scoping Report (Esso, 2018) but has also been informed by consultation and engagement with relevant consultees, the results of desk studies, and professional judgement.

Walkover Surveys – Habitat Sensitivity

2.3.2 The desk survey identified a number of sites that were potentially important for aquatic ecology. Sites were screened into the walkover surveys if they were larger than field drainage ditches and were groundwater dependent terrestrial ecosystems, with particular focus on Sites of Special Scientific Interest (SSSI) and Special Areas of Conservation (SAC).

2.3.3 The purpose of the walkover surveys was to identify key aquatic habitat types that could be sensitive to the project. Watercourses were screened in collaboration with the Water Framework Directive (WFD) team.

2.3.4 For small watercourses, walkover surveys covered the area within the Order Limits. Larger rivers (i.e. Main Rivers, geomorphologically active rivers or watercourses designated under the WFD) required a larger area to be covered, with the walkover covering a minimum of 250m upstream and 250m downstream of the Order Limits. For areas in which access was limited or vegetation impaired the visibility of the watercourse, spot checks were taken from the nearest accessible vantage point.

2.3.5 The habitat at each site was classified as high, medium or low sensitivity. Sensitivity was determined by professional judgement of the surveyor. This took cognisance of the physical habitat observed at each site; the presence of optimal/sub habitats for species of conservation interest and general aquatic flora and fauna; and the potential influence of wider catchment pressures.

- High sensitivity sites were those containing a diverse range of habitat types, with a diverse macrophyte cover and a low degree of sedimentation and human



impacts. These sites provided optimal ecological habitat and were likely to have high levels of invertebrate diversity.

- Medium sensitivity sites were free-flowing waterways that supported limited macrophyte cover and had areas where sedimentation and channelisation were apparent, and/or characterised by a reduced number of habitat types offering suboptimal fish habitat and moderate invertebrate diversity.
- Low sensitivity sites comprised heavily modified waterways in which macrophytes were absent and there was little or suboptimal invertebrate or fish habitat. These sites were characterised by a single habitat type and had often been subjected to intensive modification, maintenance and ongoing human stressors, for example dredging, abstraction and intensive surrounding land uses.

Environmental eDNA

- 2.3.6 Water samples for fish eDNA analysis were collected at sites where walkover surveys were not able to conclusively provide a habitat sensitivity judgement and supporting Environment Agency fisheries data were absent. This technique was used to identify the presence of fish species of conservation interest: migratory salmonids, bullhead (*Cottus gobio*), lamprey (*Lampetra planeri*) and European eel (*Anguilla anguilla*).
- 2.3.7 Water samples were collected using the fish eDNA sampling protocol from NatureMetrics Ltd (NatureMetrics Ltd, 2018). Sampling was undertaken from the bank and surveyors did not enter the water during sampling to prevent cross-contamination.

2.4 Survey Constraints

- 2.4.1 The walkover survey recorded the aquatic ecology features evident at the time of survey in July 2018. During this midsummer period, bankside vegetation tends to be at its highest and most dense and in a number of locations obstructed the view of the watercourse bed. However, macrophytes form an important part of the habitat complexity of riverine corridors and it was assessed to be of beneficial value to allow an accurate assessment of habitat complexity.
- 2.4.2 Summer 2018 was notable for its hot, dry conditions, resulting in several watercourses experiencing lower than average summer flows, with a high proportion appearing dry at the time of survey. This could have led to an over representation of low sensitivity watercourses. Professional judgement by the surveyor was made when assessing the potential sensitivity of watercourses, including those under low flow conditions. Evidence of long-term lack of flow, including the establishment of terrestrial vegetation and geomorphologically inactive channels, was used to determine whether channels were naturally ephemeral or a relic drainage feature.



3 Results

3.1 Desk Study

Macroinvertebrates

- 3.1.1 The Environment Agency holds historic macroinvertebrate data for nine sites within 2km of the Order Limits, where hydrologically connected (Table 3.1). These data indicate a wide range of biological metrics that are representative of the habitat types observed at the proposed crossing points.
- 3.1.2 Four key metrics are reported in Table 3.1. Whalley Hawkes Paisley Trigg (WHPT) is a measure of general degradation. Number of Taxa (N-Taxa) is a measure of richness and represents a count of the number of taxa present within a sample. Average Score Per Taxon (ASPT) measures the overall community tolerance to pollution and Community Conservation Index (CCI) measures the conservation value of the macroinvertebrate community.

Table 3.1: Environment Agency Macroinvertebrate Historic Data and Location Relative to the Watercourse Crossing Points

Key: US = upstream; DS = downstream

Watercourse Crossing Reference	Site Name	Date	WHPT ASPT	WHPT N Taxa	WHPT Total	CCI
WCX012 1.79km DS	Above Alton Sewage Treatment Works SU7288839604	1999, 2010, 2014 (six samples)	3.6 – 5.4	6 - 29	20.1 – 156.3	4.1 – 7.1
WCX012 1.89km DS	Above SWO, Mill Lane Industrial Estate. Caker Stream Rd SU7290839696	1999 (two samples)	4.4 – 4.5	13 - 16	57.7 – 72.0	-
WCX019 420m US	At Haw Bridge, Cuckoo's Corner SU7447041170	1999 (two samples)	3.0 – 3.8	17 - 18	51.3 – 67.9	-
WCX019 865m DS	At Mill Court Bridge, Wyck SU7561241730	1995 - 96, 1998 - 2002, 2005, 2008 (19 samples)	3.2 – 4.9	14 – 33	45.3 – 162.7	-
WCX047 80m US	Ively Road Farnborough SU8523554854	1995 - 1998, 2000 - 2001, 2003, 2006, 2013, 2015 (18 samples)	2.5 – 4.6	5 – 21	12.5 – 83.5	3.9 – 4.3



Watercourse Crossing Reference	Site Name	Date	WHPT ASPT	WHPT N Taxa	WHPT Total	CCI
WCX048 10m US	At B3014, Farnborough SU85704557 35	1995 - 98, 2000 - 01, 2004 (11 samples)	3.7 – 4.7	11 – 30	40.1 – 139.8	-
WCX051 790m DS	At Frimley Bridge SU87094577 85	1995, 1997 - 2002, 2005 - 06, 2009, 2014 - 15 (21 samples)	3.9 – 4.7	14 – 27	59.7 – 121.8	-
WCX066 520m US	At Halebourne, Chobham SU95350619 50	1995, 1997 - 98, 2000 - 01, 2003, 2006, 2008, 2013 (16 samples)	4.3 – 5.5	13 – 27	56.6 – 148.0	8.7
WCX095 1.49km DS	Above Thames, Hamm Court Estate TQ06744657 47	1995 - 2001, 2003, 2006 - 07, 2013, 2015 (22 samples)	3.4 – 5.5	14 – 18	61.3 – 151.9	8.5 – 9.7

- 3.1.3 Historic macroinvertebrate data are also available for site 'Below Lightwater Sewage Treatment Works' (NGR SU93943 62099, watercourse crossing reference WCX066; Figure A7.5.1) but this has been discounted as the data predate 1995 and are considered too old to be relevant.
- 3.1.4 No macroinvertebrate species of conservation concern were reported from the historic data provided by the Environment Agency. There were a number of records of white-clawed crayfish (*Austropotamobius pallipes*) from the Wey, Thames and the Halebourne. In all instances, records lie over 2km downstream of the Order Limits.
- 3.1.5 A single record of the invasive non-native species signal crayfish (*Pacifastacus leniusculus*) was reported from Frimley Bridge in 2009. No other non-native macroinvertebrate species were reported within 2km of watercourse crossing points of the Order Limits.
- 3.1.6 No aquatic macroinvertebrate data were provided from HBIC or GiGL.

Fish

- 3.1.7 Fish data were provided by the Environment Agency for 24 historic monitoring points, covering 14 proposed watercourse crossings (Table 3.2). Of these 14, nine would be crossed with trenchless installation methods and are not considered to be impacted by the project. The remaining five crossing points (WCX006, WCX007, WCX012, WCX021 and WCX047) would be crossed by open cut installation techniques.



3.1.8 Historic data for sites on the tributaries of the Hamble (WCX006, WCX007; Table 3.2) indicate the presence of brown trout (*Salmo trutta*), bullhead and European eel, species of conservation interest. European eel is a migratory species currently considered Critically Endangered and trout, in its migratory form, requires clear waters and unobstructed access to headwaters of catchments to spawn.

Table 3.2: Environment Agency Fish Records Within 3km of Crossing Locations of the Order Limits

Species in bold are numerically dominant at each site

Crossing Reference	Survey Location	Distance From Crossing (km)	Year	Species Recorded
WCX002a Ford Lake	Chancellors Lane SU5107115419	0.8	2012, 2016	Brook lamprey (<i>Lampetra planeri</i>), brown trout, bullhead , chub (<i>Squalius cephalus</i>), European eel, minnow (<i>Phoxinus phoxinus</i>).
	Lower Wangfield Farm Meadow SU5171414125	0.8	2007, 2008, 2009, 2010, 2012, 2015	Brown trout, bullhead, chub, dace (<i>Leuciscus leuciscus</i>), European eel, grayling (<i>Thymallus thymallus</i>), lamprey sp, minnow, roach (<i>Rutilus rutilus</i>).
WCX006 Tributary of River Hamble	Tangier Farm SU5390017300	1.2	2008, 2013	Brown trout, bullhead, European eel, three-spined stickleback (<i>Gasterosteus aculeatus</i>).
	Brooklands farm SU5420016500	1.8	2008, 2013	Brook lamprey, brown trout, bullhead , European eel, three-spined stickleback.
WCX007 Tributary of River Hamble	Tangier Farm SU5390017300	1.7	2008, 2013	Brown trout, bullhead, European eel, three-spined stickleback.
WCX012 Caker Stream	Caker Lane – The Clock House SU7269237987	0.2	2014, 2015	Brown trout, bullhead, three-spined stickleback, minnow, stone loach (<i>Barbatula barbatula</i>).
	Gaston Lane SU7266635966	2	2012	NO FISH
WCX019 River Wey	Upstream Froyle Mill SU7640042400	2.2	2002	Brown trout, bullhead, dace, minnow, stone loach.
WCX021 Ryebridge Stream	Upstream Froyle Mill SU7640042400	1	2002	Brown trout, bullhead, dace, minnow, stone loach.
WCX041 Basingstoke Canal	Fleet SU8224653706	1.15	2004	Perch (<i>Perca fluviatilis</i>), pike (<i>Esox lucius</i>), roach



Crossing Reference	Survey Location	Distance From Crossing (km)	Year	Species Recorded
	Eelmoor Flash SU8420052800	1.2	2004	Bream (<i>Abramis brama</i>) , common carp (<i>Cyprinus carpio</i>), gudgeon (<i>Gobio gobio</i>), perch , pike, roach , rudd (<i>Scardinius erythrophthalmus</i>).
WCX047 Tributary of Cove Brook	Downstream of former Southwood Golf Course SU8551854963	0.3	2006, 2013	Bullhead, chub, perch, pike, roach, ruffe (<i>Gymnocephalus cernua</i>), stone loach.
WCX048 Cove Brook	Houseman Road SU8565856622	1	2013	Bream, bullhead, chub, perch , pike, roach, stone loach, three-spined stickleback.
	Downstream of former Southwood Golf Course SU8551854963	1	2006, 2013	Bullhead, chub, perch, pike, roach, ruffe, stone loach.
WCX048 Cove Brook	Downstream of former Southwood Golf Course SU8551854963	0.8	2006, 2013	Bullhead, chub, perch, pike, roach, ruffe, stone loach.
	Houseman Road SU8565856622	1.1	2013	Bullhead, bream, chub, perch , pike, roach, stone loach, three-spined stickleback.
WCX051 River Blackwater	Coleford Bridge SU8804156002	2	2010, 2013, 2016	Brown trout, bullhead, chub, common carp, dace, gudgeon, minnow, perch, pike, roach, stone loach, tench (<i>Tinca tinca</i>), three-spined stickleback.
	Hawley Meadows SU8605059030	2.7	2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2012, 2013, 2016	Bream, bullhead, chub, common carp, dace, European eel, gudgeon, minnow, perch, pike, roach, roach x bream hybrid, stone loach, tench, three-spined stickleback.
WCX066 Halebourne	Downstream Lightwater Sewage	1	2003, 2014	Bullhead, European eel, gudgeon, minnow, mirror carp (<i>Cyprinus carpio carpio</i>), perch,



Crossing Reference	Survey Location	Distance From Crossing (km)	Year	Species Recorded
	Treatment Works SU9394362099			pike, roach, stone loach.
	Hollandia SU9526861904	0.6	2009	Minnow
WCX095 Chertsey Bourne	Gogmore Park TQ0382566869	2	2012, 2015	Bleak (<i>Alburnus alburnus</i>), bream, bullhead, chub, dace , European eel, gudgeon, lamprey spp, minnow, perch, pike, stone loach, roach , roach x bream Hybrid.
	Chertsey Meads TQ0640065800	1.3	1989, 1991, 2006, 2008, 2011, 2015	Bleak, bream, brown trout, bullhead, chub, dace , European eel, gudgeon, minnow, perch, pike, roach , rudd, ruffe, three-spined stickleback.
WCX096 River Thames	Chertsey Main TQ0639966543	1.1	2005	Bleak, chub, European eel, gudgeon, mirror carp, perch, pike, roach , tench.
	Chertsey Main TQ0544866755	0.5	1995, 2000, 2009, 2010, 2011, 2012, 2013	Barbel (<i>Barbus barbus</i>), bleak, chub, dace, European eel, gudgeon, perch, pike, roach, ruffe, silver bream (<i>Abramis bjoerkna</i>), tench.

- 3.1.9 Brown trout and bullhead are among the fish fauna reported from the upper catchment of the Caker Stream (WCX012) and the Ryebridge Stream (WCX021). These species require good quality watercourses and favour solid substrates and dynamic flow types. Other fish species reported alongside the species of conservation interest are indicative of faster flow types and clean water.
- 3.1.10 Fish reported from the tributary of the Cove Brook (WCX047) demonstrate a more diverse fish community, with a number of species that favour a wide range of flow types. There is also an increase in the number of piscivorous species (perch, pike, ruffe), compared to the shallower headwater streams in the south of the project.

Incidental Data

- 3.1.11 A number of incidental fish records are available at Environment Agency macroinvertebrate monitoring sites (Table 3.3). Incidental data broadly support the routine fish monitoring data provided by the Environment Agency at the few crossing points for which data are available.



Table 3.3: Incidental Fish Data Reported from Environment Agency Macroinvertebrate Data

Crossing Reference	Site Name	Date	Species
WCX012 - 1.79km DS	Above Alton Sewage Treatment Works SU7288839604	2014	Bullhead
		2010	Bullhead
WCX019 - 865m DS	At Mill Court Bridge, Wyck SU7561241730	2008	Bullhead
WCX047 - 80m US	Ively Road Farnborough SU8523554854	2015	Three-spined stickleback
WCX051 - 790m DS	At Frimley Bridge SU8709457785	2014	Bullhead
		2009	Stone loach
WCX066 - 520m US	At Halebourne, Chobham SU9535061950	2006	Bullhead
WCX095 - 1.49km DS	Above Thames, Hamm Court Estate TQ0674465747	2014	Bullhead
		2013	Bullhead
		2007	Stone loach

Consultation Data

- 3.1.12 The Environment Agency was consulted during the development of the project and provided a detailed advice letter dated 25 April 2018 that contained fish data for a number of watercourses with proposed crossings. This information is summarised in Table 3.4 and was used to assign sensitivity to the fish communities within the Order Limits.
- 3.1.13 The information provided in the Detailed Advice Letter aligns well with historic monitoring data provided by the Environment Agency Fisheries team (Table 3.2). All sites that have identified migratory species present are proposed to be crossed using trenchless methodology and are not considered to be impacted by the project.
- 3.1.14 Brown trout (resident) and bullhead are reported from the majority of watercourses crossed by the project. A wide range of cyprinid species are also present across the study area, indicating a mixed habitat of flows, substrates and riparian habitat, necessary to support a diverse community.
- 3.1.15 A number of the minor watercourses are recognised to be of low value to fish, with fish being either totally absent from the site or habitats under considerable environmental stress so that they support small populations of tolerant fish species only.
- 3.1.16 No non-native fish species are reported from hydrologically connected watercourses within 3km of the proposed crossing points.



Table 3.4: Fish data provided in the Detailed Advice Letter (25 April 2018)

Location	Migratory species	Resident species
WCX002 - Ford Lake Stream	Sea trout (<i>Salmo trutta</i>) and European eel	Brown trout, bullhead, brook lamprey
WCX012 - Caker Stream		Brown trout, bullhead, brook lamprey
WCX019 - River Wey North		Brown trout, bullhead, brook lamprey, dace, chub, roach, minnow, stone loach
WCX036 - Fleet Brook	Morphologically damaged and unlikely to support viable populations of fish	
W040 - Gelvert Stream	Very small but may support minor species	
WCX047 - Ively Brook	Morphologically damaged but may support minor species such as three-spined stickleback	
WCX048 - Cove Brook		Bullhead, dace, chub, roach, minnow and stone loach
WCX051 - River Blackwater		Brown trout, bullhead, dace, chub, roach, minnow, pike, perch, barbel and stone loach.
WCX095 - Chertsey Bourne	European eel	Bullhead, dace, chub, roach, minnow, pike, perch and stone loach
WCX096 - River Thames	Atlantic salmon, sea trout and European eel	Bullhead, dace, chub, roach, minnow, pike, perch, barbel and stone loach
WCX100 - River Ash	European eel	

Other Data Sources

- 3.1.17 No fish data were provided by HBIC or GiGL.
- 3.1.18 Anecdotal fisheries data were available from angling club websites within the Order Limits. Most of these data were sporadic club reports or newsletters and have not been included in this assessment.

3.2 Field Study

Walkover – habitat sensitivity

- 3.2.1 The Order Limits cross 88 watercourses.
- 3.2.2 Forty crossing sites were screened out at the desk study stage of the investigation. These were typically relic field drains, networks of minor drains in close proximity that could be characterised using a single site, or minor tributaries with limited hydrological connectivity to the Order Limits. In addition, land access was denied for a single further site (WCX055).
- 3.2.3 The walkover survey was undertaken between 24 and 27 July 2018. Of the sites surveyed, these were grouped into the following four sensitivity bands (see Figure A7.5.1 and Annex A):
 - Dry channel (16 sites);
 - Low ecological sensitivity (ten sites, eight sites open cut);
 - Moderate ecological sensitivity (five sites, one site open cut); and
 - High ecological sensitivity (six sites, one site open cut).



- 3.2.4 Sites of low ecological sensitivity tended to have high siltation levels, showed signs of agricultural runoff and were heavily shaded by terrestrial scrub. In contrast, high sensitivity sites tended to be larger waterways with abundant macrophyte growth and beds dominated by gravel and rock sediments (see Annex B – Photographs).
- 3.2.5 Watercourses crossed using a trenchless technique (see Table 3.5) have been assigned sensitivity values but are not considered at risk from construction or operational impacts on aquatic ecology.
- 3.2.6 The unnamed tributaries of the Hamble (WCX006 and WCX007) have been assigned sensitivity values of high and moderate respectively (Table 3.5). WCX006 is a small gravel and silt-based stream running through unimproved pasture. Within the sub-catchment species of conservation interest have previously been recorded and as such may have the ability to ascend the crossing point under higher flow conditions than observed during the summer walkover. WCX007, although dry in September (see 3.2.8), demonstrated good drain/ditch habitat in July. Although these habitats are unlikely to support migratory species, they may provide a diverse micro-habitat for other species, hence the moderate sensitivity value.
- 3.2.7 The proposed watercourse crossings using open cut techniques and assigned low sensitivity value were WCX020, WCX021, WCX031, WCX038, WCX039, WCX041, WCX047, WCX070 and WCX073. These watercourses were all wet during the field survey and assumed to be permanent aquatic features. Whilst providing an aquatic habitat resource these sites were generally very narrow, shallow water bodies, with poor substrate heterogeneity and low-energy, homogenous flow types. Sites assigned low sensitivity may also be choked with vegetation, lie within a predominantly urban or heavily managed landscape, receive or demonstrate pollution (in the form of surface water outfalls, oil sheens) or be recorded as extensively managed or reinforced. Watercourses assigned low sensitivity fail to provide suitable habitat for species of conservation interest or a diverse ecological community.



Table 3.5: Habitat Sensitivity Assigned to Crossing Points based upon Field Surveys, Desk-based Assessment and Crossing Method.

Full details provided in Annex A.

Dry channel
Low ecological sensitivity
Moderate ecological sensitivity
High ecological sensitivity

Watercourse Crossing Reference	Watercourse Name										Macrophytes (%)	Notes	Existing EA Data		Crossing Method
		Salmonid	European Eel	Lamprey	Bullhead	Cyprinidae	WC Crayfish	Mussels	Invertebrates	Fish			Invertebrates		
WCX002	Ford Lake Stream	N	Y	Y	Y	N	Y	N	Y	0	Good habitats, flow/substrate variation	Yes	No	Trenchless	
WCX006	Unnamed tributary of the River Hamble	N	Y	Y	N	N	N	N	N	60	Suboptimal eel and lamprey	No	No	Open cut	
WCX007	Unnamed tributary of the River Hamble	N	N	N	Y	N	Y	N	Y	0	Good ditch habitat	No	No	Open cut	
WCX010		N	N	N	N	N	N	N	N	0	Artificial drain, ditch, no water	No	No	Open cut	
WCX012	Caker Stream	N	N	N	N	N	N	N	N	0	Dry	Yes	No	Open cut	
WCX013	Tributary of Caker Stream	N	N	N	N	N	N	N	N	0	Artificial drain with culverts, ditch, no water	No	No	Open cut	



Watercourse Crossing Reference	Watercourse Name										Macrophytes (%)	Notes	Existing EA Data		Crossing Method
		Salmonid	European Eel	Lamprey	Bullhead	Cyprinidae	WC Crayfish	Mussels	Invertebrates	Fish			Invertebrates		
WCX014a		N	N	N	N	N	N	N	N	N	0	Dry	No	No	Open cut
WCX015		N	N	N	N	N	N	N	N	N	0	Dry	No	No	Open cut
WCX017		N	N	N	N	N	N	N	N	N	0	Dry ditch	No	No	Open cut
WCX018		N	N	N	N	N	N	N	N	N	0	Dry ditch	No	No	Open cut
WCX019	River Wey North	Y	Y	Y	Y	Y	Y	Y	Y	Y	80	Chalk stream like site	Yes	Yes	Trenchless
WCX020		N	N	N	N	N	N	N	N	N	-	Overgrown ditch	No	No	Open cut
WCX021	Ryebridge Stream	N	N	N	N	N	N	N	N	N	-	Very shallow ditch	No	No	Open cut
WCX027		N	N	N	N	N	N	N	N	N	0	Dry	No	No	Open cut
WCX031		N	N	N	N	N	N	N	N	N	-	Very small, poor quality ditch	No	No	Trenchless
WCX032		N	N	N	N	N	N	N	N	N	0	Dry	No	No	Open cut
WCX033		N	N	N	N	N	N	N	N	N	0	Dry	No	No	Open cut
WCX034		N	N	N	N	N	N	N	N	N	0	Dry	No	No	Open cut
WCX038		N	N	N	N	N	N	N	N	N	-	Very small, shallow ditch	No	No	Trenchless
WCX039		N	N	Y	Y	N	N	N	N	N	-	Very small, shallow ditch	No	No	Trenchless
WCX040	Gelvert Bottom	N	N	N	N	N	N	N	N	N	0	Dry	No	No	Trenchless
WCX041	Basingstoke Canal	N	N	N	N	N	N	N	N	N	-	Slow flowing, silt bed, CANAL	No	No	Trenchless
WCX047	Ively Brook	N	Y	N	N	N	N	N	N	Y	N	Very shallow, flowing watercourse	Yes	Yes	Open cut



Watercourse Crossing Reference	Watercourse Name										Macrophytes (%)	Notes	Existing EA Data		Crossing Method
		Salmonid	European Eel	Lamprey	Bullhead	Cyprinidae	WC Crayfish	Mussels	Invertebrates	Fish			Invertebrates		
WCX048	Cove Brook	N	Y	Y	N	N	N	N	Y	25	Muddy, little vegetation silt	Yes	Yes	Trenchless	
WCX048	Cove Brook	N	N	N	N	N	N	N	Y	-					
WCX048	Cove Brook	N	N	N	N	N	N	N	Y	-					
WCX051	River Blackwater	N	Y	Y	Y	Y	N	N	Y	10	Suboptimal for eel, ammocoetes	Yes	Yes	Trenchless	
WCX058		N	N	N	N	N	N	N	N	0	Dry ditch	No	No	Trenchless	
WCX066	Halebourne	Y	Y	Y	Y	Y	Y	N	N	30	Substrate diversity, woody debris	Yes	Yes	Trenchless	
WCX070	Clappers Brook	N	N	N	N	N	N	N	N	-	Ochre, no flow, oil sheen	No	No	Open cut	
WCX073		N	N	N	N	N	N	N	N	-	Stagnant ditch	No	No	Trenchless	
WCX079		N	N	N	N	N	N	N	N	0	Dry grassy ditches	No	No	Open cut	
WCX080	Tributary of the Bourne	N	N	N	N	N	N	N	N	0	Dry artificial channel	No	No	Open cut	
WCX081		N	N	N	N	N	N	N	N	0	Very shallow dry ditch	No	No	Open cut	
WCX095	Chertsey Bourne	N	Y	Y	N	Y	N	Y	Y	25	Thick silts	Yes	Yes	Trenchless	
WCX096	River Thames	Y	Y	N	N	Y	N	Y	N	2	Adult fish observed	Yes	No	Trenchless	



Watercourse Crossing Reference	Watercourse Name										Notes	Existing EA Data		Crossing Method
		Salmonid	European Eel	Lamprey	Bullhead	Cyprinidae	WC Crayfish	Mussels	Invertebrates	Macrophytes (%)		Fish	Invertebrates	
WCX100	River Ash	Y	Y	Y	N	Y	Y	N	Y	60	Adult fish, vegetation	No	No	Trenchless
WCX102	Intake channel from River Thames to Queen Mary Reservoir	N	Y	Y	N	Y	N	Y	Y	15	Fish present, slow, coloured water, vegetation	No	No	Trenchless
WCX104	Staines Reservoirs Aqueduct	N	N	N	N	N	N	N	N	-	Artificial drainage channel	No	No	Trenchless



Environmental eDNA

3.2.8 Four watercourse crossing sites which lacked both Environment Agency fisheries data and a conclusive assessment of the habitat from walkover surveys were selected for fish eDNA surveys (Table 3.6). These sites were: WCX006 and WCX007 (tributaries of the River Hamble), WCX048 (Cove Brook), and WCX100 (River Ash – sampled at W101). WCX007 was dry at the time of survey (21 September 2018) so no water sample was taken.

Table 3.6: Fish Species and Proportion of the DNA Sequencing Results

Common name	Scientific name	WCX006	WCX007	WCX048	W101
Common bream	<i>Abramis brama</i>	-	Dry	0.6	-
European eel	<i>Anguilla anguilla</i>	8.65		-	10.02
Stone loach	<i>Barbatula barbatula</i>	-		20.29	2.28
Crucian carp	<i>Carassius carassius</i>	-		2.23	1.78
Bullhead	<i>Cottus gobio</i>	18.94		-	5.13
Pike	<i>Esox lucius</i>	-		1.37	15.45
Three-spined stickleback	<i>Gasterosteus aculeatus</i>	70.28		48.59	-
Gudgeon	<i>Gobio gobio</i>	-		-	7.3
Dace	<i>Leuciscus leuciscus</i>	-		-	4.34
Smelt	<i>Osmerus erperlanus</i>	-		-	-
Perch	<i>Perca fluviatilis</i>	-		-	15.55
Minnnow	<i>Phoxinus phoxinus</i>	-		0.57	8.1
Nine-spined stickleback	<i>Pungitius pungitius</i>	-		1.15	-
Roach	<i>Rutilus rutilus</i>	0.91		11.2	23.29
Atlantic salmon	<i>Salmo salar</i>	0.27		-	-
Brown trout	<i>Salmo trutta</i>	-		-	-
Chub	<i>Squalius cephalus</i>			8.8	6.75
Non-fish species	-	0.94		5.2	-

3.2.9 Where present, three-spined stickleback dominated the proportion of sequenced output. Whilst care should be taken in interpreting the proportion of sequenced output in terms of relative species abundance, a high sequence proportion can be interpreted as a greater confidence in detection.

3.2.10 Species of conservation interest were reported from WCX006, WCX074 and WCX101. WCX006 returned weak positive results for the presence of bullhead and moderate positive results for the presence of European eel. These species were absent in WCX048 and WCX074, although WCX074 did show a weak positive result for the presence of brown trout. W101 showed a weak positive result for the presence of bullhead and a moderate positive result for the presence of European eel. W101 is situated downstream of WCX100 and it is considered valid that fish will move between these sites.



4 Discussion

Habitats

- 4.1.1 Aquatic habitats vary considerably within the Order Limits, from ephemeral watercourses that may only flow for a small number of months in the year to large permanent water bodies such as the River Thames. The habitats supported by this array of watercourse types are generally typical of the lowland landscape they are set within.
- 4.1.2 Pressures on aquatic habitat are markedly varied across the length of the pipeline, with influences in the southern sections related to rural and semi-rural land uses, whilst the northern sections are predominantly urban in nature. Land use is a key factor in the quality of aquatic habitats, in part determining the current and historic morphology of the river planform, water quality pressures and the interaction between aquatic and terrestrial habitats that form functional habitats for supporting species.
- 4.1.3 A field study of all main watercourse crossings has been used to determine the sensitivity of aquatic habitats for environmental receptors. These classifications can be used to assign values to aquatic habitats. Low and moderate sensitivity habitats are proposed to be crossed by open cut construction methods. However, none of these watercourses have been identified as supporting species of conservation interest.
- 4.1.4 Low and moderate sensitivity habitats are typified by either dry, or low-energy river typologies, hydromorphologically inactive, in heavily urbanised or intensively managed settings potentially affected by historic modification or management. Under these scenarios, low and moderate sensitivity habitats would be considered to be of Local importance, as they will retain a broadly ubiquitous habitat type supporting common aquatic flora and fauna.
- 4.1.5 Watercourses classed as high quality for habitat, represent sites that support species of conservation interest. These watercourses are generally associated with greater habitat diversity, either in terms of multiple flow or sediment types present, interaction between riparian and aquatic habitats, or absence of obvious environmental stress such as modification and management. High sensitivity habitats are of County importance, reflecting the higher quality habitat condition with the context of a typical lowland setting.

Macroinvertebrates

- 4.1.6 Macroinvertebrate data have been reviewed from the watercourse crossings and their presence would be reasonably expected in all permanently wetted and seasonally ephemeral watercourses within the Order Limits. No macroinvertebrate species of conservation interest were reported from the desk study. The walkover surveys identified a number of sites with habitat characteristics that would support a diverse macroinvertebrate fauna.



- 4.1.7 Low and moderate sensitivity habitats are proposed to be crossed by open cut construction methods. However, none of these watercourses have been identified as supporting species of conservation interest.
- 4.1.8 Construction activities using an open cut method have the potential to result in localised mortality to macroinvertebrate populations. Watercourse fluming during the laying of the pipeline and maintaining a haul road has the potential to result in hydrological change and habitat fragmentation to macroinvertebrate communities.
- 4.1.9 The desk study indicates broadly ubiquitous macroinvertebrate communities, supporting field assessment of low to moderate sensitivity habitat at crossing points that may be directly affected by open cut methods. No species of conservation interest have been reported from within the Order Limits. Macroinvertebrate communities within the Order Limits are considered to be of Local importance, in accordance with guidance from the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018).

Fish

- 4.1.10 Fish data have been provided for watercourse crossings and species records are widely distributed within the Order Limits. A number of migratory species, including sea trout, Atlantic salmon and European eel have been reported from a number of the main watercourses. Other species of conservation interest include brown trout and bullhead; these are distributed widely in watercourses within the Order Limits. Species of conservation interest have been confirmed using eDNA in a number of sites where baseline data were absent, or where existing information preceded 1995.
- 4.1.11 The walkover surveys identified a number of watercourse crossings with physical habitat (substrates, riparian habitat) and flows that would support fish species of conservation interest.
- 4.1.12 There is the potential for mortality/injury, habitat fragmentation and disturbance to resident fish species on open cut watercourse crossings (see Annex A).
- 4.1.13 The large number of watercourses intersected by the Order Limits support a wide range of habitats capable of use by different fish species. Fish communities that include migratory life stages are considered to be of Regional importance. This includes sites known to support European eel, Atlantic salmon, lamprey species and sea trout. All of these species receive protection beyond that of the Salmon and Freshwater Fisheries Act 1975. Fish communities comprising non-migratory species are typically ubiquitous to watercourses surveyed across the Order Limits. Whilst receiving protection under the Salmon and Freshwater Fisheries Act, these communities' sensitivity to change is likely to be more localised than migratory species, therefore they are assessed as being of Local importance in accordance with valuation guidance (CIEEM, 2018).



References

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Annex A – Watercourse Ecological Sensitivity

Dry channel
Low ecological sensitivity
Moderate ecological sensitivity
High ecological sensitivity
Screened out at desk stage (geomorphology)

	Salmonid	European Eel	Lamprey	Bullhead	Cyprinidae	WC Crayfish	Mussels	Macrophyte %	Width (m)	Depth (m)	Flow	Substrate	Land Use	Notes	Geomorph Screen	Existing EA Data		Crossing Method
																Fish	Inverts	
WCX002a	N	Y	Y	Y	N	Y	N	0	1	0.1	Riffle, run, pool, glide	Silt/clay, gravel, cobbles, pebbles	Woodland, unimproved pasture	Good habitats, flow/substrate variation	Y	US & DS	No	Trenchless
WCX003	-	-	-	-	-	-	-	-	-	-	-	-	-	Minor field drain	N	No	No	Open cut
W004	-	-	-	-	-	-	-	-	-	-	-	-	-	Minor field drain	N	No	No	Open cut
WCX005	-	-	-	-	-	-	-	-	-	-	-	-	-	Minor field drain	N	No	No	Open cut
WCX006	N	Y	Y	N	N	N	N	60	1	0.1	Glide	Silt/clay, gravel	Unimproved pasture	Suboptimal eel and lamprey	Y	No	No	Open cut
WCX007	N	N	N	Y	N	Y	N	0	0.5	0.05	Riffle, run	Silt/clay, gravel, sand, cobbles, pebbles	Woodland, tilled land	Good ditch habitat	Y	No	No	Open cut
WCX010	N	N	N	N	N	N	N	-	-	-	-	-	-	Artificial drain, ditch, no water	Y	No	No	Open cut
WCX011								-	-	-	-	-	-	Headwater of minor drain	N	No	No	Open cut
WCX012	N	N	N	N	N	N	N	-	-	-	-	-	-	Dry	Y	DS	No	Open cut
WCX013	N	N	N	N	N	N	N	-	-	-	-	-	-	Artificial drain with culverts, ditch, no water	Y	No	No	Open cut
WCX014a	N	N	N	N	N	N	N	-	-	-	-	-	-	Dry	Y	No	No	Open cut
WCX015	N	N	N	N	N	N	N	-	-	-	-	-	-	Dry	Y	No	No	Open cut
WCX016								-	-	-	-	-	-	Minor field drain	N	No	No	Open cut
WCX017	N	N	N	N	N	N	N	-	-	-	-	-	-	Dry ditch	Y	No	No	Open cut
WCX018	N	N	N	N	N	N	N	-	-	-	-	-	-	Dry ditch	Y	No	DS at confluence	Open cut
WCX019	Y	Y	Y	Y	Y	Y	Y	80+	7	20	Riffle, run, pool, glide	Gravel, sand, pebble. Silt/clay	Scrub, tall herb, gardens	Chalk stream like site	Y	US & DS within 1km	US & DS	Trenchless
Wcx020	N	N	N	N	N	N	N	-	-	-	-	-	-	Overgrown ditch	Y	No	No	Open cut
WCx021	N	N	N	N	N	N	N	-	-	-	-	-	-	Very shallow ditch	Y	DS below confluence	No	Open cut
WCX111	-	-	-	-	-	-	-	-	-	-	-	-	-	Minor field	N	No	No	Open cut
WCX023	-	-	-	-	-	-	-	-	-	-	-	-	-	Minor field drain	N	No	No	Open cut
WCX025a	-	-	-	-	-	-	-	-	-	-	-	-	-	Headwater of minor drain	N	No	No	Open cut



	Salmonid	European Eel	Lamprey	Bullhead	Cyprinidae	WC Crayfish	Mussels	Macrophyte %	Width (m)	Depth (m)	Flow	Substrate	Land Use	Notes	Geomorph Screen	Existing EA Data		Crossing Method
																Fish	Inverts	
WCX026	-	-	-	-	-	-	-	-	-	-	-	-	-	Headwater of minor drain	N	No	No	Open cut
WCX027	N	N	N	N	N	N	N	-	-	-	-	-	-	Dry	Y	No	No	Open cut
WCX029	-	-	-	-	-	-	-	-	-	-	-	-	-	Headwater of minor drain	N	No	No	Open cut
WCX030	-	-	-	-	-	-	-	-	-	-	-	-	-	Headwater of minor drain	N	No	No	Open cut
WCX031	N	N	N	n	N	N	N	-	-	-	-	-	-	Very small, poor quality ditch	Y	No	No	Trenchless
WCX032	N	N	N	N	N	N	N	-	-	-	-	-	-	Dry	Y	No	No	Open cut
WCX033	N	N	N	N	N	N	N	-	-	-	-	-	-	Dry	Y	No	No	Open cut
WCX034	N	N	N	N	N	N	N	-	-	-	-	-	-	Dry	Y	No	No	Open cut
WCX035	-	-	-	-	-	-	-	-	-	-	-	-	-	Headwater of minor drain	N	No	No	Open cut
WCX036	-	-	-	-	-	-	-	-	-	-	-	-	-	Minor field drain	N	No	No	Open cut
WCX038	N	N	N	N	N	N	N	-	-	-	-	-	-	Very small, shallow ditch	Y	No	No	Trenchless
WCX039	N	N	Y	Y	N	N	N	-	-	-	-	-	-	Very small, shallow ditch	Y	No	No	Trenchless
WCX040	N	N	N	N	N	N	N	-	-	-	-	-	-	Dry	Y	No	No	Trenchless
WCX041	N	N	N	N	N	N	N	-	-	-	-	-	-	Slow flowing, silt bed, CANAL	Y	No	No	Trenchless
WCX043	-	-	-	-	-	-	-	-	-	-	-	-	-	Minor drain - urban	N	No	No	Open cut
WCX044	-	-	-	-	-	-	-	-	-	-	-	-	-		N	No	No	Open cut
WCX045	-	-	-	-	-	-	-	-	-	-	-	-	-		N	No	No	Open cut
WCX047	N	Y	N	N	N	N	N	N	0.6	0.1	Run	-	-	Very shallow, heavily shaded	Y	DS	US	Open cut
W048c/ WCX048	N	N	N	N	N	N	N	-	-	-	-	-	-		Y	DS and US	US	Trenchless
WCX049	-	-	-	-	-	-	-	-	-	-	-	-	-	Minor field drain	N	No	No	Open cut
WCX051	N	Y	Y	Y	Y	N	N	10	2	0.25	Glide	Silt/clay, gravel, cobble	Woodland	suboptimal for eel, ammocoetes	Y	US	DS	Trenchless
WCX055	-	-	-	-	-	-	-	-	-	-	-	-	-		N	No	No	Trenchless
WCX058 (plus a to d)	N	N	N	N	N	N	N	-	-	-	-	-	-	Dry ditch	Y	No	No	Trenchless
WCX063	-	-	-	-	-	-	-	-	-	-	-	-	-	Minor field drain	N	No	No	Open cut
WCX064	-	-	-	-	-	-	-	-	-	-	-	-	-	Minor field drain	N	No	No	Open cut
WCX065	-	-	-	-	-	-	-	-	-	-	-	-	-	Minor field drain	N	No	No	Open cut
WCX066	Y	Y	Y	Y	Y	Y	N	30	3.5	0.25	Glide	Gravel, silt/clay, pebbles	Woodland, unimproved pasture	Good substrate diversity, macrophytes, woody debris	Y	US & DS	US & DS	Trenchless
WCX067	-	-	-	-	-	-	-	-	-	-	-	-	-		N	DS below confluence	No	Open cut
WCX068a	-	-	-	-	-	-	-	-	-	-	-	-	-		N	US & DS below confluence	US & DS below confluence	Open cut
WCX070	N	N	N	N	N	N	N	-	-	-	-	-	-	Ochre, no flow, oil sheen	Y	No	No	Open cut
WCX073	N	N	N	N	N	N	N	-	-	-	-	-	-	Stagnant ditch	Y	No	No	Trenchless
WCX076	-	-	-	-	-	-	-	-	-	-	-	-	-	Minor field drain	N	No	No	Trenchless



	Salmonid	European Eel	Lamprey	Bullhead	Cyprinidae	WC Crayfish	Mussels	Macrophyte %	Width (m)	Depth (m)	Flow	Substrate	Land Use	Notes	Geomorph Screen	Existing EA Data		Crossing Method
																Fish	Inverts	
WCX077	-	-	-	-	-	-	-	-	-	-	-	-	-	Minor field drain	N	No	No	Open cut
WCX079 (plus a and b)	N	N	N	N	N	N	N	-	-	-	-	-	-	Dry grassy ditches	Y	No	No	Open cut
WCX080	N	N	N	N	N	N	N	-	-	-	-	-	-	Dry artificial channel	Y	No	No	Open cut
WCX081 (and a)	N	N	N	N	N	N	N	-	-	-	-	-	-	Very shallow dry ditch	Y	No	No	Open cut
WCX082	-	-	-	-	-	-	-	-	-	-	-	-	-	Minor field drain – golf course	Y	No	No	Open cut
WCX083	-	-	-	-	-	-	-	-	-	-	-	-	-	Minor field drain – golf course	N	No	No	Open cut
WCX086	-	-	-	-	-	-	-	-	-	-	-	-	-	-	N	No	No	Trenchless
W087	-	-	-	-	-	-	-	-	-	-	-	-	-	Minor field drain	N	No	No	Open cut
WCX092	-	-	-	-	-	-	-	-	-	-	-	-	-	Minor field drain	N	No	No	Open cut
WCX093 (and a)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	N	No	No	Trenchless
WCX094 (and a)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	N	No	No	Trenchless
WCX095	N	Y	Y	N	Y	N	Y	25	6	0.05	Glide	Silt/clay, cobble	Unimproved pasture, woodland	Thick silts	Y	US & DS	US & DS	Trenchless
WCX096b	Y	Y	N	N	Y	N	Y	2	20	2	Glide	Sand, silt/clay, gravel, pebble	Parkland	Adult fish	Y	US & DS	No	Trenchless
WCX098	-	-	-	-	-	-	-	-	-	-	-	-	-	Minor field drain	N	No	No	Open cut
WCX100	Y	Y	Y	N	Y	Y	N	60	2.5	0.4	Glide	Silt/clay, pebbles, sand	Suburban, tall herb	Adult fish, vegetation	Y	No	No	Trenchless
W101	--	-	-	-	-	-	-	-	-	-	-	-	-	Minor field drain	N	No	No	Open cut
WCX102d	N	Y	Y	N	Y	N	Y	15	12	1	Slack	Silt/clay	Unimproved pasture	Fish present, slow, coloured water, vegetation	Y	No	No	Trenchless
WCX104f	N	N	N	N	N	N	N	-	-	-	-	-	-	Artificial drainage channel	Y	No	No	Trenchless
WCX105	-	-	-	-	-	-	-	-	-	-	-	-	-	Minor field drain	N	No	No	Trenchless
WCX106	-	-	-	-	-	-	-	-	-	-	-	-	-	Culvert	N	No	No	Open cut
WCX108	-	-	-	-	-	-	-	-	-	-	-	-	-	-	N	No	No	Open cut
WCX112	-	-	-	-	-	-	-	-	-	-	-	-	-	-	N	No	No	Open cut
WCX113	-	-	-	-	-	-	-	-	-	-	-	-	-	-	N	No	No	Open cut
WCX114	-	-	-	-	-	-	-	-	-	-	-	-	-	-	N	No	No	Open cut
WCX115	-	-	-	-	-	-	-	-	-	-	-	-	-	-	N	No	No	Open cut
WCX116	-	-	-	-	-	-	-	-	-	-	-	-	-	-	N	No	No	Trenchless

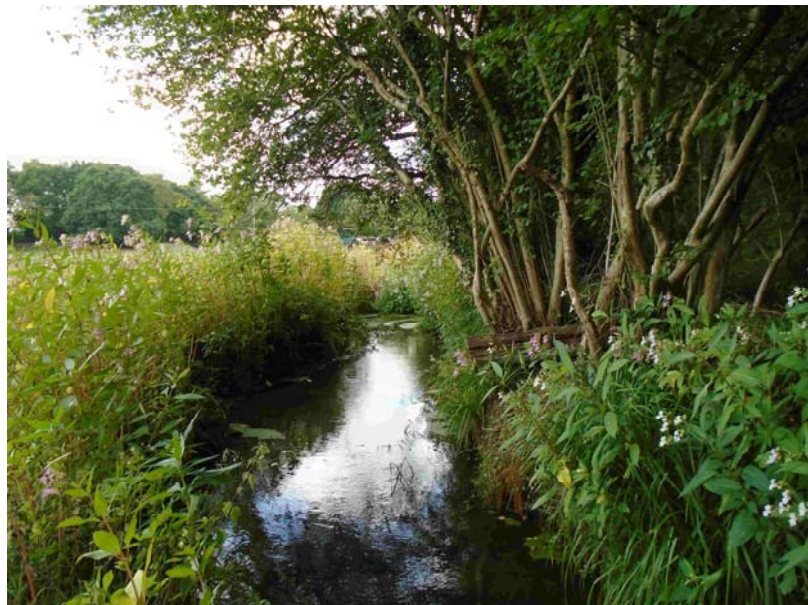
Annex B – Photographs

Examples of High Sensitivity Sites



Ford Lake Stream, 24/07/18, standard lens

Photograph 7.5.1: WCX002a



Halebourne, 25/07/18, standard lens.

Photograph 7.5.3: WCX066



River Wey North, 27/07/18, standard lens

Photograph 7.5.2: WCX019



River Wey North, 27/07/18, standard lens

Photograph 7.5.4: WCX096

Examples of Moderate Sensitivity Sites



Unnamed tributary of River Hamble, 24/07/18, standard lens.

Photograph 7.5.5: WCX007



Cove Brook, 25/07/18, standard lens.

Photograph 7.5.6: WCX048



Unnamed tributary of River Hamble, 24/07/18, standard lens.

Photograph 7.5.7: WCX102

Examples of Low Sensitivity Sites

Photograph 7.5.8: WCX020



Unnamed drainage ditch, 27/07/18, standard lens.

Photograph 7.5.9: WCX041



Basingstoke Canal, 25/07/18, standard lens.

Photograph 7.5.10: WCX070



Clappers Brook, 26/07/18, standard lens.

Photograph 7.5.11: WCX073



Unnamed drainage ditch, 26/07/18, standard lens.

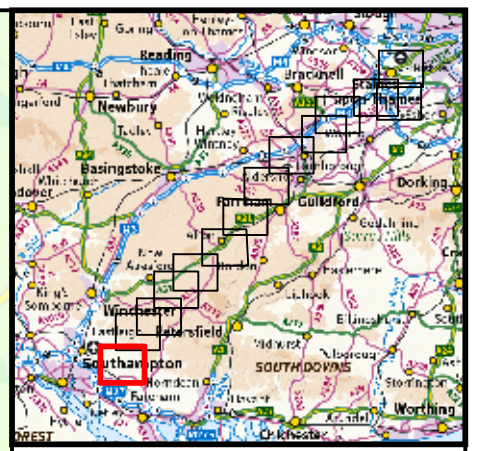
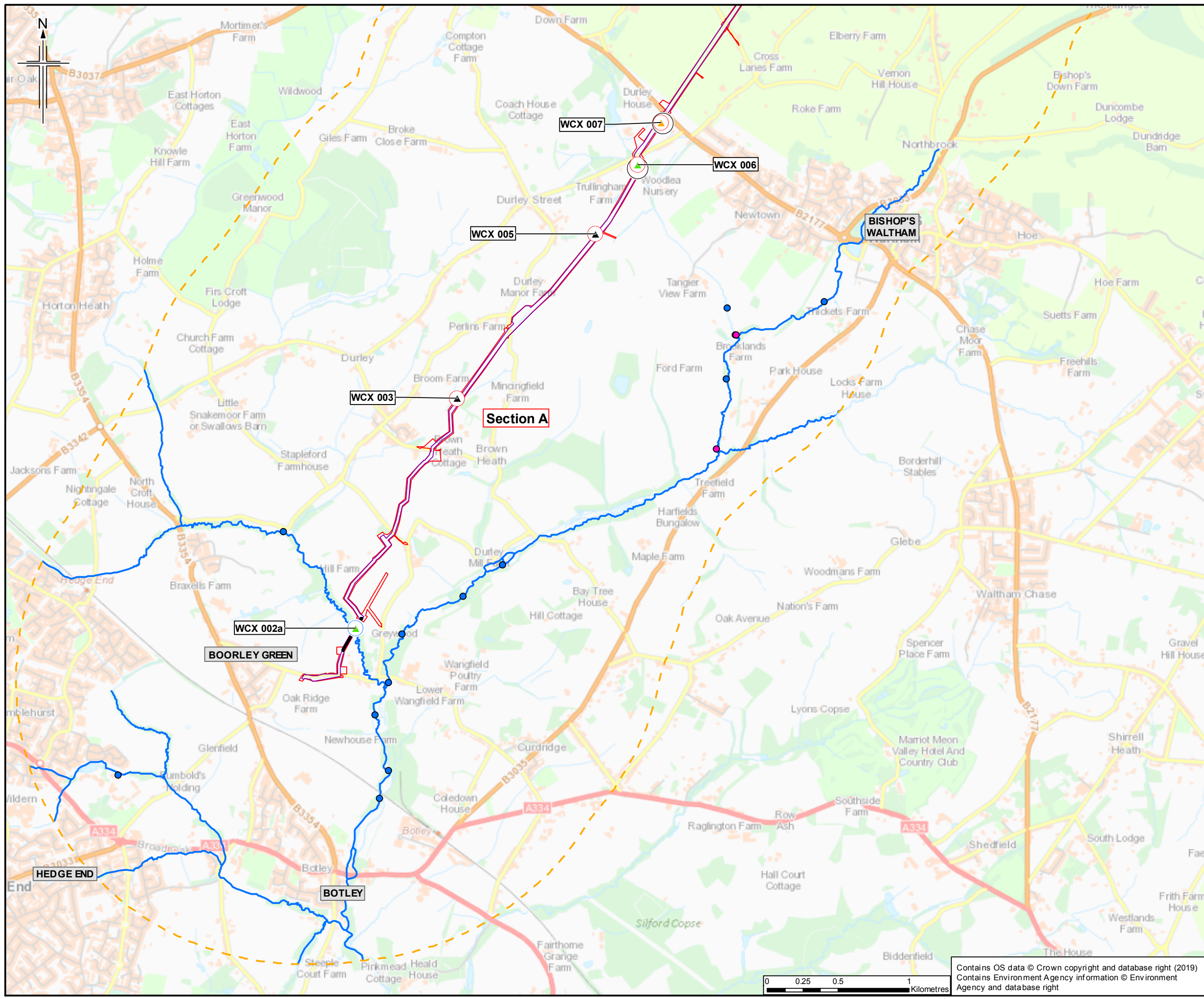


Figure

Figure A7.5.1 Aquatic Ecology



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- Legend**
- Order Limits
 - Limits of deviation
 - Order Limits 2km buffer
 - Trenchless crossing
 - Section break
 - Main River
- Habitat Sensitivity**
- ▲ High
 - ▲ Moderate
 - ▲ Low
 - ▲ Dry
 - ▲ Field Drain
- Water Crossing Method**
- Open cut
 - Trenchless
 - Environmental eDNA survey
- Environment Agency Data**
- Fish
 - Invertebrate
- Sheet displays part of Section A

Rev.	Rev. Date	Purpose of revision	OrigDwn	Checked	Rev'd	Apprv'd
0	13/03/2019	For Issue	HM	NS	LG	SH



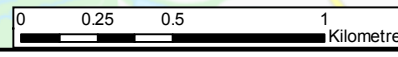
Client
Esso Petroleum Company, Limited
Ermyn House,
Ermyn Way,
Leatherhead,
Surrey,
KT22 8UX

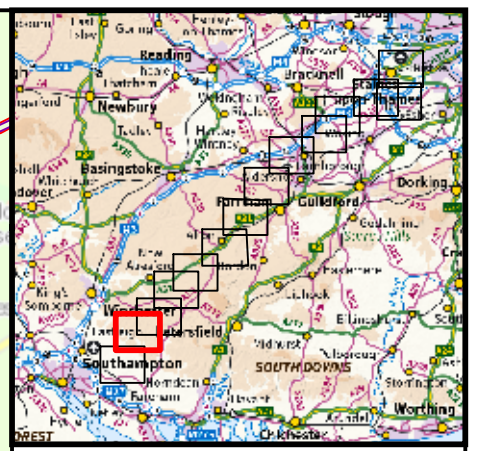
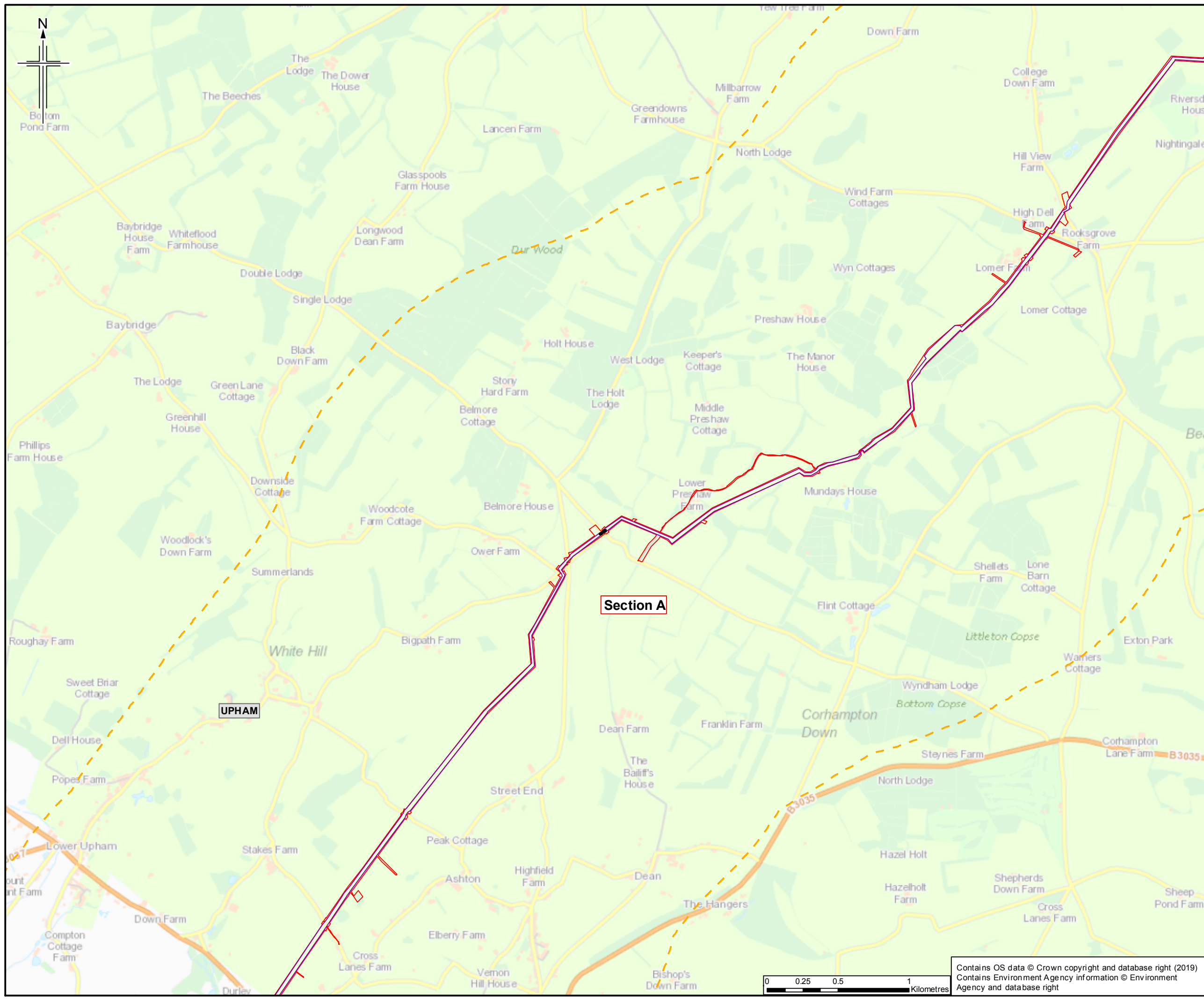


Drawing title
**ENVIRONMENTAL STATEMENT
AQUATIC ECOLOGY
APFP Reg. (2009) 5(2)(I)**

Drawing Status	For Issue
Scale	1:25,000 @ A3 DO NOT SCALE
JACOBS No.	B2325300
ProjectWise No.	B2325300-JAC-000-ENV-DRG-001068
Drawing number	Figure A7.5.1 Sheet 1 of 14
Rev	0

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Legend

- Order Limits
- Limits of deviation
- Order Limits 2km buffer
- Trenchless crossing
- Section break
- Main River

Habitat Sensitivity

- ▲ High
- ▲ Moderate
- ▲ Low
- ▲ Dry
- ▲ Field Drain

Water Crossing Method

- Open cut
- Trenchless
- Environmental eDNA survey

Environment Agency Data

- Fish
- Invertebrate

Sheet displays part of Section A

0	1303/2019	For Issue	HM	NS	LG	SH
Rev.	Rev. Date	Purpose of revision	OrigDwn	Checked	Rev'd	Apprv'd

Client
 Esso Petroleum Company, Limited
 Ermyn House,
 Ermyn Way,
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 KT22 8UX

Project

Southampton to London Pipeline Project

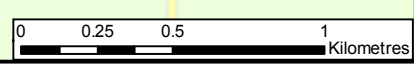
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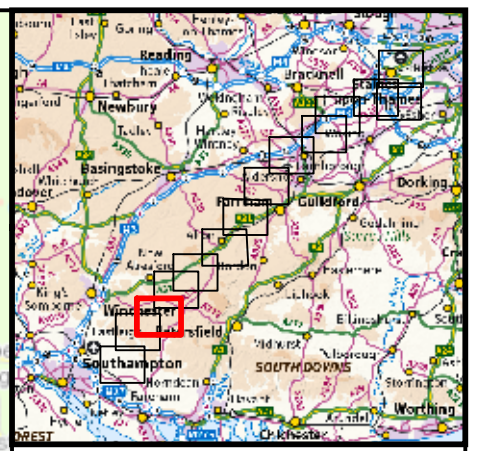
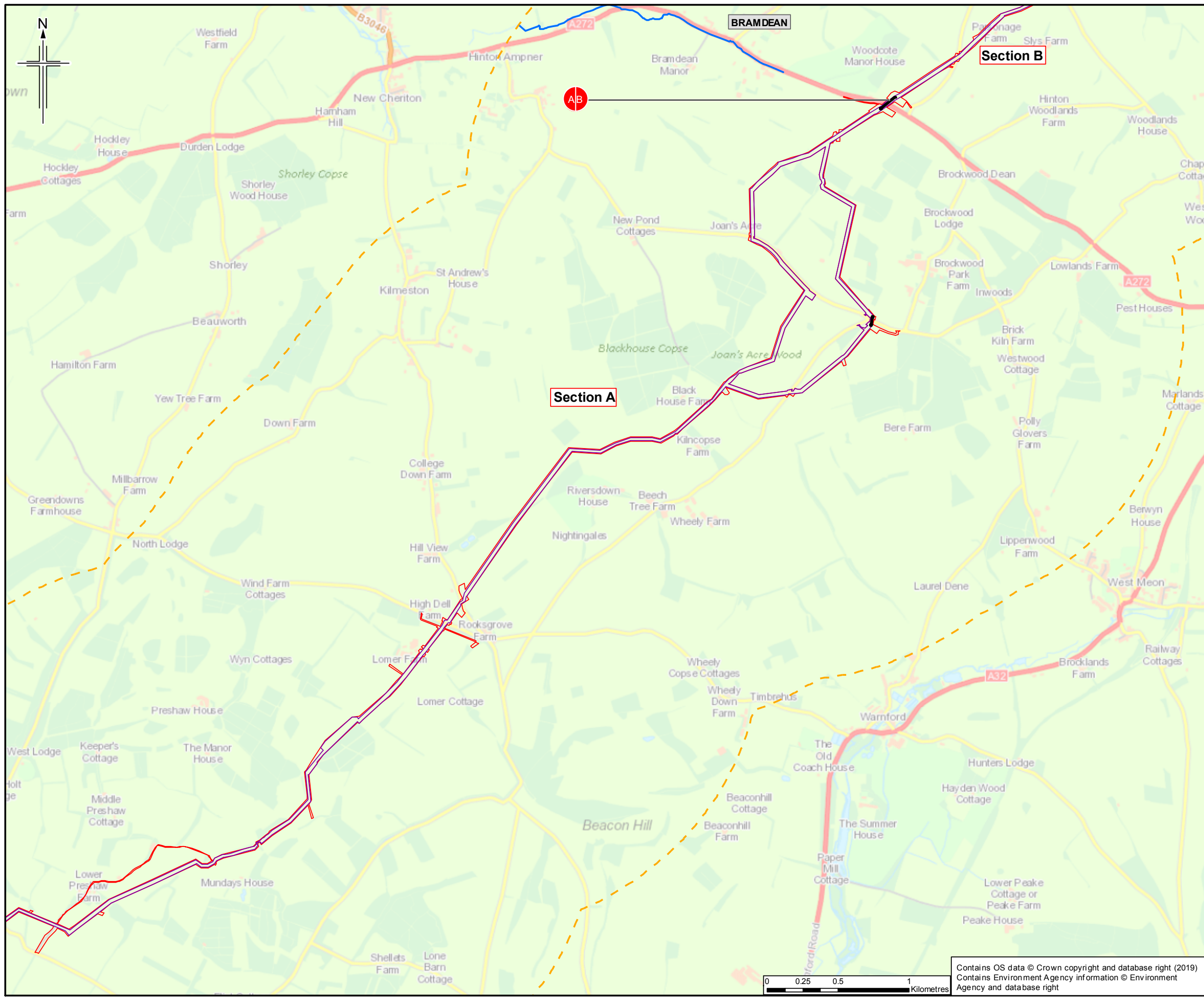
**ENVIRONMENTAL STATEMENT
 AQUATIC ECOLOGY
 APFP Reg. (2009) 5(2)(I)**

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ProjectWise No.	B2325300-JAC-000-ENV-DRG-001068	
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Legend

- Order Limits
- Limits of deviation
- Order Limits 2km buffer
- Trenchless crossing
- Section break
- Main River

Habitat Sensitivity

- ▲ High
- ▲ Moderate
- ▲ Low
- ▲ Dry
- ▲ Field Drain

Water Crossing Method

- Open cut
- Trenchless
- Environmental eDNA survey

Environment Agency Data

- Fish
- Invertebrate

Sheet displays parts of Section A and Section B

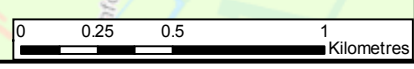
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Rev.	Rev. Date	Purpose of revision	Orig/Dwn	Checked	Rev'd	Apprv'd

Client
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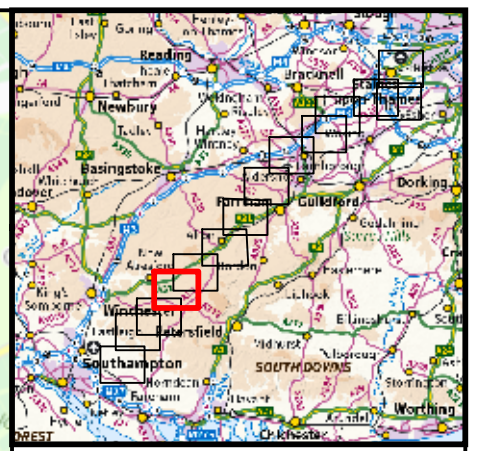
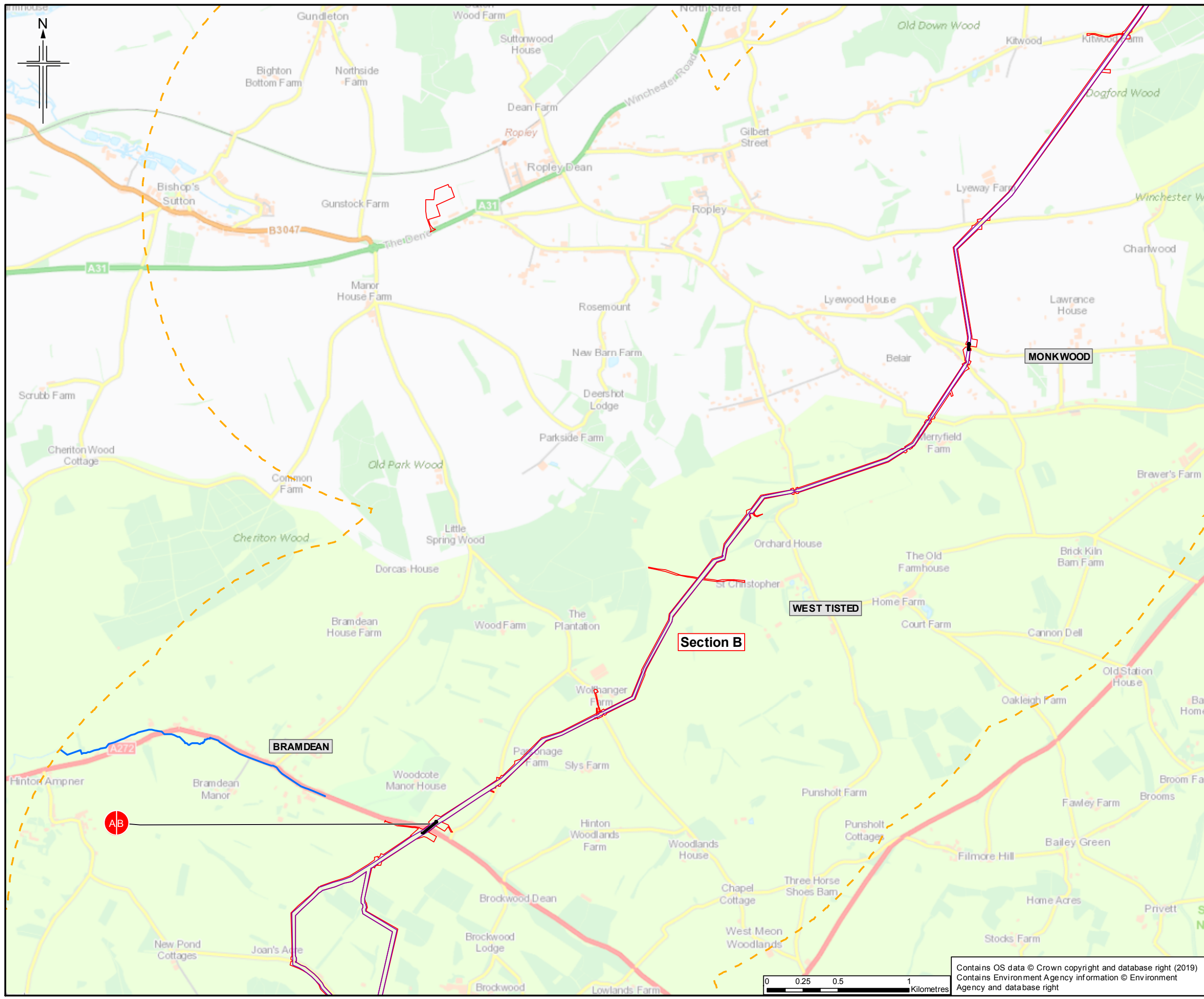
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 AQUATIC ECOLOGY
 APFP Reg. (2009) 5(2)(I)

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- Legend**
- Order Limits
 - Limits of deviation
 - Order Limits 2km buffer
 - Trenchless crossing
 - Section break
 - Main River
- Habitat Sensitivity**
- ▲ High
 - ▲ Moderate
 - ▲ Low
 - ▲ Dry
 - ▲ Field Drain
- Water Crossing Method**
- Open cut
 - Trenchless
 - Environmental eDNA survey
- Environment Agency Data**
- Fish
 - Invertebrate
- Sheet displays parts of Section A and Section B

Rev.	Date	Purpose of revision	OrigDwn	Checked	Rev'd	Apprv'd
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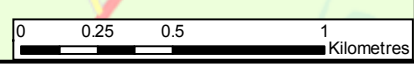
JACOBS
1180 Colindale Avenue, Watlington, Reading, RG2 0JY, UK
Tel: +44 (0) 118 946 7000 Fax: +44(0)118 946 7001
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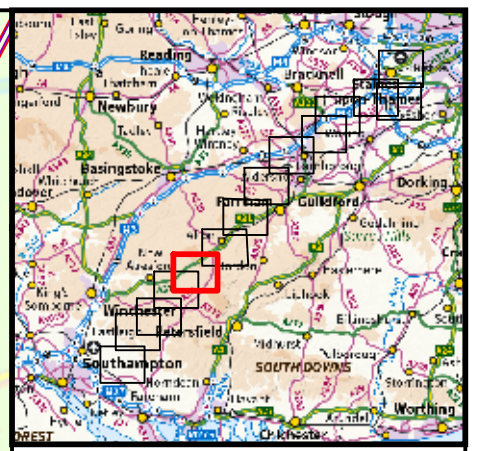
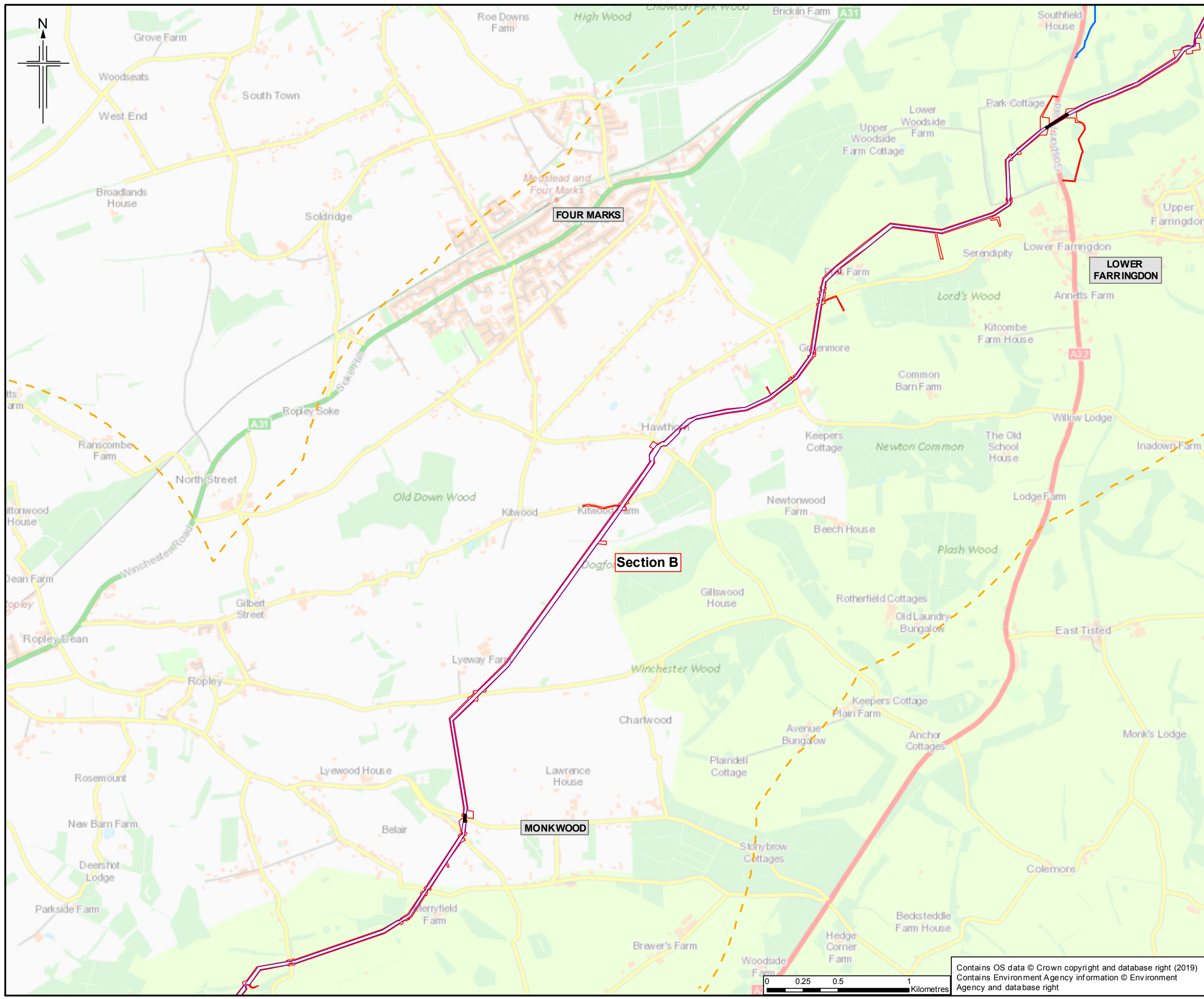
Project
 Southampton to London Pipeline Project

Drawing title
ENVIRONMENTAL STATEMENT
AQUATIC ECOLOGY
APFP Reg. (2009) 5(2)(I)

Drawing Status	For Issue	
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Drawing number	Figure A7.5.1 Sheet 4 of 14	Rev 0



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- Legend**
- Order Limits
 - Limits of deviation
 - Order Limits 2km buffer
 - Trenchless crossing
 - Section break
 - Main River
- Habitat Sensitivity**
- ▲ High
 - ▲ Moderate
 - ▲ Low
 - ▲ Dry
 - ▲ Field Drain
- Water Crossing Method**
- Open cut
 - Trenchless
 - Environmental eDNA survey
- Environment Agency Data**
- Fish
 - Invertebrate
- Sheet displays part of Section B

0	13/03/2019	For Issue	HM	NS	LG	SH
Rev.	Rev. Date	Purpose of revision	Orig'Dwn	Checked	Rev'd	Apprv'd



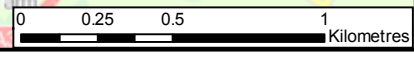
Client
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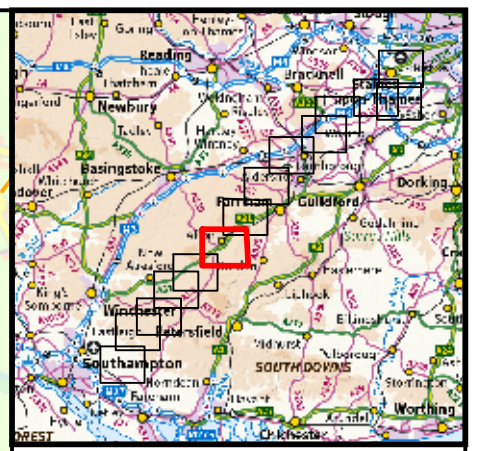
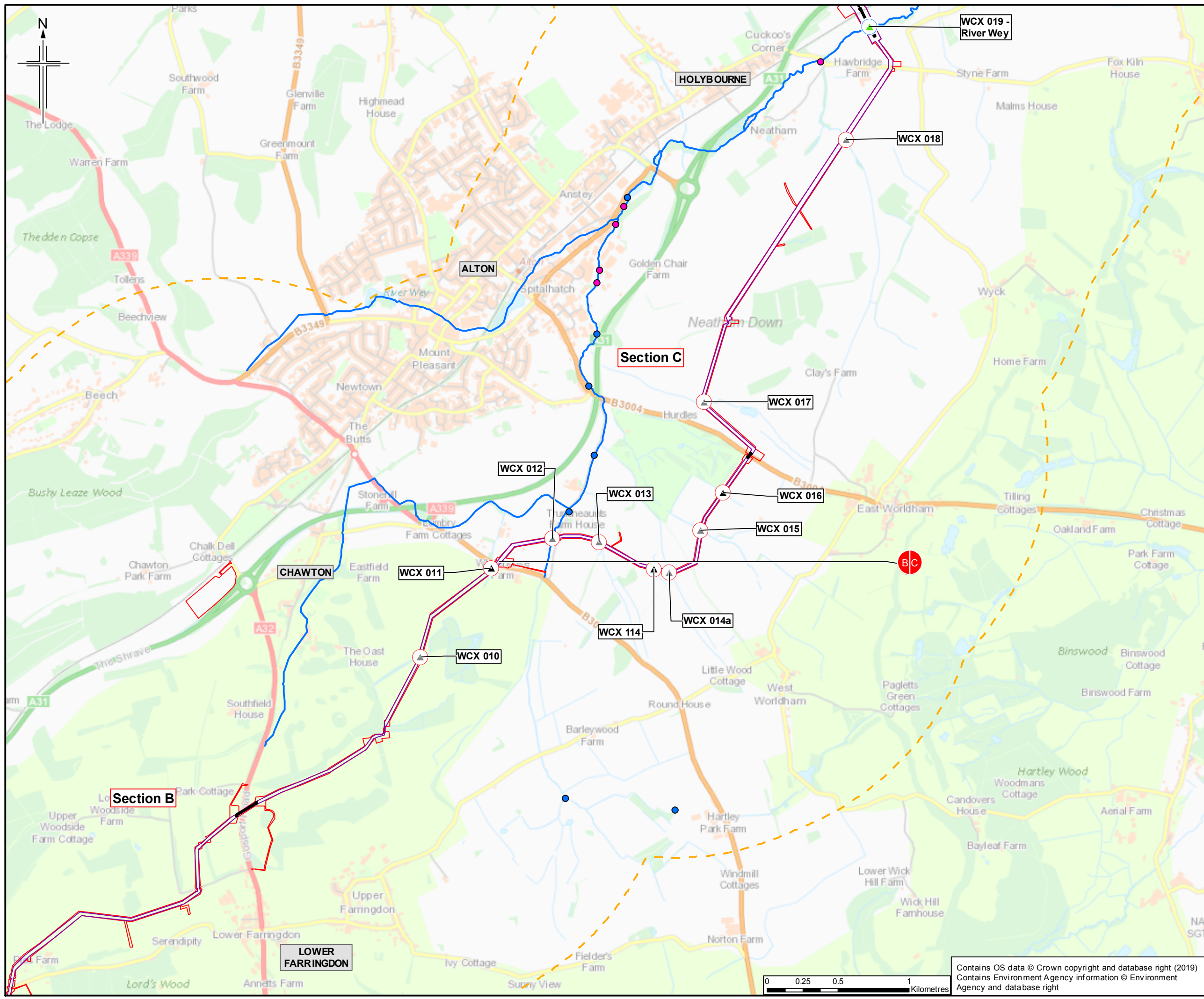


Drawing title
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AQUATIC ECOLOGY
APFP Reg. (2009) 5(2)(I)**

Drawing Status	For Issue	
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Drawing number	Figure A7.5.1 Sheet 5 of 14	Rev 0

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- Legend**
- Order Limits
 - Limits of deviation
 - Order Limits 2km buffer
 - Trenchless crossing
 - Section break
 - Main River
- Habitat Sensitivity**
- ▲ High
 - ▲ Moderate
 - ▲ Low
 - ▲ Dry
 - ▲ Field Drain
- Water Crossing Method**
- Open cut
 - Trenchless
 - Environmental eDNA survey
- Environment Agency Data**
- Fish
 - Invertebrate
- Sheet displays parts of Section B and Section C

0	13/03/2019	For Issue	HM	NS	LG	SH
Rev.	Date	Purpose of revision	OrigDwn	Checked	Rev'd	Apprv'd



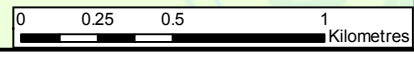
Client
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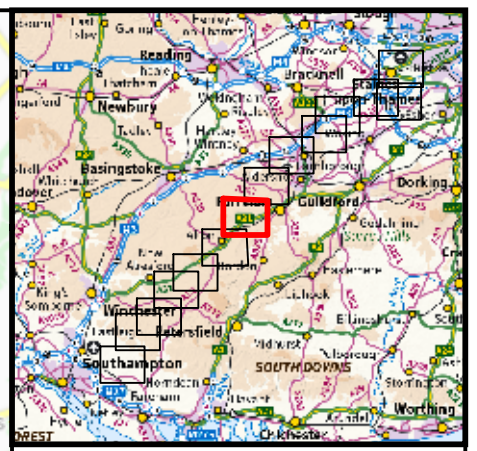
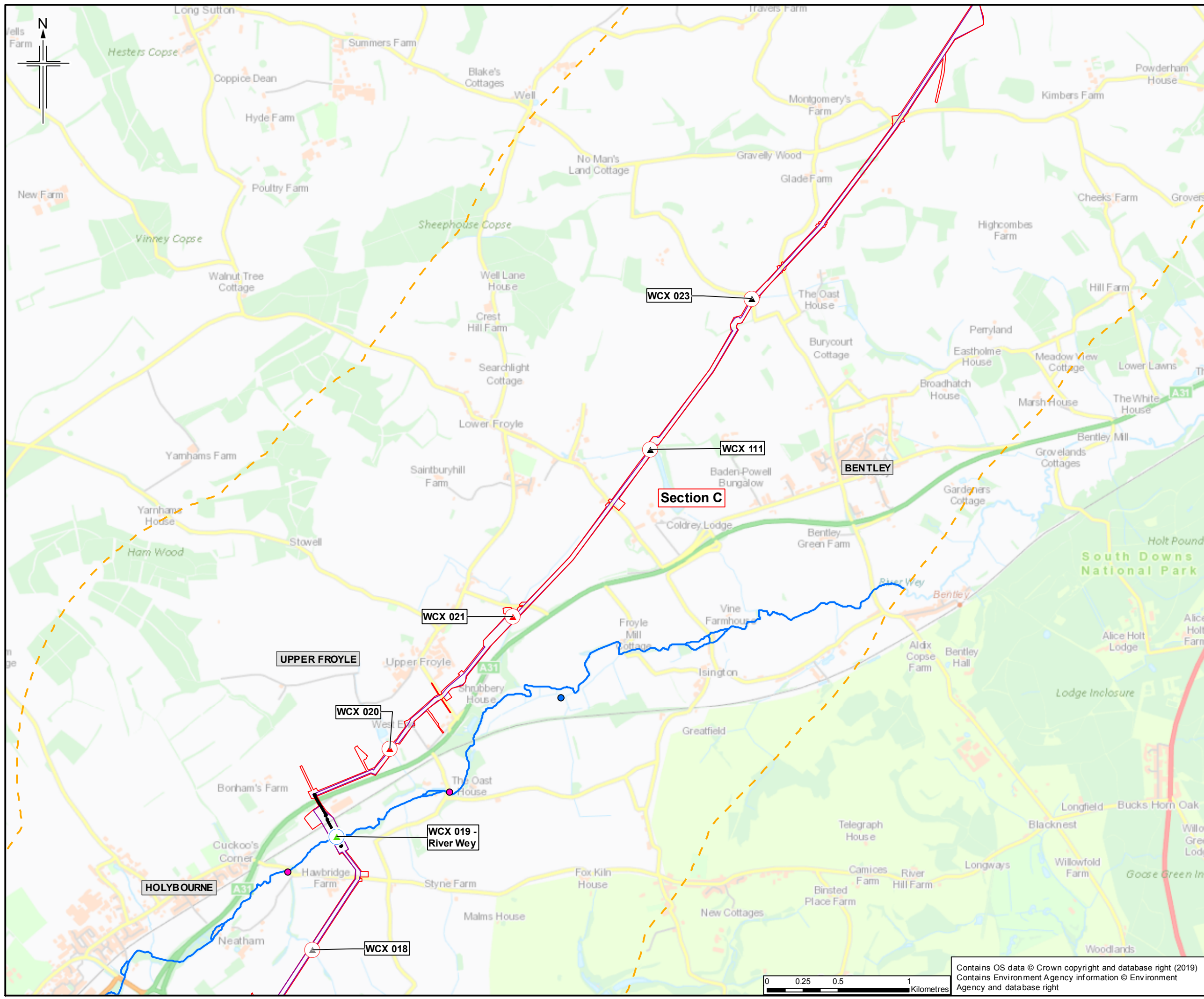


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**ENVIRONMENTAL STATEMENT
AQUATIC ECOLOGY
APFP Reg. (2009) 5(2)(I)**

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Legend

- Order Limits
- Limits of deviation
- Order Limits 2km buffer
- Trenchless crossing
- Section break
- Main River

Habitat Sensitivity

- ▲ High
- ▲ Moderate
- ▲ Low
- ▲ Dry
- ▲ Field Drain

Water Crossing Method

- Open cut
- Trenchless
- Environmental eDNA survey

Environment Agency Data

- Fish
- Invertebrate

Sheet displays part of Section C

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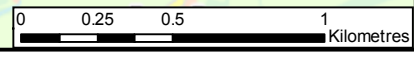
Southampton to London Pipeline Project

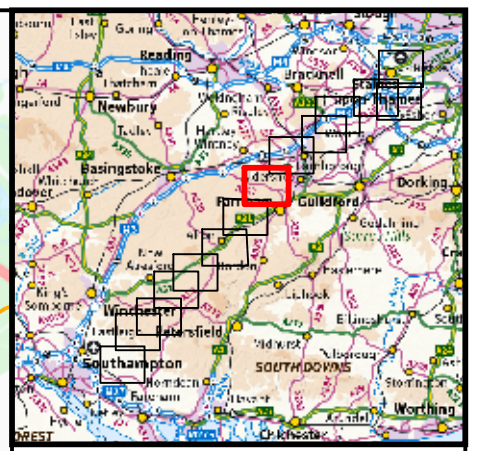
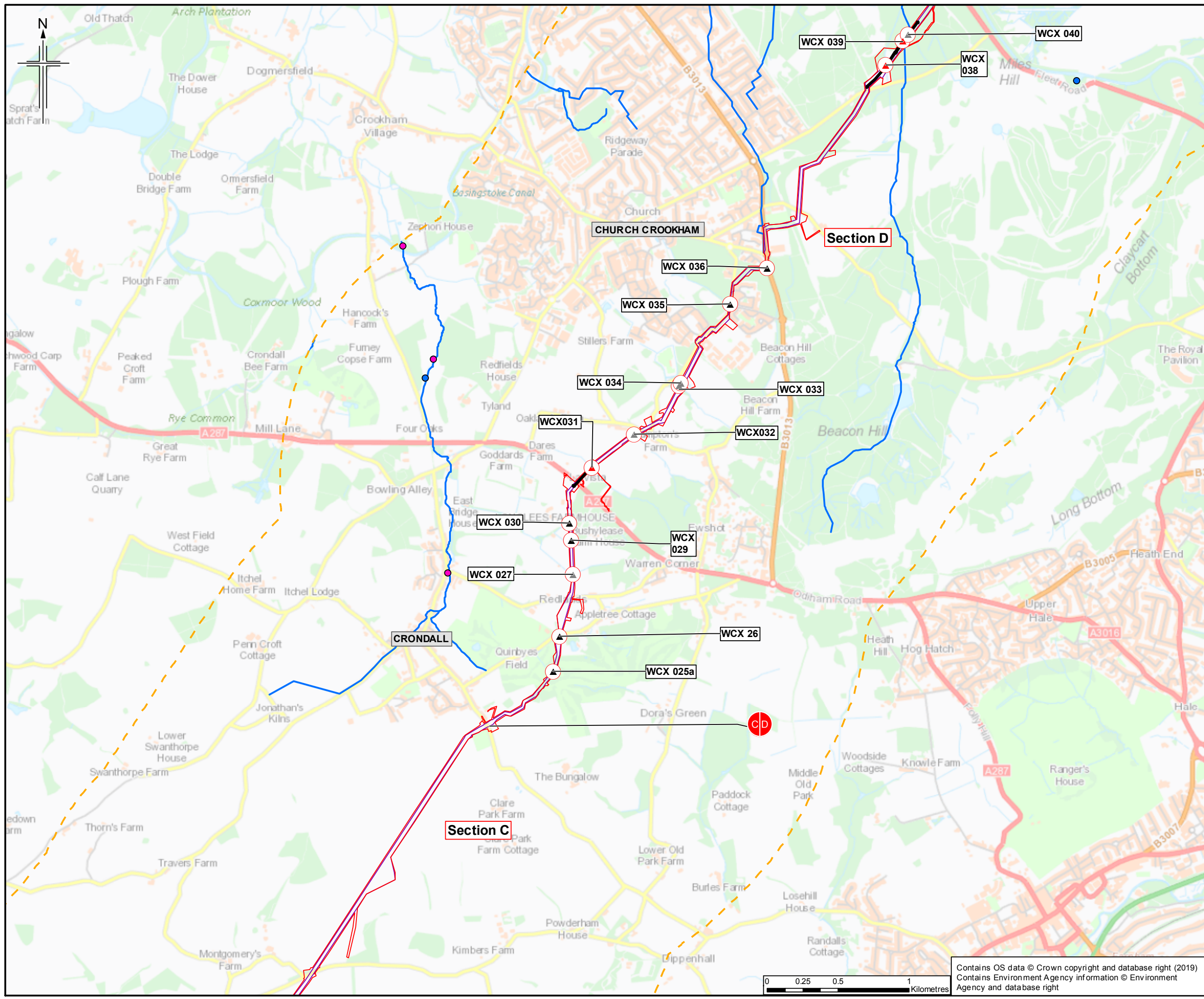
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**ENVIRONMENTAL STATEMENT
 AQUATIC ECOLOGY
 APFP Reg. (2009) 5(2)(I)**

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Drawing number	Figure A7.5.1 Sheet 7 of 14	Rev 0

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Legend

- Order Limits
- Limits of deviation
- Order Limits 2km buffer
- Trenchless crossing
- Section break
- Main River

Habitat Sensitivity

- ▲ High
- ▲ Moderate
- ▲ Low
- ▲ Dry
- ▲ Field Drain

Water Crossing Method

- Open cut
- Trenchless
- Environmental eDNA survey

Environment Agency Data

- Fish
- Invertebrate

Sheet displays parts of Section C and Section D

Rev.	Rev. Date	Purpose of revision	Orig'Dwn	Checked	Rev'd	Apprv'd
0	13/03/2019	For Issue	HM	NS	LG	SH



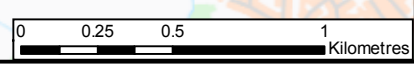
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KT22 8UX

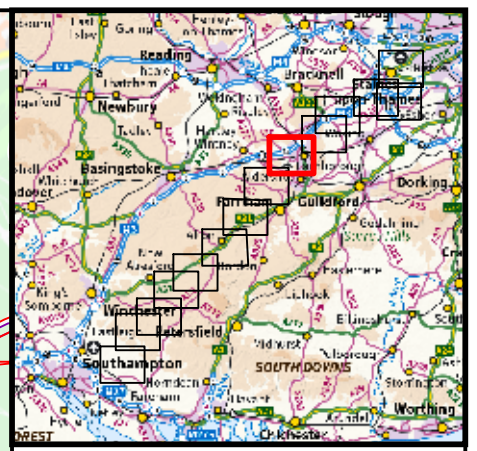
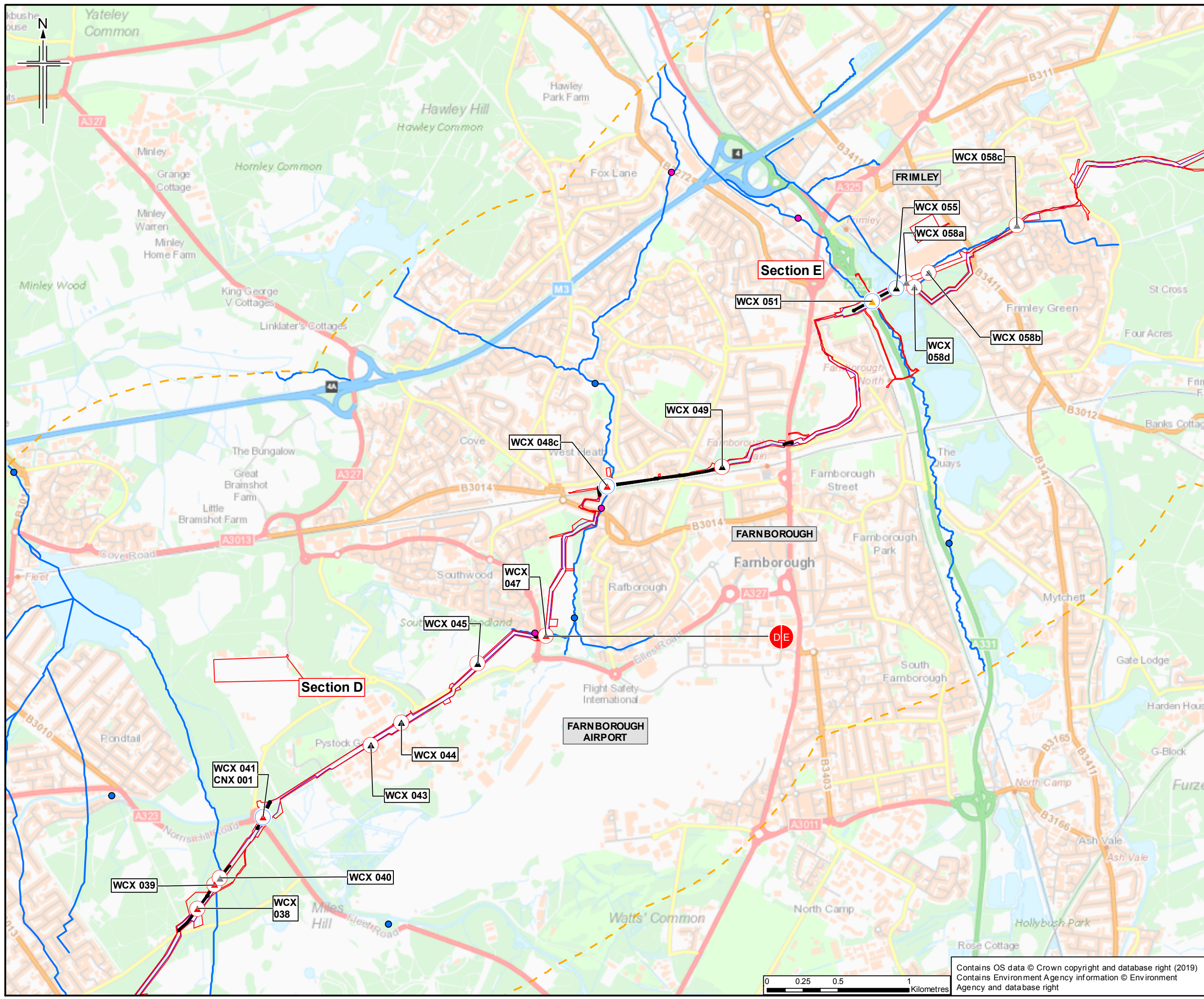


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AQUATIC ECOLOGY
APFP Reg. (2009) 5(2)(I)**

Drawing Status: For Issue
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Project/Work No.: B2325300-JAC-000-ENV-DRG-001068
Drawing number: Figure A7.5.1 Sheet 8 of 14 Rev 0

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- Legend**
- Order Limits
 - Limits of deviation
 - Order Limits 2km buffer
 - Trenchless crossing
 - Section break
 - Main River
- Habitat Sensitivity**
- ▲ High
 - ▲ Moderate
 - ▲ Low
 - ▲ Dry
 - ▲ Field Drain
- Water Crossing Method**
- Open cut
 - Trenchless
 - Environmental eDNA survey
- Environment Agency Data**
- Fish
 - Invertebrate
- Sheet displays parts of Section D and Section E

Rev.	Rev. Date	Purpose of revision	Orig/Dwn	Checked	Rev'd	Apprv'd
0	13/03/2019	For Issue	HM	NS	LG	SH



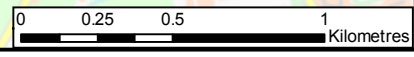
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KT22 8UX

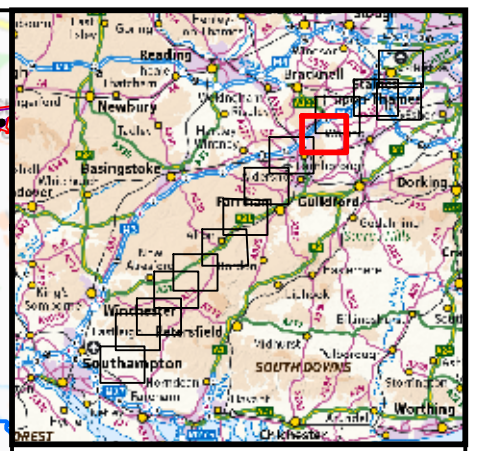
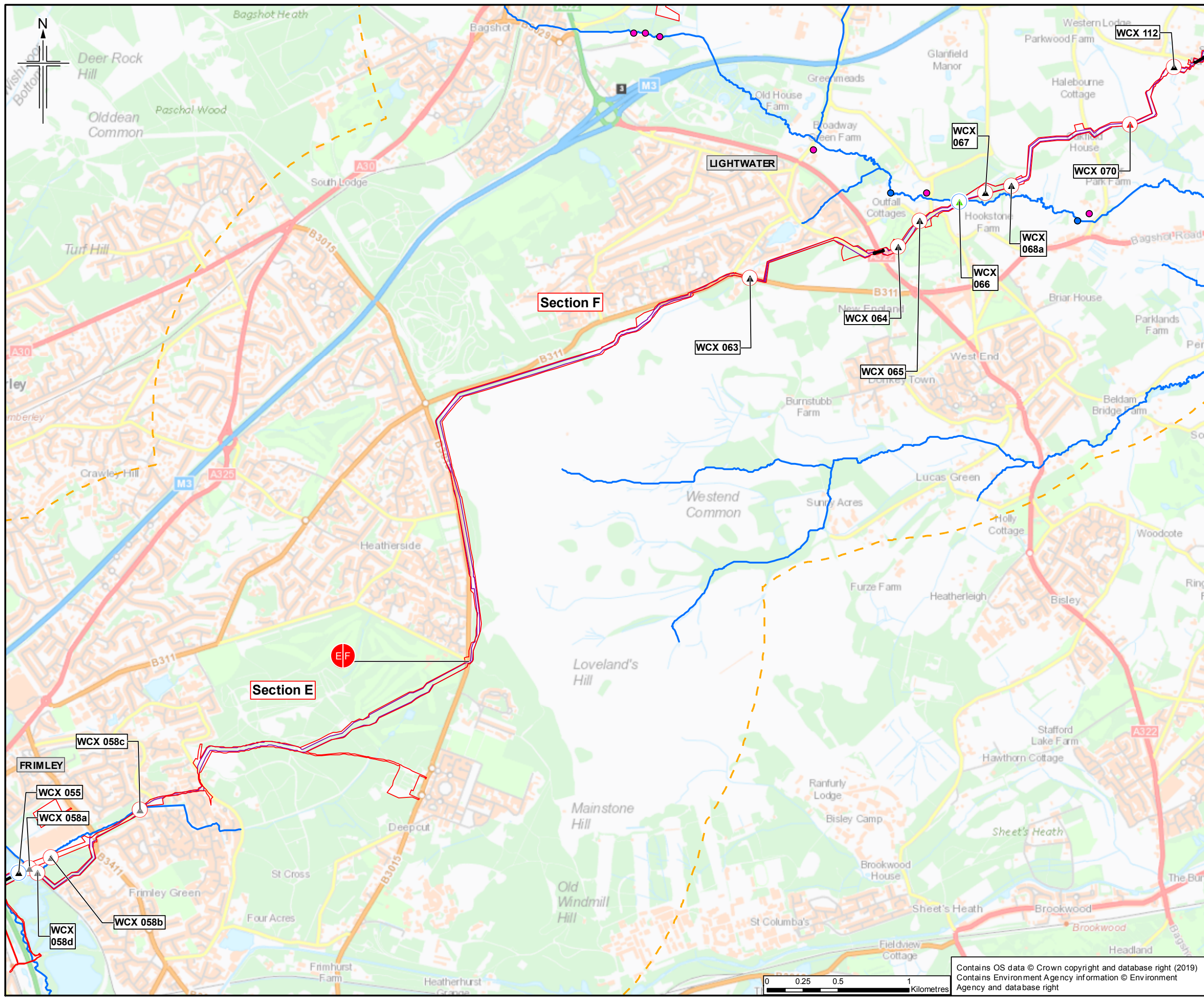


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APFP Reg. (2009) 5(2)(I)**

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Legend

- Order Limits
- Limits of deviation
- Order Limits 2km buffer
- Trenchless crossing
- Section break
- Main River

Habitat Sensitivity

- ▲ High
- ▲ Moderate
- ▲ Low
- ▲ Dry
- ▲ Field Drain

Water Crossing Method

- Open cut
- Trenchless
- Environmental eDNA survey

Environment Agency Data

- Fish
- Invertebrate

Sheet displays parts of Section E and Section F

0	13/03/2019	For Issue	HM	NS	LG	SH
Rev.	Rev. Date	Purpose of revision	OrigDwn	Checked	Rev'd	Apprv'd



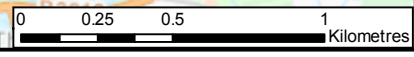
Client
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KT22 8UX

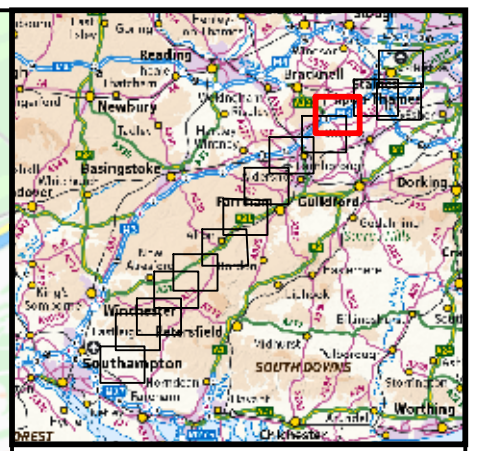
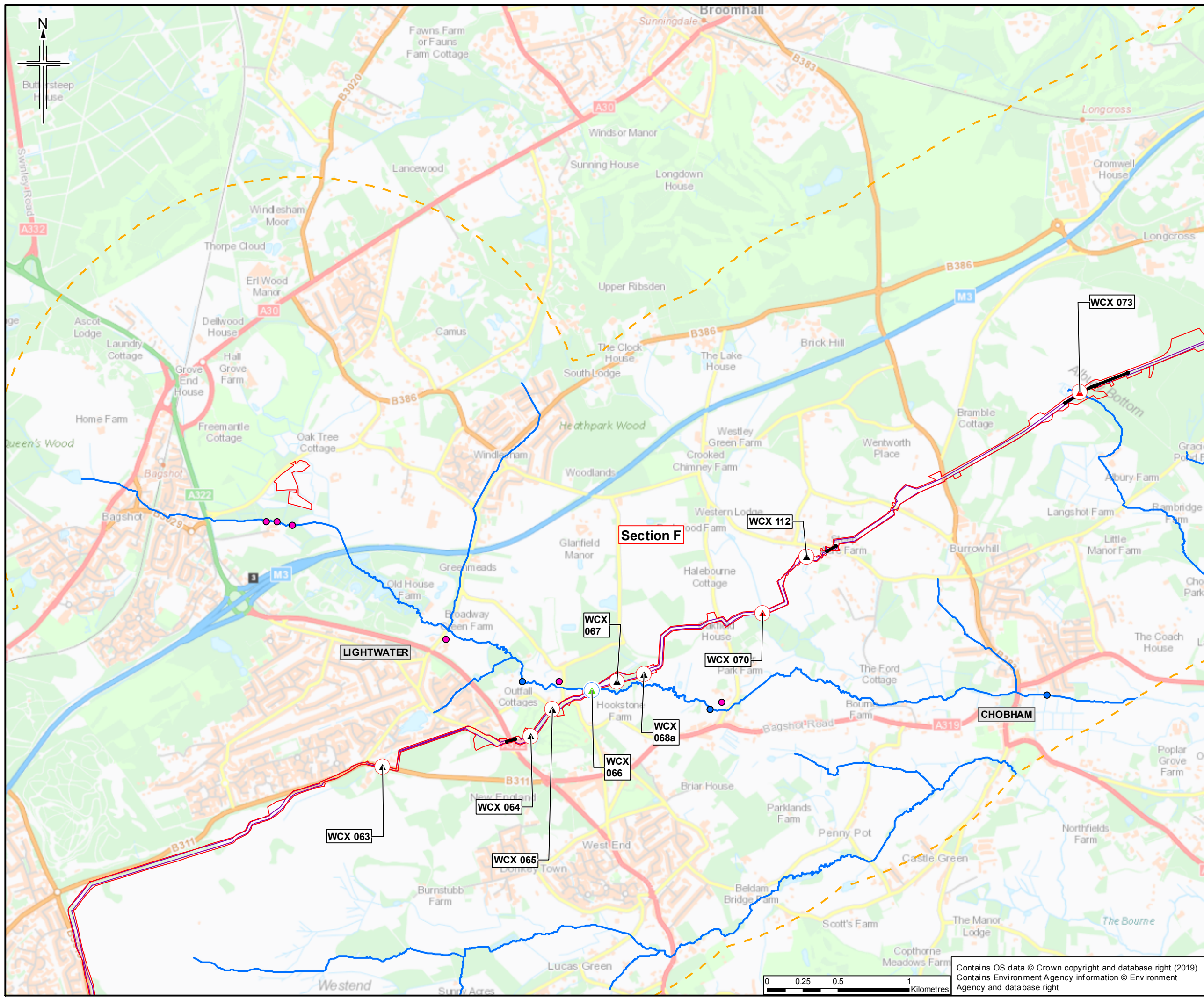


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AQUATIC ECOLOGY
APFP Reg. (2009) 5(2)(I)**

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Legend

- Order Limits
- Limits of deviation
- Order Limits 2km buffer
- Trenchless crossing
- Section break
- Main River

Habitat Sensitivity

- ▲ High
- ▲ Moderate
- ▲ Low
- ▲ Dry
- ▲ Field Drain

Water Crossing Method

- Open cut
- Trenchless
- Environmental eDNA survey

Environment Agency Data

- Fish
- Invertebrate

Sheet displays a part of Section F

Rev.	Rev. Date	Purpose of revision	Orig'Dwn	Checked	Rev'd	Apprv'd
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 Tel: +44 (0)118 946 7000 Fax: +44(0)118 946 7001
 www.jacobs.com

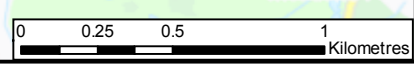
Client
 Esso Petroleum Company, Limited
 Ermyn House,
 Ermyn Way,
 Leatherhead,
 Surrey,
 KT22 8UX

Project
 Southampton to London Pipeline Project

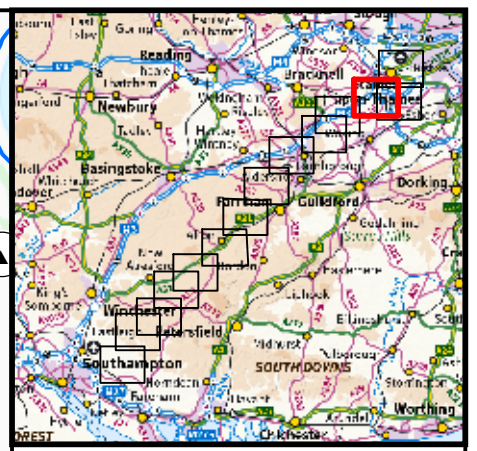
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Legend

- Order Limits
- Limits of deviation
- Order Limits 2km buffer
- Trenchless crossing
- Section break
- Main River

Habitat Sensitivity

- ▲ High
- ▲ Moderate
- ▲ Low
- ▲ Dry
- ▲ Field Drain

Water Crossing Method

- Open cut
- Trenchless
- Environmental eDNA survey

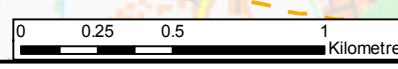
Environment Agency Data

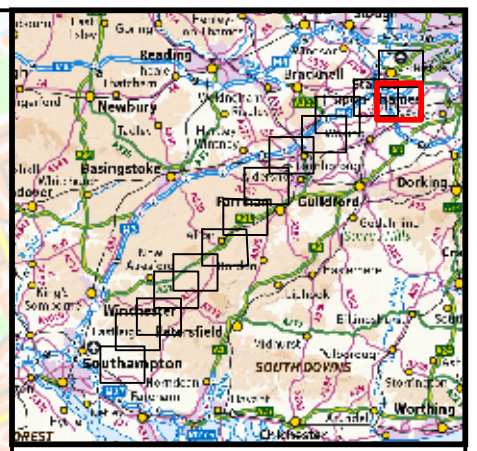
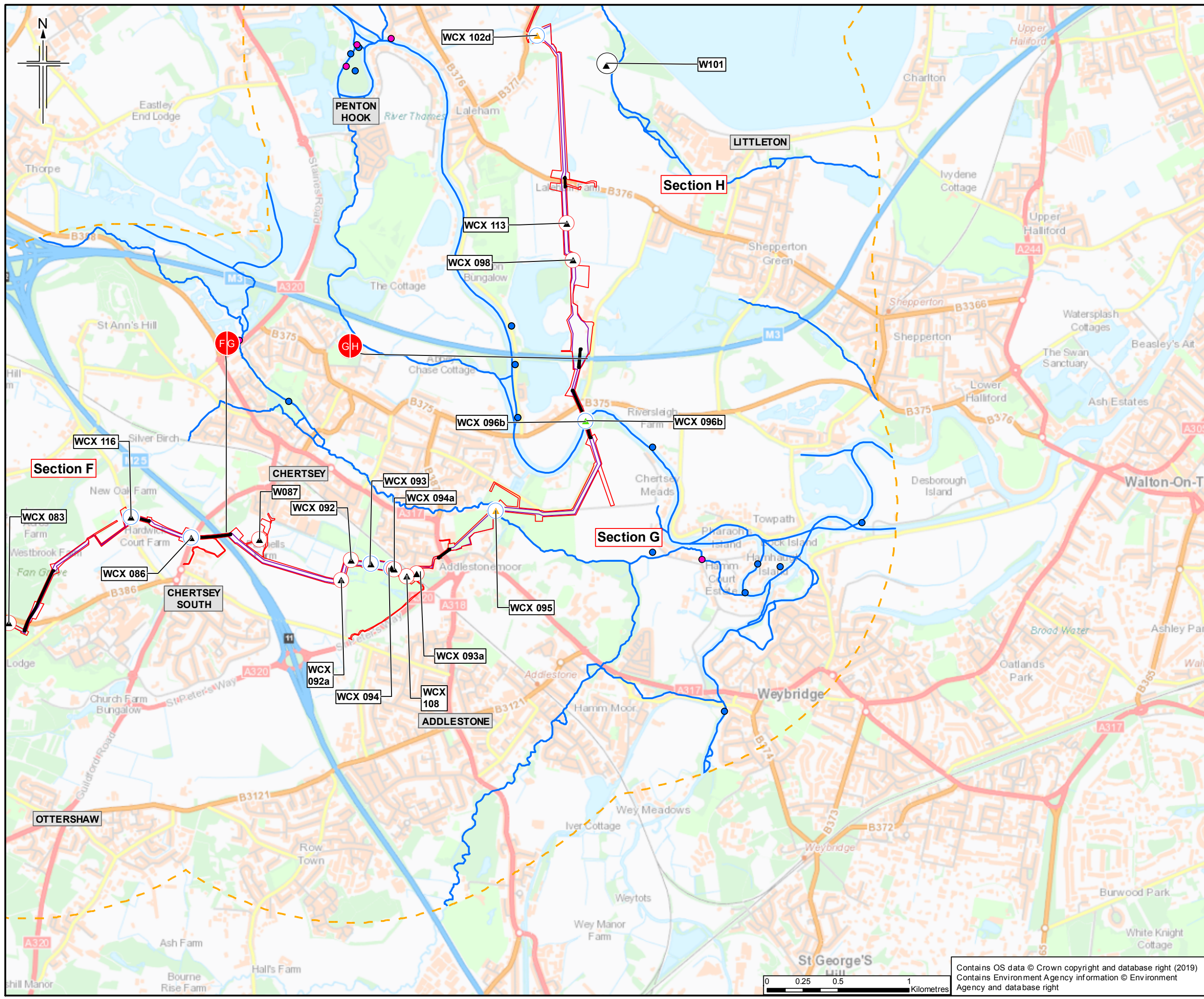
- Fish
- Invertebrate

Sheet displays parts of Section F, Section G and Section H

0	13/03/2019	For Issue	HM	NS	LG	SH
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Client: Esso Petroleum Company, Limited Ermyn House, Ermyn Way, Leatherhead, Surrey, KT22 8UX						
Project: Southampton to London Pipeline Project						
Drawing title: ENVIRONMENTAL STATEMENT AQUATIC ECOLOGY APFP Reg. (2009) 5(2)(I)						
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JACOBS No.	B2325300					
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- Legend**
- Order Limits
 - Limits of deviation
 - Order Limits 2km buffer
 - Trenchless crossing
 - Section break
 - Main River
- Habitat Sensitivity**
- ▲ High
 - ▲ Moderate
 - ▲ Low
 - ▲ Dry
 - ▲ Field Drain
- Water Crossing Method**
- Open cut
 - Trenchless
 - Environmental eDNA survey
- Environment Agency Data**
- Fish
 - Invertebrate
- Sheet displays parts of Section F, Section G and Section H

Rev.	Rev. Date	Purpose of revision	Orig'Dwn	Checked	Rev'd	Apprv'd
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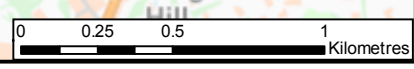
Client
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KT22 8UX

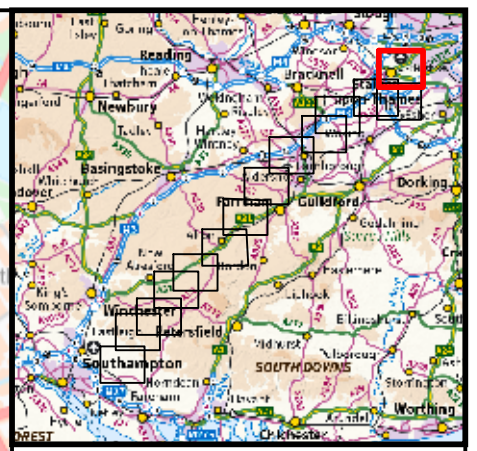
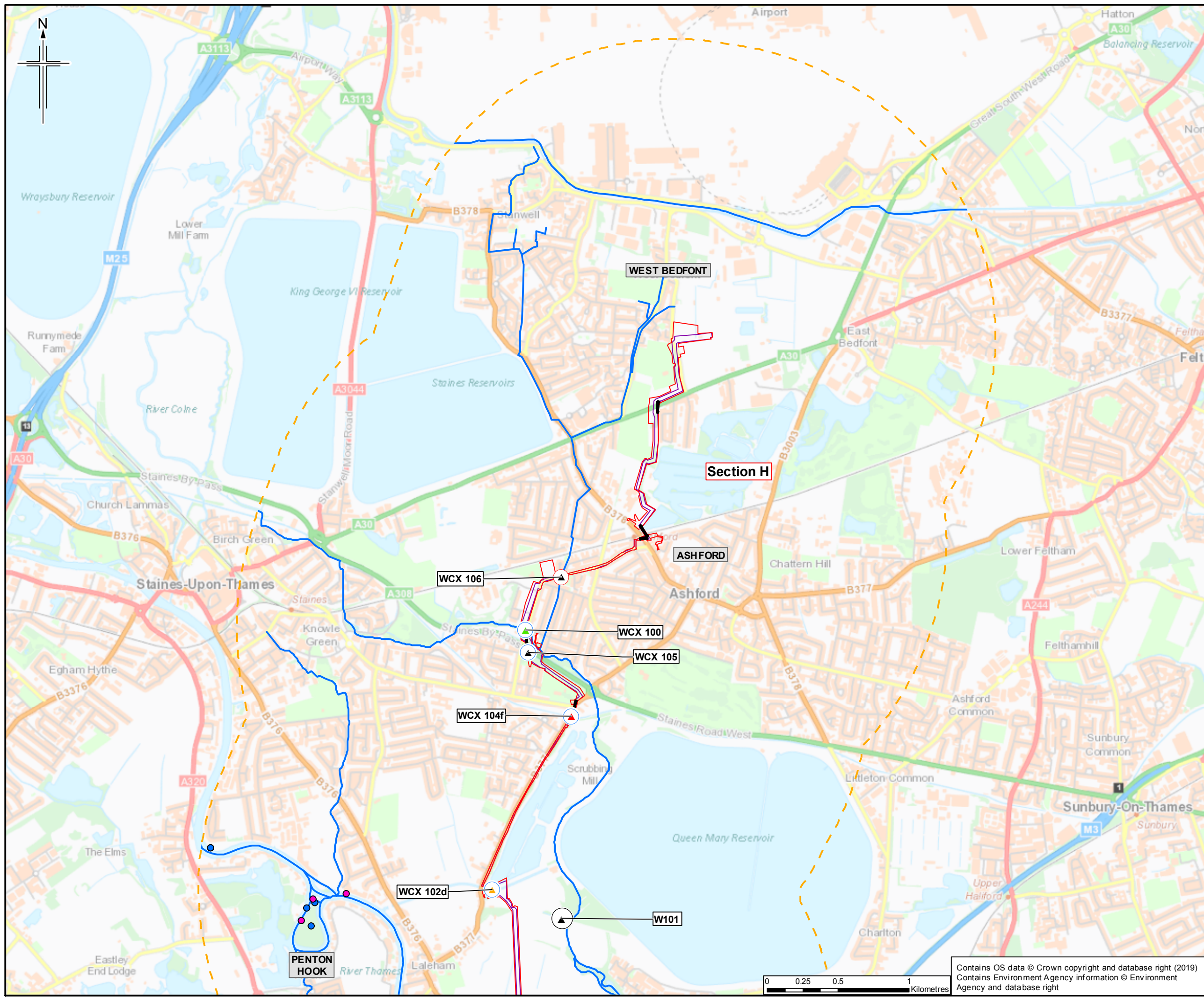


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**ENVIRONMENTAL STATEMENT
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APFP Reg. (2009) 5(2)(I)**

Drawing Status	For Issue	
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- Legend**
- Order Limits
 - Limits of deviation
 - Order Limits 2km buffer
 - Trenchless crossing
 - Section break
 - Main River
- Habitat Sensitivity**
- ▲ High
 - ▲ Moderate
 - ▲ Low
 - ▲ Dry
 - ▲ Field Drain
- Water Crossing Method**
- Open cut
 - Trenchless
 - Environmental eDNA survey
- Environment Agency Data**
- Fish
 - Invertebrate
- Sheet displays part of Section H

0	13/03/2019	For Issue	HM	NS	LG	SH
Rev.	Rev. Date	Purpose of revision	OrigDwn	Checked	Rev'd	Apprv'd

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Drawing title
 ENVIRONMENTAL STATEMENT
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 APFP Reg. (2009) 5(2)(I)

Drawing Status	For Issue	
Scale	1:25,000 @ A3	DO NOT SCALE
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ProjectWise No.	B2325300-JAC-000-ENV-DRG-001068	
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