

**Rampion 2 Wind Farm**  
**Category 6:**  
**Environmental Statement**  
**Volume 4, Appendix 22.6:**  
**Fisheries habitat survey report**  
**Date: August 2023**  
**Revision A**

Document Reference: 6.4.22.6  
Pursuant to: APFP Regulation 5 (2) (a)  
Ecodoc number: 004866564-01



## Document revisions

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Revision	Date	Status/reason for issue	Author	Checked by	Approved by
A	04/08/2023	Final for DCO Application	WSP	RED	RED

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# 1. Introduction

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- 1.1.1 This Appendix should be read in conjunction with **Chapter 22: Terrestrial ecology and nature conservation, Volume 2** of the ES (Document Reference: 6.2.22) which is provided in support of the delivery of and Environmental Impact Assessment (EIA) associated with the Rampion 2 Offshore Wind Farm, hereafter referred to as the 'Proposed Development' or 'Rampion 2'.
- 1.1.2 Further information on the Proposed Development is provided in **Chapter 4: The Proposed Development, Volume 2** of the ES (Document Reference: 6.2.4).
- 1.1.3 This Appendix describes the survey method and summarises the results of a fisheries habitat survey undertaken in 2021 and 2023 within the proposed Development Consent Order (DCO) Limits when above mean high water springs. Information on fish within the marine environment is provided in **Chapter 8: Fish and shellfish ecology, Volume 2** of the ES (Document Reference: 6.2.8).

## 1.2 Structure of this Appendix

- 1.2.1 The remainder of this Appendix is structured as follows:
- **Section 2: Methodology;**
  - **Section 3: Potential construction impacts and mitigation;**
  - **Section 4: Site survey results;**
  - **Section 5: Summary;**
  - **Section 6: Glossary of terms and abbreviations; and**
  - **Section 7: References.**



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## 2. Methodology

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2.1.1 The fisheries habitat appraisal consisted of two stages: a desk study followed by field survey of the proposed DCO Order Limits. The desk study involved a review of published material including searches of relevant databases and archive material to document known fish fauna records for the proposed DCO Order Limits. Sources used in this appraisal included:

- Environment Agency Ecology & Fish Data Explorer;
- The Rivers Trust. Water Framework Directive Fish Survey Results (Fisheries Classification Scheme);
- Environment Agency Solent & South Downs Fish Monitoring report 2015; and
- Environment Agency Solent & South Downs Fish Monitoring report 2018.

### 2.2 Field survey

2.2.1 The aim of the field survey was to assess the presence of suitable fish habitat and the likely presence of significant fish populations. Where the potential for impact to fish populations were identified, resulting from the construction of the onshore elements of the Proposed Development, embedded environmental measures have been identified (see **Chapter 22: Terrestrial ecology and nature conservation, Volume 2** (Document Reference: 6.2.22) of the ES for further details).

2.2.2 There is a total of 41 watercourse and ditch crossings described in the Crossing Schedule (**Appendix 4.1: Crossing schedule, Volume 4** (Document Reference 6.4.4.1)). These include two rivers (the River Arun and River Adur), 19 streams and 20 ditches (including some that are mostly dry).

2.2.3 An appraisal of the fish habitat at 15 water crossings along the onshore cable route was conducted over three days between 26 and 29 May 2021. Three additional sites were surveyed on 6 April 2023 to include additional changes to the onshore cable corridor. No fish fauna surveys (for example electric fishing) were undertaken during this appraisal of fish habitat. Where historical survey data was not available, professional judgement and expert knowledge<sup>1</sup> of fish stocks within the catchment was used to identify the potential presence of significant fish species.

### 2.3 Ground conditions

2.3.1 The 2021 surveys were carried out following a period of generally high river levels although the hydrograph for the River Arun showed levels were falling (**Graphic 2-1**) at the time of the survey. Rainfall immediately prior to the site surveys (24 May 2021) however raised turbidity levels in all watercourses making bed substrate appraisal at some sites difficult. The river levels in both the Rivers Adur

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<sup>1</sup> Sites were surveyed by an ex- Environment Agency Sussex Area fisheries scientist.

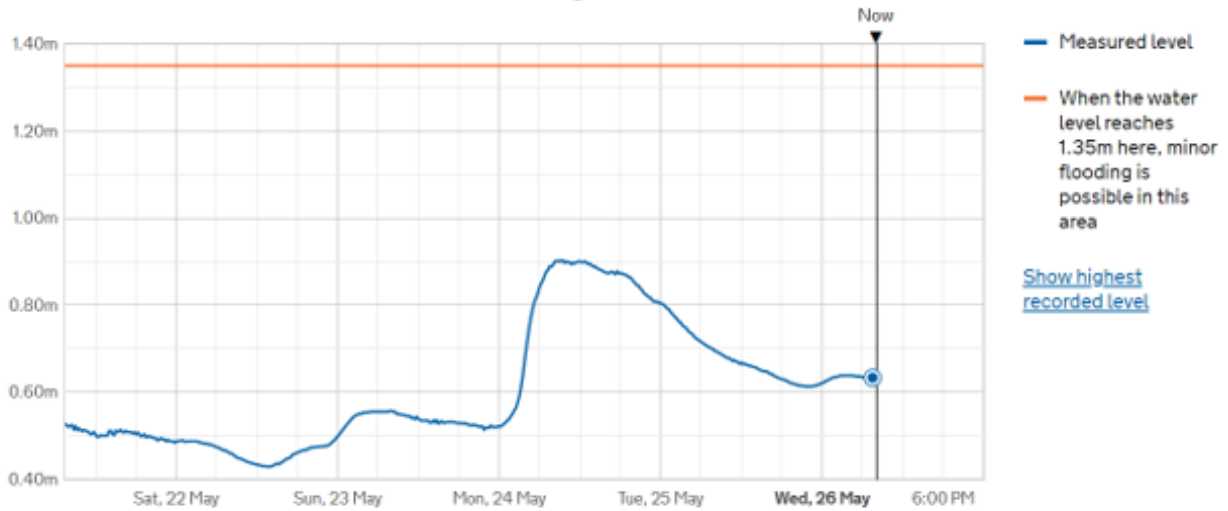


and Arun immediately prior to site surveys in May 2021 are shown in **Graphic 2-1** and **Graphic 2-2**.

### Graphic 2-1 River levels for the River Adur at Sakeham Weir, 26 May 2021

Latest recorded level 0.63m at 7:30am Wednesday 26 May 2021.

#### River levels at this location in the last 5 days



### Graphic 2-2 River Levels for the River Arun at Tanbridge, 26 May 2021

Latest recorded level 32.30m at 7:00am Wednesday 26 May 2021.

#### River levels at this location in the last 5 days



## 2.4 Construction methodologies

2.4.1 **Appendix 4.1: Crossing schedule, Volume 4** of the ES (Document Reference 6.4.4.1) identifies crossing points for the onshore cable corridor from landfall at Climping to the onshore substation at Oakendene and then to the existing National Grid Bolney substation. The crossing type and construction methodologies are

presented for each watercourse crossing point within **Appendix 4.1: Crossing schedule, Volume 4** of the ES (Document Reference 6.4.4.1). A total of 40 river, stream or drainage ditch crossings are identified within the proposed DCO Order Limits. A summary of each crossing site and an appraisal of the potential impact to fish fauna and possible mitigation have been provided in **Section 5: Summary**.

- 2.4.2 The majority of watercourse crossings are expected to be constructed using open-cut trenching method (either with or without water diversion dependent on the watercourse at time of crossing). When the watercourse / ditch is dry or with very low water levels, no streamflow diversion or displacement of standing water will be required.
- 2.4.3 This method consists of digging an open trench in the stream bottom, without any diversion of in-stream flow, into which the cable ducts are laid bank to bank prior to backfilling. The site is first prepared by stripping the topsoil from the banks and areas adjacent to the river at the crossing point. Watercourse bed and bank material and trench soil should be stockpiled separately for replacement after the cable has been laid.
- 2.4.4 The standard open-cut trenching methodology when flowing or standing water are present involves damming and over pumping to enable a dry cut. Site preparation is the same as that described in **paragraph 2.4.3**. Soil filled sandbags are used to seal or dam the watercourse. Cofferdams may be required on larger watercourses. Stream flow is then diverted around the work area using pumps and hoses. On larger watercourses flume pipes that extend on each side of the trench line crossing point for a suitable distance may be installed in the riverbed to take the flow from upstream to downstream of the crossing point. The trench line crossing point between the dams may need to be pumped dry. Excavation of the watercourse then proceeds along the dry trench line with excavated material stored on the bank separately from the bank material.
- 2.4.5 Back filling will initially use excavated subsoil. The final reinstatement will use the stored riverbed materials with both banks and bed reformed to their original profile. Dams are removed once the bed materials and bank profile is reinstated. Final bank reinstatement may require further measures to stabilise the banks and prevent erosion.
- 2.4.6 Trenchless crossing installation techniques are undertaken with little or no surface excavation and approaches include horizontal directional drilling (HDD). HDD is a technique involving minimal impact and uses a specialised machine to first create a pilot bore hole between an entrance and a receiving pit. The cable to be installed is then anchored to an oversized reamer, which is pulled back through the hole dragging the cable through behind it to create an accurate path. A drilling fluid is usually pumped through the cutting head to lubricate the passage for the cable.

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## 3. Potential construction impacts and mitigation

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### 3.1 Potential construction impacts

3.1.1 Both open-cut and trenchless crossing methodologies have the potential to impact upon watercourses in multiple ways as follows:

- Sediment released as a result of in-channel trenching can cause short-term changes to downstream aquatic life and their habitats. Identified effects include alterations to streambed conditions for example, smothering fish spawning habitats and or deposited eggs. Increase in suspension of fine particulates can also result in gill irritation or trauma particularly in juvenile fish which may influence early life stage success. Increased turbidity may also impact on foraging success as a result of prey selection and prey abundance.
- Damming rivers to facilitate open-cut dry ditch installation of the cable may impede the free movement of migratory species such as sea trout (both returning adults and emigrating juveniles).
- Where over-pumping is employed, fish may be entrained into the upstream intake pipes and pump where they may be fatally injured as a result of pump passage (for example resulting from blade strike). Juveniles and fish larvae are particularly vulnerable to entrainment due to their size and poor swimming efficiency. Typically these pumps are fitted with either integral or end-of-pipe suction strainers that are primarily intended to exclude debris that could damage the pump. Although not designed to protect fish, the suction strainers may provide limited screening for larger specimens of fish. On some schemes where there are significant volumes of waterborne debris repeated fouling of suction strainers has resulted in their removal which has in turn led to fish mortalities (Environment Agency, 2011).
- Where open-cut trenching methods are employed dewatering of impounded reaches may result in fish, fish larvae or eggs becoming stranded and desiccated. The food of fish such as mussels and some aquatic macroinvertebrates, that are not mobile, and which cannot be moved from the dewatered area may also be lost.
- The clearing and grading of stream banks can increase exposure of the soil to erosional forces which may result in increased surface runoff from these areas. Increased surface runoff caused by removal of riparian vegetation facilitates transport of sediment into surface waters, which can result in increased turbidity levels and increased sedimentation in the receiving waterbody.
- Removal of riparian vegetation along the cleared section of the waterbody may result in the loss of important fish habitat for example, refuge or foraging habitat.

- When it rains water may also infiltrate and collect in unconsolidated trench backfill and follow the trench down slope resulting in gulying of trenches and possible bank erosion resulting in sediment input to the water course.
- Pollution from fuels and other chemicals accidentally spilled into the water course may degrade water quality and cause acute and chronic toxic effects on both fish and invertebrates. Accidental spill may result in prosecution by regulators or nuisance or negligence claims from persons effected by the spill, for example angling clubs or landowners.

## 3.2 Mitigation

3.2.1 A number of mitigation measures may be adopted to avoid the impacts discussed in **Section 3.1: Potential construction impacts** above. Mitigation options are presented in **Table 3-1**. Appropriate measures were highlighted for for each crossing point during the field survey.

**Table 3-1 Potential fisheries mitigation measures**

Ref.	Title	Mitigation
A	Erosion Control	Install and maintain sediments and erosion control measures, such as coir matting during construction and on an as required basis for water course approaches and banks to prevent sediment run off from entering water courses.
B	Channel Profile	Recontour banks and riparian landforms as soon as practicable following construction.
C	Spoil Storage	Where crossings installed by open-cut trenching excavated bank material should be stockpiled outside of the riparian areas (at least 50 metres from the watercourse) or behind containment structures.
D	Bank Reinstatement	Final bank reinstatement may require further measures to stabilise the banks and prevent erosion. Geotextiles such as GeoJute may be used in conjunction with seeding of an appropriate grass mix or planting.
E	Works Timing	Schedule water crossing activities as far as possible to occur during the drier months from the end of May to October to minimise disruption to the free passage of fish or when water levels within minor streams/ditches is negligible.
F	Works Duration	Keep the duration of the isolation works as short as possible.
G	Pump Screening	Where over-pumping is required, intake should be screened with a suitably sized , pump guard screens to avoid entrainment a fauna. Further information is provided in The Eel Manual (Environment Agency, 2011).

Ref.	Title	Mitigation
H	Over-pumping	Where pumps are used, make a competent person responsible for regularly monitoring the over pumping including: upstream and downstream water levels; and blinding of the pump guard screens.
I	De-watering	During any dewatering exercise the discharge hose(s) should be directed through a filtering medium to limit silt carry over or bed disturbance, before the pumped water is returned to the watercourse.
J	Riparian Habitat	Retain large mature trees where possible and trim trees in preference to removal to retain rootstock for stabilisation of the banks. Minimise the extent of riparian vegetation clearance.
K	Fish Habitat	Wherever possible document and replace snags or other structures of potential fisheries value which are disturbed by cable lay construction.
L	Fish Rescue	Before the isolated area is de-watered, take appropriate measures to relocate any stranded wildlife. Ensure specialist techniques such as electric-fishing are carried out by suitably qualified personnel.
M	Identification of Non-Native Species (INNS)	Ensure that any pumps and associated pipework used are emptied, thoroughly cleaned and dried before leaving the previous site to minimise the risk of transferring water containing plant or animal diseases (or invasive non-native species) to the development site. On completion of work all pumping equipment should be emptied and thoroughly cleaned (and preferably dried) before leaving site in order to prevent moving anything damaging to the next site at which it is to be used. Pumping operations should avoid placing the inlet pipe amongst water plants and the pump inlet should be positioned just below the water surface, rather than on the bed of the water body, to reduce the risk of non-native plant or animal species being taken through the pump.
N	Water Quality	Works should be compliant with guidance on preventing pollution from construction sites for example, PPG5: Works and Maintenance in or Near Water.

### 3.3 Constraints and limitations

- 3.3.1 Due to land access and health and safety constraints, 22 of 41 sites identified as watercourse or ditch crossings within [Appendix 4.1: Crossing schedule, Volume 4](#) of the ES (Document Reference 6.4.4.1) were not fully assessed during the fisheries habitat surveys, however habitat information available from other

surveys (for example [Appendix 22.3: Extended Phase 1 Habitat Survey, Volume 4](#) of the ES (Document Reference 6.4.22.3)) provides some details about these sites, as described within **Table 3-2**, below.

**Table 3-2 Watercrossings identified within the Crossing schedule that were not subject to field survey**

Crossing Matrix Reference number <sup>2</sup>	Crossing type	Considered constraint	Outcome
DTX-01	Trenchless	No	No further action required as trenchless crossing
DTX-02	Open-cut, running water	Potential	Surveyed during Phase 1 habitat survey – diversion of water (damming and over-pumping likely necessary)
DTX-03	Open-cut, standing water	Potential	Surveyed during Phase 1 habitat survey – diversion of water (damming and over-pumping likely necessary)
DTX-04	Open-cut, running water	Potential	Surveyed during Phase 1 habitat survey – diversion of water (damming and over-pumping likely necessary)
DTX-05	Trenchless	No	No further action required as trenchless crossing
DTX-06	Open-cut, running water	Potential	Follow-up survey required for detailed design as limited information only
DTX-07	Open-cut, seasonally dry ditch	No	No further action required as seasonally dry
DTX-08	Trenchless	No	No further action required as trenchless crossing
DTX-09	Open-cut, wet ditch	Potential	Surveyed during Phase 1 habitat survey – diversion

<sup>2</sup> The crossing matrix references all include a middle section of '1de' – for clarity on figures this has been shortened in this appendix, i.e. RVX-1de-01 = RVX-01.



Crossing Matrix Reference number <sup>2</sup>	Crossing type	Considered constraint	Outcome
			of water (damming and over-pumping likely necessary)
<b>DTX-10</b>	Open-cut, wet ditch	Potential	Surveyed during Phase 1 habitat survey – diversion of water (damming and over-pumping likely necessary)
<b>DTX-12</b>	Open-cut, seasonally dry ditch	No	No further action required as seasonally dry
<b>DTX-13</b>	Open-cut, ditch	Potential	Follow-up survey required; no access during Phase 1 habitat survey
<b>DTX-15</b>	Trenchless	No	No further action required as trenchless crossing
<b>DTX-16</b>	Open-cut, dry ditch	No	Surveyed during Phase 1 habitat survey – reported as dry ditch associated with tree line
<b>DTX-17</b>	Open-cut, ditch	Potential	Follow-up survey required for detailed design as limited information only
<b>STRX-07</b>	Trenchless	No	No further action required as trenchless crossing
<b>STRX-08</b>	Trenchless	No	No further action required as trenchless crossing
<b>STRX-11</b>	Open-cut, dry ditch	No	Surveyed during Phase 1 habitat survey – reported as dry ditch associated with hedgerow
<b>STRX-12</b>	Open-cut	Potential	Follow-up survey required for detailed design as limited information only
<b>DTX-20</b>	Open-cut, wet ditch	Potential	Surveyed during Phase 1 habitat survey – diversion of water (damming and

Crossing Matrix Reference number <sup>2</sup>	Crossing type	Considered constraint	Outcome
			over-pumping likely necessary)
STRX-13	Open-cut	Potential	Surveyed during Phase 1 habitat survey – diversion of water (damming and over-pumping likely necessary)
STRX-17	Trenchless	No	No further action required as trenchless crossing

- 3.3.2 Eight of the 22 crossings not surveyed will be crossed using trenchless crossing methodology, therefore there is no potential for impact to fish. Works should be compliant with guidance on preventing pollution from construction sites.
- 3.3.3 Ten of the 22 sites identified within [Appendix 4.1: Crossing schedule, Volume 4](#) of the ES (Document Reference 6.4.4.1) are described in other survey results (see [Appendix 22.3: Extended Phase 1 habitat survey report, Volume 4](#) of the ES (Document Reference: 6.4.22.3) and [Appendix 22.11: Badger, otter and water vole survey report, Volume 4](#) of the ES (Document Reference: 6.4.22.11) and include a range of wet, dry and seasonally dry features. The approach to mitigation described in **Section 3.2: Mitigation** has been judged to be appropriate in these locations. The exact approach will be determined, as for all crossings, during the detailed design phase of the Proposed Development.
- 3.3.4 Four of the 22 sites do not have sufficient information regarding their nature to draw a conclusion regarding level of effect. However, none of these features are expected (from satellite imagery, Ordnance Survey (OS) mapping etc.) to be out of keeping with other crossings described in **Section 4: Site survey results**, therefore the mitigation described in **Section 3.2: Mitigation** is likely to be appropriate. The exact approach will be determined, as for all crossings, during the detailed design phase of the Proposed Development.

## 4. Site survey results

### 4.1 Field Survey Summary

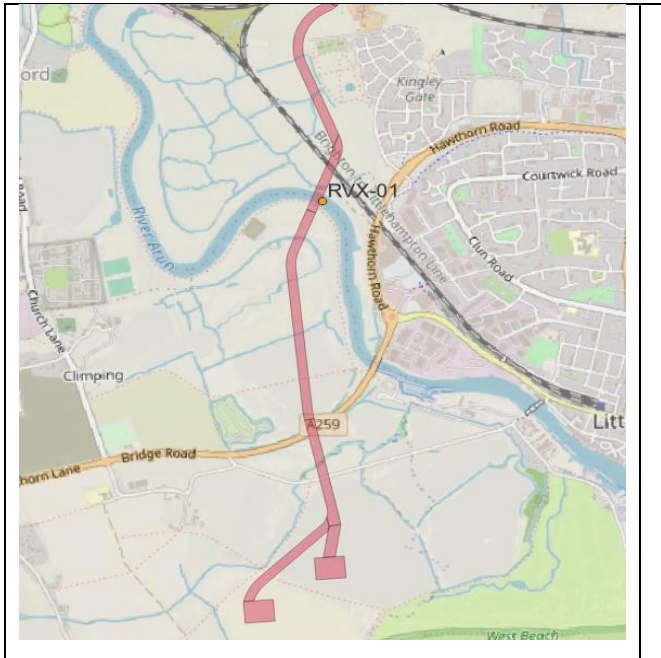
4.1.1 Field surveys have been undertaken at the locations described in **Table 4-1** and then in more detail in **Sections 4.2 to 4.19** (also see **Annex A**).

**Table 4-1 Watercrossings subject to field survey**

Crossing Matrix Reference number	Crossing type	Name
<b>RVX-01</b>	Trenchless	River Arun
<b>DTX-11</b>	Open cut	Calceto Lane
<b>DTX 14</b>	Open cut	The Vinery Industrial Estate
<b>STRX-01</b>	Trenchless	Arundel Road
<b>STRX-02</b>	Trenchless	Washington
<b>STRX-03</b>	Open cut	Chancton Farm Stream
<b>STRX-04</b>	Trenchless	Wiston Stream, Washington Road
<b>STRX-05</b>	Trenchless	Wiston Stream, Water Lane
<b>STRX-06</b>	Open cut	Guessgate Farm
<b>STRX-09</b>	Trenchless	Ashurst Stream
<b>STRX-10</b>	Open cut	Robertsfield Farm Stream
<b>RVX-02</b>	Trenchless	Bines Bridge
<b>STRX-14</b>	Open cut	Homelands Farm
<b>STRX-15</b>	Open cut	Partridge Green
<b>STRX-16</b>	Open cut	Partridge Green
<b>STRX-18</b>	Trenchless	Cowfold Stream
<b>STRX-19</b>	Open cut	Kings Lane
<b>STRX-20</b>	Trenchless	Downstream Kent Street

## 4.2 River Arun – RVX-01 - TQ 01359 03134

**Graphic 4-1 Onshore cable route crossing site RVX-01**



4.2.1 **Crossing method:** Trenchless.

4.2.2 **Fisheries surveys:** None.

4.2.3 **Fisheries habitat:** Crossing site RVX-01 is located in the transitional reach of the River Arun east of Ford approximately 2.7 km upstream of the mouth where it enters into the English Channel at Littlehampton. At high water the channel is approximately 58m in width. The depth of the channel in this reach varies from 2.0 to 4.5 m in depth (**Graphic 4-1**). The river bed substrate in this reach is classified as raised marine and coastal zone deposits comprising gravel (shingle), sand, silt and clay; commonly charged with organic debris (plant and shell) (McMillan & Powell, 1999). Riparian banks comprise maintain flood banks fronting arable fields.

4.2.4 **Fisheries appraisal:** Fish stocks comprise estuarine resident species for instance mullet, marine juvenile species for example sand smelt, marine seasonal for instance golden grey mullet, freshwater adventitious for example carp and migratory fish including European eel, lamprey species and sea trout. Composition, abundance and distribution of fish fauna with the transitional water will depend on season. Key species include migratory fish. Eel will be present year round at all life stages. River lamprey will migrate downstream to the estuary as sub adults from July through to September. This movement typically takes place during the hours of darkness but may vary according to water turbidity and season. Adults return upstream during the months of October to December. Sea trout migrate to sea as smolts from late April through until June. Adults move upstream into freshwater from late May through until late October.

4.2.5 Fish stocks in the lower River Arun may be sensitive to bank or bed disturbance. The cable will be passed under the riverbed using a trenchless crossing. This trenchless methodology will be set well back from the banks and at a depth that should limit disturbance. In order to negate any potential disturbance trenchlessly crossing the River Arun would be done between October and April. However, it is noted that in order to minimise risks of disturbance to wildfowl and those associated with working within a flood plain works between October and February will be restricted.

4.2.6 **Mitigation:** The methodology proposed for the cable crossing is trenchless and should not disturb the banks or bed of the water course. Works should be compliant with guidance on preventing pollution from construction sites, for example PPG5: Works and Maintenance in or Near Water (Environment Agency 2007). See **Table 5-1** for summary. Potential fisheries mitigation measures include:

N Water Quality (see **Table 3-1**)

**Graphic 4-2 River Arun Bathymetry at RVX-01 (Littlehampton Harbour Board, 2020)**





## 4.3 Calceto Lane – DTX-11 – TQ 03727 05193

**Graphic 4-3 Onshore cable crossing at site DTX-11**



4.3.1 **Crossing method:** Open cut trenching

4.3.2 **Fisheries surveys:** No data

4.3.3 **Fisheries habitat:** Due to land access restrictions, the watercourse was assessed approximately 150m downstream of the proposed crossing site from Public Rights of Way (PRoW). The site is the confluence of two unnamed channels. Flow rate was classed as slow during the survey visit.

4.3.4 Channel width was measured as circa 1m with a depth of < 0.2m. The channel was exposed to the sunlight (10% canopy cover) with encroaching riparian vegetation overhanging the channel with trailing branches that would provide cover for fish.

4.3.5 The substrate comprises alluvium, formed mainly of clay with accretions of silt and sand where flow was slack.

4.3.6 **Fisheries appraisal:** Fisheries habitat in the channel is considered suboptimal however species such as three-spined stickleback could inhabit this part of the river. The site is online and therefore potentially accessible by migratory species such as European eel. No fish were observed during the survey visit.

4.3.7 **Mitigation:** Temporary construction works during low flow period is considered to present a minimal risk to fish stocks. Due to the online nature of the water course however it is recommended that a watching brief is maintained during site preparation by the Environmental Clerks of Works equipped with hand net to relocate fish should they be present within any bunded reach. Temporary construction works should be compliant with good practice guidance for works and maintenance in or near water (Environment Agency, 2007). Mitigation recommended (see also **Table 5-2**) includes the following:

- A Erosion Control;
- B Channel Profile;

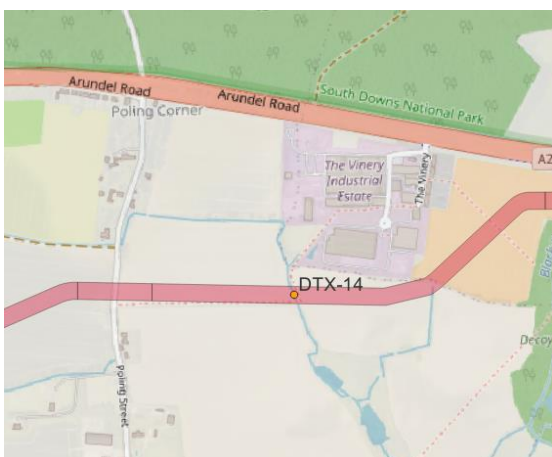
- C Spoil Storage;
- D Bank Reinstatement;
- L Fish Rescue; and
- M INNS.

#### Graphic 4-4 Downstream DTX-11



### 4.4 The Vinery Industrial Estate – DTX-14 - TQ 05052 05365

#### Graphic 4-5 Onshore cable crossing DTX-14



4.4.1 **Crossing method:** Open cut trenching

4.4.2 **Fisheries surveys:** No data

4.4.3 **Fisheries habitat:** The proposed crossing site at DTX-14 marks the confluence of two unnamed channels, with irrigated cropland either side of the river channel. The



channel is cut into weald clay, with bed substrate predominantly clay with superficial silt deposits. Channel width was measured as circa 1m with a depth of < 0.1m.

- 4.4.4 The stream was exposed (<1% canopy cover) with emergent macrophytes growing in the middle of the channel. Water quality in the channel feeding in from the east appeared poor; with algae coverage and macroinvertebrates suggestive of poor water quality (**Graphic 4-6**).
- 4.4.5 **Fisheries appraisal:** Fish fauna at site DTX-14 are considered low or absent and the potential risk to fish resulting from an open cut cable crossing is considered negligible.
- 4.4.6 **Mitigation:** Whilst there is considered to be no risk to fish stocks at this proposed crossing site, it is recommended that due to the online nature of the water course, construction works should be compliant with good practice guidance for works and maintenance in or near water (Environment Agency, 2007) (also see **Table 5-2**). Potential mitigation measures include:
  - A Erosion Control;
  - B Channel Profile;
  - C Spoil Storage;
  - D Bank Reinstatement; and
  - N Water Quality.

**Graphic 4-6 Unnamed channel feeding into site DTX-14**



## Graphic 4-7 Plant growth in stream (macrophytes and algae)



## 4.5 Arundel Road – STRX-01 - TQ 05722 05655

### Graphic 4-8 Onshore cable crossing site STRX-01



4.5.1 **Crossing method:** Trenchless

4.5.2 **Fisheries surveys:** No data

4.5.3 **Fisheries habitat:** The stream at site STRX-01 was predominantly in shade (80% canopy cover) with encroaching riparian vegetation overhanging the channel with trailing branches that would provide cover for fish. Channel width was measured as circa 1m with a depth of < 0.2m.

4.5.4 The bed comprised superficial deposits of fines with occasional gravel/cobble.

4.5.5 The site was located downstream of a riffle (**Graphic 4-9**) however the channel was dominated by slower flowing glides.

4.5.6 The site was located circa 100m downstream of a culvert under the A27 (Arundel Road) the cill of which was contiguous with the stream bed and in itself would not directly inhibit the free passage of fish.



4.5.7 **Fisheries appraisal:** The habitat within the stream was considered suboptimal for minor fish species for example, stickleback. The site is online and therefore potentially accessible by migratory species such as European eel. No fish were observed during the survey visit.

4.5.8 **Mitigation:** The methodology proposed for the cable crossing is a trenchless and should not disturb the banks or bed of the water course. Temporary construction works should be in-line with guidance on preventing pollution from construction sites in or Near Water (Environment Agency, 2007) (also see **Table 5-2**). Potential mitigation measures include:

J Riparian Habitat.

**Graphic 4-9 Riffle upstream of site STRX-01**

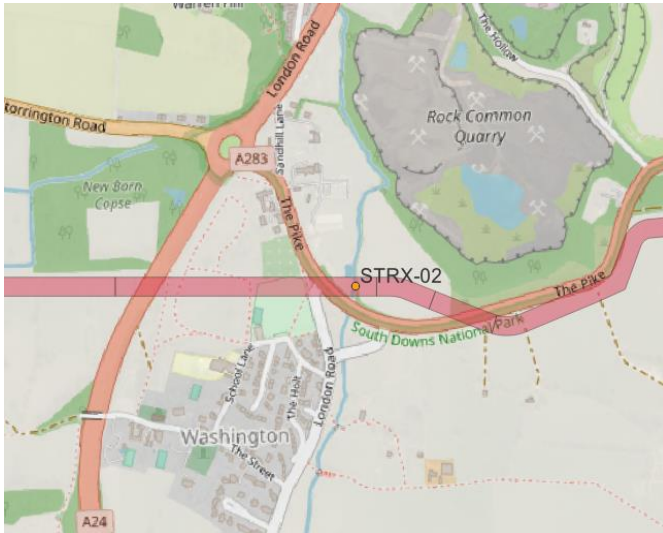


**Graphic 4-10 Close-up of site STRX-01**



## 4.6 Washington – STRX-02 – TQ 12298 13104

Graphic 4-11 Onshore cable crossing route STRX-02



4.6.1 **Crossing method:** Trenchless.

4.6.2 **Fisheries surveys:** No data.

4.6.3 **Fisheries habitat:** Water levels within the watercourse were high on the day of survey and the water turbid, concealing the bed substrate. The watercourse drains a small catchment area to the south of Washington, West Sussex. The proposed crossing site lies approximately 500m from the source and is situated immediately down stream of a culvert that passes under the A283 road. The coarse screens preventing access to the culvert were heavily blinded. The ditch drains into the Honeybridge Stream, a tributary of the western arm of the River Adur with a confluence north-west of Bines Green.

4.6.4 The wetted channel width was approximately 1.5m with a depth of  $\leq 0.2$ m. The surface bed substrate was not determined as there was no safe access into the channel. The flow in the reach below the road culvert was slack (shallow). Where there was no tree/shrub canopy the channel was heavily choked with emergent macrophytes. Under tree canopy there there was significant overhang of riparian vegetation into the channel.

4.6.5 **Fisheries appraisal:** Flow in the channel is ephemeral. Whilst the lower reaches of the watercourse near the confluence with the western arm of the River Adur may support coarse fish and migratory species such as European eel and sea trout, the flows width and depth of the wetted channel profile at the proposed cable crossing are unsuitable to support significant populations of fish. Therefore the impact on fish stocks from the proposed works is considered negligible.

4.6.6 **Mitigation:** The methodology proposed for the cable crossing is trenchless and should not disturb the banks or bed of the water course. Works should be compliant with guidance on preventing pollution from construction sites, for



example PPG5: Works and Maintenance in or Near Water (Environment Agency 2007). See **Table 5-1** for summary. Potential mitigation measures include:

N Water Quality

**Graphic 4-12 Heavily fouled coarse screening on the downstream entrance to the A283 road culvert at Washington, West Sussex immediately upstream of the proposed crossing site STRX-02**

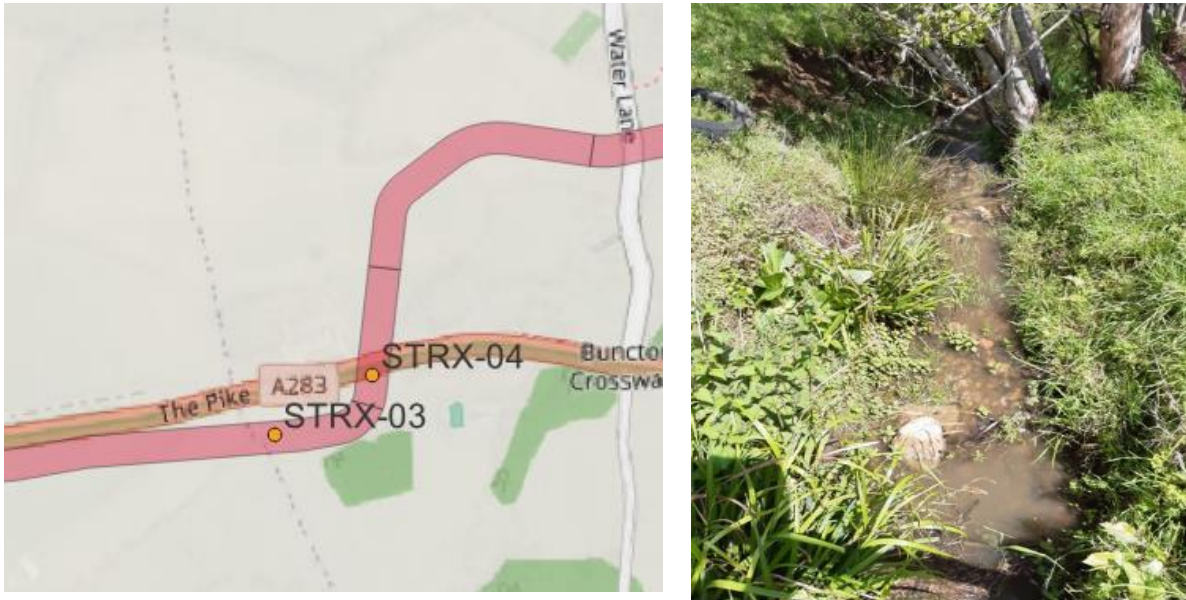


**Graphic 4-13 Ditch draining into Washington stream immediately upstream of proposed cable crossing (dry at time of visit)**



## 4.7 Chancton Farm stream – STRX-03 - TQ 13955 13425

Graphic 4-14 Onshore cable crossing site STRX-03



4.7.1 **Crossing method:** Open cut trenching.

4.7.2 **Fisheries surveys:** No data.

4.7.3 **Fisheries habitat:** The proposed crossing site STRX-03 is located within the upper, ephemeral reaches of the Wiston Stream catchment, approximately 0.9km from the source, draining a small catchment south of the A283. Surface substrate comprises gravels, sand and clay with lenses of silt, clay or peat and organic material. Water levels within the water course were high on the day of the survey and the water was turbid. The wetted channel width was measured at 0.9m, with a central channel depth averaging 0.1m. The flow was slack (shallow) with cascades or in river obstructions that included tree roots, debris dams and through culverts under farm tracks.

4.7.4 **Fisheries appraisal:** Fish are unlikely to be resident at site STRX-03 and the potential risk to fish resulting from an open-cut trenching cable crossing is considered negligible.

4.7.5 **Mitigation:** Whilst there is considered to be no risk to fish stocks at this proposed crossing site it is recommended that, due to the online nature of the watercourse, construction works should be compliant with good practice guidance for works and maintenance in or near water (Environment Agency 2007) (also see **Table 5-1**). Potential mitigation measures include:

N Water Quality.



**Graphic 4-15 Chancton Farm stream**



**Graphic 4-16 Debris dams Chancton Farm stream**





**Graphic 4-17 Culvert Chancton Farm stream**



**Graphic 4-18 Riparian vegetation Chancton Farm stream**



## 4.8 Wiston Stream, Washington Road – STRX-04 - TQ 14124 13514

Graphic 4-19 Onshore cable crossing route STRX-04



4.8.1 **Crossing method:** Trenchless.

4.8.2 **Fisheries surveys:** No data.

4.8.3 **Fisheries habitat:** The proposed crossing site STRX-04 is located within the upper, ephemeral reaches of the Wiston Stream catchment, approximately 1.3km from the source, draining a small catchment south of the A283. The site was located immediately adjacent to the A283 from which it received run off. The channel runs parallel to the road for approximately 200m before passing through a culvert under the road where it forms the head waters of the more permanent Wiston Stream. Surface substrate comprises clay with lenses of silt and organic material. Water levels within the water course were high on the day of survey and the water was turbid. The wetted channel width was measured at 1.1m, with a central channel depth averaging 0.05m. The flow was slack (shallow).

4.8.4 **Fisheries appraisal:** Fish fauna at site STRX-04 are considered low or absent and the potential risk to fish resulting from a trenchless cable crossing is considered negligible.

4.8.5 **Mitigation:** The methodology proposed for the cable crossing is trenchless and should not disturb the banks or bed of the water course. Works should be compliant with guidance on preventing pollution from construction sites, for example PPG5: Works and Maintenance in or Near Water (Environment Agency 2007). See **Table 5-1** for summary. Potential mitigation measures include:

N Water Quality.



**Graphic 4-20 Riparian vegetation, Washington road**

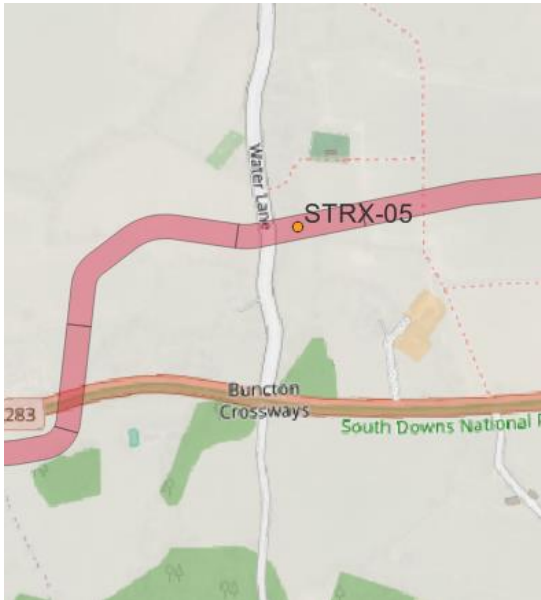


**Graphic 4-21 Road culvert, Washington road**



## 4.9 Wiston Stream – STRX-05 - TQ 14434 13726

Graphic 4-22 Onshore cable crossing route STRX-05



4.9.1 **Crossing method:** Trenchless

4.9.2 **Fisheries surveys:** No fish survey data is available for the Wiston stream however two historic survey stations are located on the Honeybridge Stream, upstream and downstream of Daylands Farm approximately 4km downstream of the proposed crossing site (TQ1571916393 and TQ1602416788 respectively). Fish stocks comprised brown / sea trout, chub, dace, European eel, roach and stone loach.

4.9.3 **Fisheries habitat:** The crossing point lies in the headwaters of the Wiston Stream, due south of Wiston, and receives water from a small catchment that lies predominantly to the south of the Washington Road (A283). Much of the water course upstream to the south of the A283 is ephemeral. The channel is cut into superficial substrate comprising silt, clay and gravel. The stream has its confluence with the Honeybridge Stream approximately 1.9km to the north, subsequently draining into the western arm of the River Adur approximately 8km to the north-east, upstream of Bines Bridge. There are at least two in channel obstructions along the course of the Honeybridge Stream that may restrict the free movement of fish between the proposed crossing point and the confluence with the western River Adur.

4.9.4 The wetted channel at the proposed crossing point is approximately 1.5m in width with a mid-channel depth of approximately 0.30m. The flow at the time of the site visit was slack (shallow). Adjacent land on both banks was permanent grassland (pasture). The banks were treelined providing 70% canopy cover (**Graphic 4-15**). Tree root systems extended into the channel providing cover along with allochthonous material comprising branches and log.



- 4.9.5 **Fisheries appraisal:** The Wiston Stream contains superficial deposits of gravel. During high flow years brown trout / sea trout have been observed spawning within the channel upon the gravels from late October through until early January. Kelts (spawned adults) may frequent the stream from November through until January before returning downstream. Delaying the downstream migration of kelts may reduce their chance of survival. Eggs may remain buried within the gravels until late February – March. During this period disturbance or smothering by silts will result in high levels of mortality. Juvenile brown trout may frequent the stream year round.
- 4.9.6 Habitat for coarse fish species at the proposed onshore cable crossing location is considered sub-optimal however with no barriers between the surveyed reach and the Honeybridge Stream coarse fish may be present in low abundance. Rheophilic species such as chub may spawn on gravels within the surveyed reach where water depths are suitable ( $\sim \geq 0.2\text{m}$ ) throughout June and July.
- 4.9.7 **Mitigation:** The methodology proposed for the cable crossing is trenchless and should not disturb the banks or bed of the water course. Works should be compliant with guidance on preventing pollution from construction sites, for example PPG5: Works and Maintenance in or Near Water (Environment Agency 2007) (also see **Table 5-1**). Potential mitigation measures include:
- N Water Quality.

**Graphic 4-23 Adjacent grassland and tree-lined banks providing ~70% canopy cover at site STRX-05**

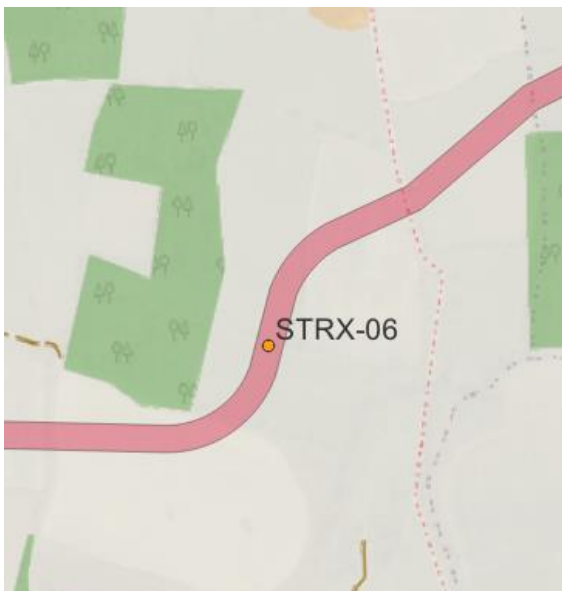


**Graphic 4-24** Tree root systems extended into the channel providing fish cover / habitat at site STRX-05



#### 4.10 Guessgate Farm – STRX-06 – TQ 15845 13930

**Graphic 4-25** Onshore cable crossing route STRX-06



4.10.1 **Crossing method:** Open cut trenching

4.10.2 **Fisheries surveys:** No data

4.10.3 **Fisheries habitat:** The proposed crossing site STRX-06 is located within the upper, ephemeral reaches of a small tributary of the western River Adur, lying

approximately 0.4 km from the source. The site lay approximately 100m upstream of a perched culvert that ran under a farm track crossing, which would have impeded any upstream fish migration. The surface substrate comprises Weald clay with lenses of silt and organic material. Water levels within the watercourse were high on the day of survey, and the water was turbid. The wetted channel width was measured at 1.1m, with a central channel depth averaging 0.15m. The flow was slack (shallow). Tree root systems extended into the channel providing potential cover along with allochthonous branches and logs that formed debris dams. The site was shaded by tree canopy (100%).

- 4.10.4 **Fisheries appraisal:** The ephemeral nature of the watercourse and its location upstream of a perched culvert suggest any fish within the reach would be in low abundance. Fish habitat was considered poor, there was no salmonid spawning habitat present. If present, species may include minor stream species, for example non-migratory three spined sticklebacks. However, fish are unlikely to be resident in this reach and the impact to fish is considered negligible.
- 4.10.5 **Mitigation:** Whilst there is considered to be no risk to fish stocks at this proposed crossing site it is recommended that due to the online nature of the watercourse, and its location a short distance upstream of a permanent watercourse, construction works should be compliant with good practice guidance for works and maintenance in or near water (also see **Table 5-1**). Potential mitigation measures include:

N Water Quality

#### Graphic 4-26 Debris dam Guessgate Farm stream





**Graphic 4-27 Perched culvert Guessgate Farm stream**



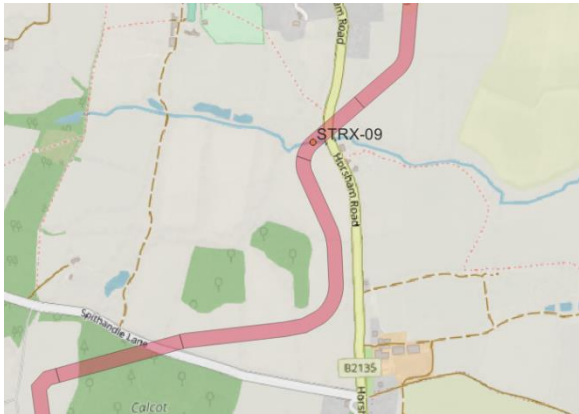
**Graphic 4-28 Permanently wetted channel downstream of proposed cable crossing site**





## 4.11 Ashurst Stream – STRX-09 – TQ 17757 15679

### Graphic 4-29 Onshore cable crossing STRX-09



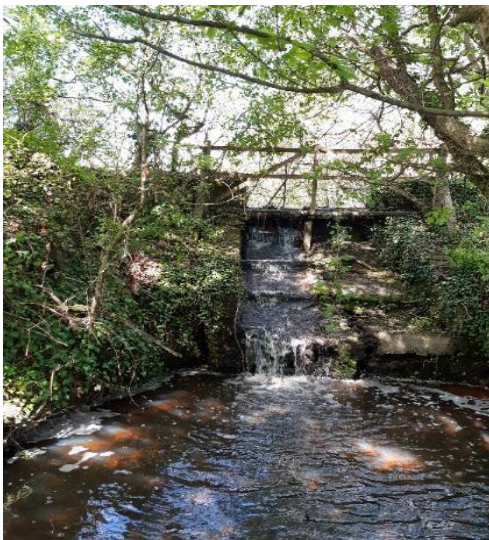
- 4.11.1 **Crossing method:** Trenchless.
- 4.11.2 **Fisheries surveys:** No data.
- 4.11.3 **Fisheries habitat:** Proposed crossing site STRX-09, located 0.5 km south of Ashurst is situated on a tributary of the tidal River Adur. The tributary discharges to the River Adur through a culvert and tidal flap that would inhibit the free passage of migratory fish.
- 4.11.4 The site lies downstream from a series of online ponds (i.e. ponds located on a stream) (TQ 17243 15694). These ponds are impounded by dams and sluice structures the impede the free passage of fish (**Graphic 4-22** and **Graphic 4-23**). The onshore cable crossing site lies adjacent to two offline ponds. The status of fish stocks within these ponds is unknown although it appears they are not hydraulically connected to the watercourse. Stream continuity is disrupted by a series of small weirs (7), debris dams and a perched culvert (**Graphic 4-27**) where the stream flows under a farm track, all of which would inhibit the free passage of fish.
- 4.11.5 The stream bed comprises superficial sedimentary deposits (alluvium) fluvial in origin with. Clay is predominant with deposits of silt and sand. No submergent or emergent macrophytes were recorded at the point of the proposed crossing that would have provide instream cover. Macrophyte growth was inhibited by shaded from the tree canopy which was assessed at circa 90%. Upstream of the track emergent macrophytes were prevalent and chocked the channel for a short distance.
- 4.11.6 The channel width was measured at circa 1.5m. Average depth was <0.2m. Flow was slack.
- 4.11.7 **Fisheries appraisal:** There was limited instream habitat for fish at the proposed crossing and fish habitat was considered poor.
- 4.11.8 Upstream of the crossing site the tree canopy reduced, and potential fish habitat improved however the in-channel barriers and shallow depth meant that fisheries

within this reach is assessed as poor. Fish fauna is likely to be abundant in the adjacent and online ponds which afford good fishery habitat (although survey data for these waters is not available). A fisheries management plan would be required should works impinge upon these sites.

4.11.9 **Mitigation:** As the wetted channel increase downstream of the proposed crossing site, the carrying capacity of the stream for fish is likely to improve and construction works should be compliant with good practice guidance for works and maintenance in or near water (Environment Agency 2007). There is however no significant fisheries interest within the stream at the proposed crossing point (also see **Table 5-1**). Potential mitigation measures include:

N Water Quality.

**Graphic 4-30 Sluice outlet to lakes upstream of STRX-09**



**Graphic 4-31 Lakes adjacent to proposed crossing point STRX-09**





**Graphic 4-32 Reach upstream of crossing point STRX-09**



**Graphic 4-33 Small weir Ashurst stream**

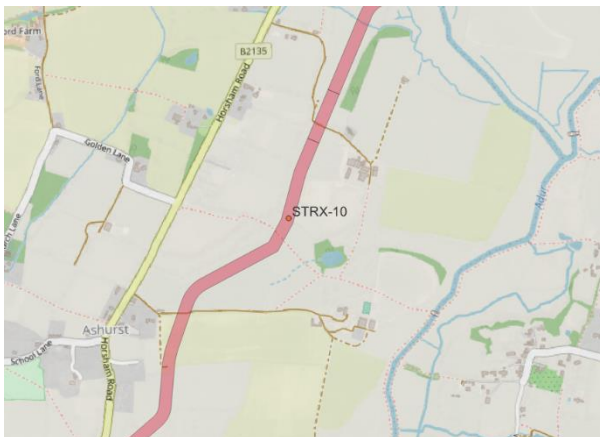


### Graphic 4-34 Perched culvert STRX-09



## 4.12 Robertsfield Farm Stream – STRX-10 – TQ 18494 16487

### Graphic 4-35 Onshore cable crossing STRX-10



4.12.1 **Crossing method:** Open cut trenching

4.12.2 **Fisheries surveys:** No data

4.12.3 **Fisheries habitat:** Proposed crossing site STRX-10 lies in the headwaters of a small unnamed tributary of the River Adur with its confluence in the tidal reaches. The tributary discharges to the River Adur through a culvert and tidal flap that would inhibit the free passage of migratory fish into the lower reaches of the channel. The site lies approximately 0.3 km from the origin of the drainage channel and is ephemeral in nature. The upper reaches of the channel were dry on the day of the site visit, lower reaches had a slight flow that percolated through a channel strewn with allochthonous material.



- 4.12.4 The site was located upstream of a shallow, small online pond (TQ 18493 16498).
- 4.12.5 The channel was approximately 0.9m in width, with standing shallow water to a depth of 0.03m. The channel was heavily shaded by tree and a herb layer canopy.
- 4.12.6 **Fisheries appraisal:** The habitat of both the channel and pond as not conducive to fish and holds no value for ichthyofauna in its current state. Fish are unlikely to be resident in this reach and the impact to fish fauna is considered negligible.
- 4.12.7 **Mitigation:** No fisheries mitigation proposed.

#### Graphic 4-36 Lower reach Robertsfield Farm stream



#### Graphic 4-37 Pond, Lower reach Robertsfield Farm stream

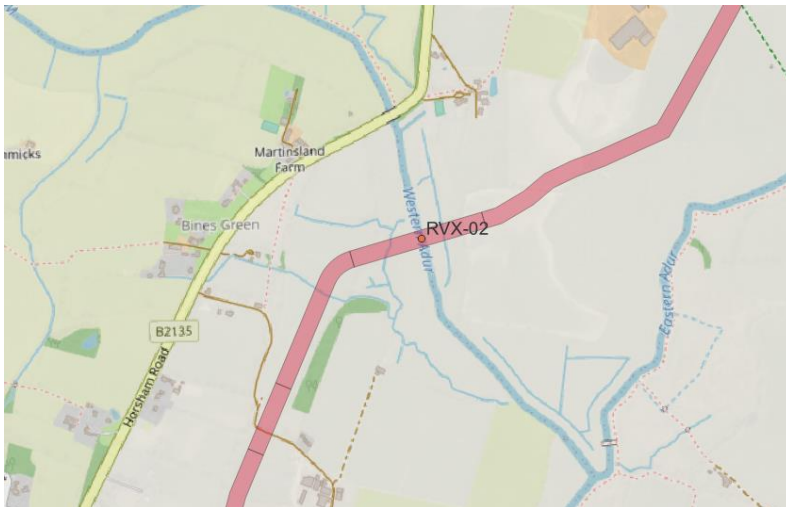


### Graphic 4-38 Upper reach Robertsfield Farm stream



## 4.13 Bines Bridge – RVX-02 – TQ 18956 17551

### Graphic 4-39 Onshore cable crossing RVX-02



#### 4.13.1 **Crossing method:** Trenchless

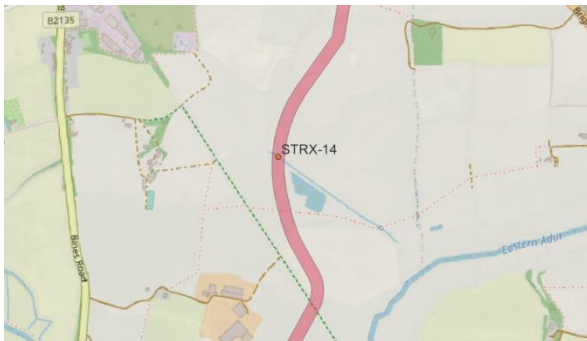
4.13.2 **Fisheries surveys:** Fish populations within the Western River Adur adjacent to Bines Bridge are described by a fish fauna sampling station at Lock Bridge approximately 2.2km upstream of Bines Bridge (Rudd & Swift, 2015). Species recorded within the Western Adur included chub, dace, common bream, gudgeon, roach, rudd, perch, pike and European eel. Migratory species including both sea trout (Fetter, 2011) and European eel frequent the river and fish passes have been installed to facilitate the free movement of these fish.

4.13.3 **Fish habitat appraisal:** The site is located at the extent of tidal influence of the River Adur. The average channel width throughout this reach is approximately 11m, with depths circa 2.5m, although levels are tidally influenced.

- 4.13.4 The channel receives little shading from riparian tree or the herb layer. Emergent macrophytes line both banks providing refuge for juvenile life stages of fish and minor species and foraging for adult lifestsage.
- 4.13.5 The bed substrate comprise alluvium comprising clay, silt and sand with lenses of gravel.
- 4.13.6 **Fisheries appraisal:** The reach is frequented by migratory fish and coarse fish that support a locally important fishery. The value of fish stocks within the reach is considered high for the presence of species of conservation importance, (e.g., European eel and sea trout) and because of the composition and abundance of the standing stock.
- 4.13.7 **Mitigation:** The methodology proposed for the onshore cable crossing is a trenchless crossing methodology that should not disturb the banks or bed of the water course. Temporary construction works should be compliant with guidance on preventing pollution from construction sites, e.g. PPG5: Works and Maintenance in or Near Water (Environment Agency 2007) (also see **Table 5-1**). Potential mitigation measures include:
- N Water Quality.

## 4.14 Homelands Farm – STRX-14 – TQ 19645 18345

**Graphic 4-40 Onshore cable crossing at site STRX-14**



- 4.14.1 **Crossing method:** Open cut trenching
- 4.14.2 **Fisheries surveys:** There is no data in the locale of the site crossing however the stream drains into the Eastern Arm of the River Adur below Shermanbury for which survey data is provided for a single survey station (Environment Agency: National Fish Population Database (NFPD) Site ID: 64743 – Nymans farm, Shermanbury). Species present include: gudgeon, roach, common bream, pike, chub, rudd, dace, European eel and perch.
- 4.14.3 **Fisheries habitat appraisal:** The site visit occurred during a period of high flows when flows in the channel was classified as 'runs rapid'.
- 4.14.4 The channel forms a short tributary of the eastern arm of the River Adur into which it drains via a culvert under the flood bank and tidal flap (TQ 20090 17928). The tidal flap would prevent the free passage of fish between the two channels.

- 4.14.5 The channel was approximately 5m wide and in excess of one metre deep. The channel drains pastureland on both banks with little riparian habitat. A large flight pond lies adjacent to the channel on the right bank that would connect with the channel during periods of flooding.
- 4.14.6 The channel was cut into alluvium over a bed rock of weald clay and the bed was comprised predominantly of clay and silt.
- 4.14.7 There is an abundance of emergent macrophytes within the channel.
- 4.14.8 **Fisheries appraisal:** The channel affords good habitat for coarse fish and European eel the composition of which is likely to reflect that found within the eastern Adur at Nymans Farm.
- 4.14.9 European eel, a critically endangered migratory species may frequent the water course.
- 4.14.10 **Mitigation:** It is proposed to lay the cable across the channel using an open cut trenching method. The following mitigation is recommended (also see **Table 5-1**):
- A Erosion Control;
  - B Channel Profile;
  - C Spoil Storage;
  - D Bank Reinstatement;
  - E Works Timing;
  - F Works Duration;
  - G Pump Screening;
  - H Over-pumping;
  - I De-watering;
  - L Fish Rescue;
  - M INNS; and
  - N Water Quality.



**Graphic 4-41 Culvert and tidal flap at confluence with River Adur**



**Graphic 4-42 Upstream of proposed crossing site STRX-14**

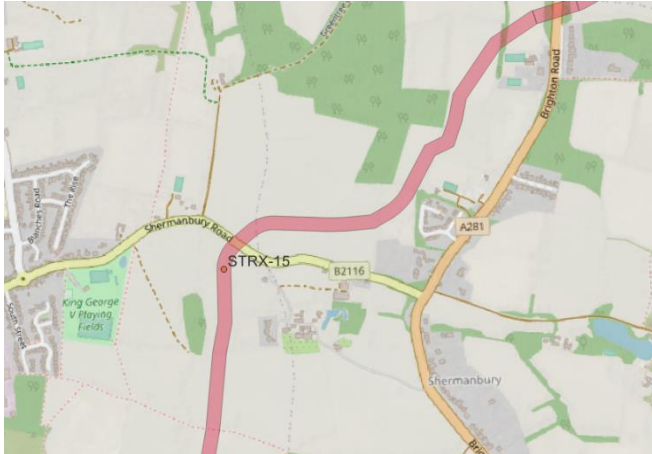


**Graphic 4-43 Site of proposed cable crossing STRX-14 and Homelands Farm**



## 4.15 Partridge Green – STRX-15 - TQ 19925 19296

### Graphic 4-44 Onshore cable crossing at site STRX-15



- 4.15.1 **Crossing method:** Open cut trenching.
- 4.15.2 **Access:** Access to the proposed crossing location was restricted as it fell on private land where no access was available. The channel approximately 100m upstream of the proposed crossing was assessed. This survey point is the same as that used to assess STRX-16.
- 4.15.3 **Fisheries surveys:** There is no data in the locale of the site crossing however the stream drains into the Eastern Arm of the River Adur below Shermanbury for which survey data is provided for a single survey station (EA: NFPD Site ID: 64743 – Nymans farm, Shermanbury). Species present include: gudgeon, roach, common bream, pike, chub, rudd, dace, European eel and perch.
- 4.15.4 **Fisheries habitat appraisal:** The site lies in the head waters of short tributary of the eastern arm of the River Adur, situated immediately south of the B2116 Shermanbury Road. The channel passes under the road via a culvert upstream of the crossing site. The water course drains into the River Adur via a culvert under the flood bank and tidal flap (TQ 20090 17928). The tidal flap inhibits the free passage of fish between the two channels.
- 4.15.5 The channel was approximately 2m wide and less than one metre in depth. The channel drains pastureland on both banks and to the north, as well as receiving runoff from the B2116 road.
- 4.15.6 The upper reaches of the water course cuts through Weald Clay and gravel was observed to form discontinuous superficial deposits along the reach.
- 4.15.7 Immediately downstream the channel was heavily shaded by both tree canopy and riparian growth. No emergent or submergent macrophytes were observed.

- 4.15.8 **Fisheries appraisal:** Fish populations are likely to comprise of predominantly juvenile coarse fish species and of similar composition to that described for the main channel of the River Adur. Under low flows however, depths within the channel are unlikely to support adult fish which may drop downstream into the deeper slower flowing reaches. The gravel deposits within the upper reaches of the channel however may afford spawning habitat to a number of species including chub and dace.
- 4.15.9 **Mitigation:** It is proposed to lay the cable across the channel using an open cut trenching method. The following mitigation is recommended (also see **Table 5-1**):
- A Erosion Control;
  - B Channel Profile;
  - C Spoil Storage;
  - D Bank Reinstatement;
  - E Works Timing;
  - F Works Duration;
  - G Pump Screening;
  - H Over-pumping;
  - I De-watering;
  - L Fish Rescue;
  - M INNS; and
  - N Water Quality.

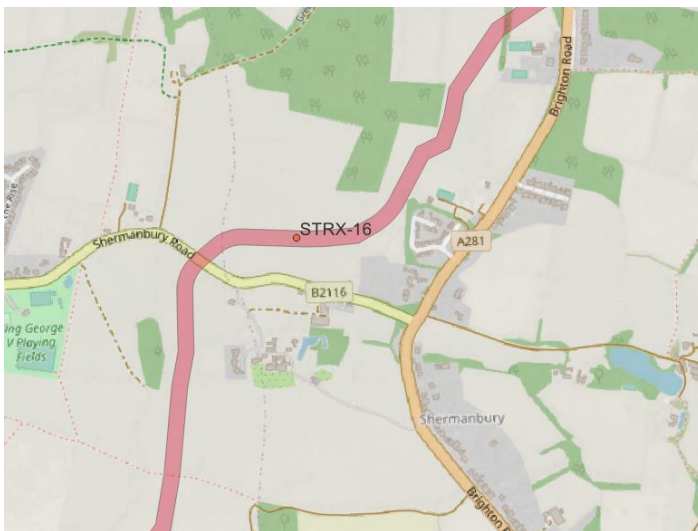


**Graphic 4-45 Road culvert upstream of proposed cable crossing site STRX-15**



## 4.16 Partridge Green – STRX-16 - TQ 20204 19427

**Graphic 4-46 Cable crossing at site STRX-16**



4.16.1 **Crossing method:** Open cut trenching.



- 4.16.2 **Access:** Access to the proposed crossing location was restricted as it fell on private land. The channel approximately 100m downstream of the proposed crossing was assessed. This survey point is the same that was used to assess STRX-15.
- 4.16.3 **Fisheries surveys:** There is no data in the locale of the site crossing however the stream drains into the eastern arm of the River Adur below Shermanbury for which survey data is provided for a single survey station (Environment Agency: NFPD Site ID: 64743 – Nymans farm, Shermanbury). Species present include: gudgeon, roach, common bream, pike, chub, rudd, dace, European eel and perch.
- 4.16.4 **Fisheries habitat appraisal:** The site lies in the head waters of short tributary of the eastern arm of the River Adur, situated immediately north of the B2116 Shermanbury Road. The channel passes under the road via a culvert downstream of the crossing site. The watercourse drains into the River Adur via a culvert under the flood bank and tidal flap (TQ 20090 17928). The tidal flap inhibits the free passage of fish between the two channels.
- 4.16.5 The channel was approximately 2m wide and less than one metre in depth. The channel drains pastureland on both banks and to the north, as well as receiving run-off from the B2116 road.
- 4.16.6 The upper reaches of the watercourse cuts through weald clay and gravel was observed to form discontinuous superficial deposits along the reach.
- 4.16.7 Immediately downstream the channel was heavily shaded by both tree canopy and riparian growth. No emergent or submergent macrophytes were observed.
- 4.16.8 **Fisheries appraisal:** Fish populations are likely to comprise of predominantly juvenile coarse fish species and of similar composition to that described for the main channel of the River Adur. Under low flows however depths within the channel are unlikely to support adult fish which may drop downstream into the deeper slower flowing reaches. The gravel deposits within the upper reaches of the channel however may afford spawning habitat to a number of species including chub and dace.
- 4.16.9 **Mitigation:** It is proposed to lay the cable across the channel using an open cut trenching method. The following mitigation has been included as the basis of the assessment in **Chapter 22.2: Terrestrial ecology and nature conservation, Volume 2** (Document Reference: 6.2.22) of the ES (also see **Table 5-1** for a summary):
- A Erosion Control;
  - B Channel Profile;
  - C Spoil Storage;
  - D Bank Reinstatement;
  - E Works Timing;
  - F Works Duration;
  - G Pump Screening;
  - H Over-pumping;

- I De-watering;
- L Fish Rescue;
- M INNS; and
- N Water Quality.

## 4.17 Cowfold Stream – STRX-18 – TQ 22152 21010

**Graphic 4-47 Onshore cable crossing site STRX-18**



- 4.17.1 **Crossing method:** Trenchless.
- 4.17.2 **Fisheries surveys:** No data.
- 4.17.3 **Fish habitat:** Crossing site STRX-18 is situated on private land. The fisheries habitat within the reach of the water course was assessed from PRow upstream and downstream of the proposed crossing site.
- 4.17.4 STRX-18 is situated on the Cowfold Stream a tributary to the eastern arm of the River Adur which it joins to the southeast of Shermanbury (TQ 21268 18646) approximately 3.5km downstream.
- 4.17.5 The watercourse averages five meters in width and averages 0.7m in depth. The substrate comprises alluvium, formed mainly of clay with accretions of silt and sand where flow was slack.
- 4.17.6 The banks were tree lined and shade varied from 50 – 80%. The water was turbid during the site visit which hampered clear views of the bed however no submergent or emergent macrophytes were observed. Cover was provided in the margins by over hanging riparian vegetation and trailing tree branches.
- 4.17.7 The reach was bounded by two brick culverts under farm tracks. There culverts were however clear span with no discontinuity to the bed and they did not appear to impede fish passage. Debris dams with a high degree of porosity were observed through the reach which provided fish refuge.

- 4.17.8 **Fisheries appraisal:** The fisheries habitat is suitable for a range of course fish species and is likely to be similar in composition to the stocks recorded in the eastern arm of the River Adur as described by survey stations at Nymans Farm, Shermanbury (TQ 21122 18317) and Wineham bridge (TQ 23442 19643). Species are likely to comprise gudgeon, roach, common bream, pike, chub, dace, and European eel. The fishery is considered moderate.
- 4.17.9 **Mitigation:** The methodology proposed for the cable crossing is trenchless and should not disturb the banks or bed of the water course. Temporary construction works should be compliant with guidance on preventing pollution from construction sites e.g. PPG5: Works and Maintenance in or Near Water (Environment Agency 2007) (also see **Table 5-1**). Potential mitigation measures include:
- N Water Quality.

**Graphic 4-48 Farm crossing culvert upstream of site STRX-18**



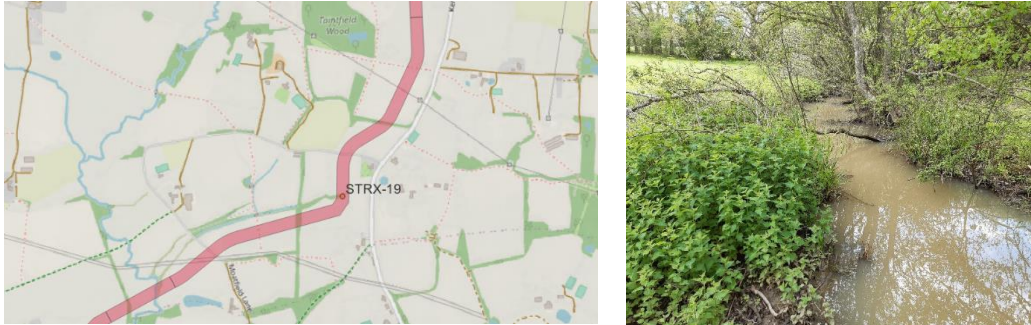
**Graphic 4-49 Upstream of site STRX-18**





## 4.18 Kings Lane – STRX-19 – TQ 22626 21461

### Graphic 4-50 Onshore cable crossing at site STRX-19



- 4.18.1 **Crossing method:** Open cut trenching.
- 4.18.2 **Fisheries surveys:** No data.
- 4.18.3 **Fisheries habitat appraisal:** The proposed crossing site lies on a small, ephemeral tributary of the Cowfold Stream. Channel width varied between circa 1m to 2.5m with an average depth of <0.4m. The channel is cut into weald clay and the bed substrate comprised silts, fines & clays.
- 4.18.4 The channel was shaded by both tree canopy and riparian vegetation (circa 50%) both with trailing branches that would have provide cover for fish. There were no submergent or emergent macrophytes observed within the channel.
- 4.18.5 There were numerous tree roots intruding into the channel and debris dams along the course of the channel, that would have impeded fish passage during average and low flow conditions.
- 4.18.6 **Fisheries appraisal:** Fish are unlikely to be resident in this reach and the impact to fish is considered negligible.
- 4.18.7 **Mitigation:** The following mitigation is therefore recommended (also see **Table 5-1**):
- N Water Quality.

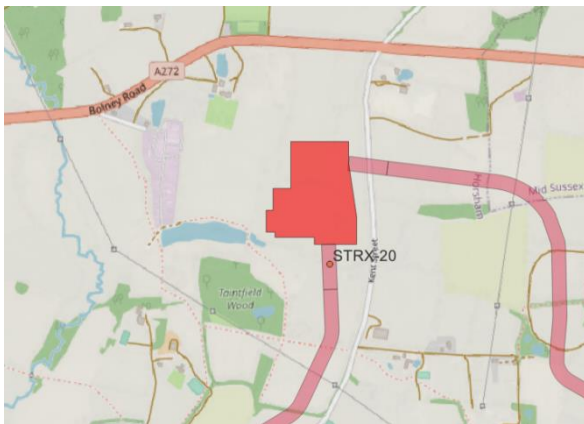


## Graphic 4-51 Tree roots obstructing flow upstream of crossing point STRX-19



## 4.19 Downstream Kent Street – STRX-20 – TQ 23021 22141

### Graphic 4-52 Onshore cable crossing at site STRX-20



- 4.19.1 **Crossing method:** Trenchless.
- 4.19.2 **Fisheries surveys:** No data.
- 4.19.3 **Fisheries habitat appraisal:** The proposed crossing site lies on a tributary of the Cowfold Stream, upstream of a large online lake. The reach is ephemeral although water levels were high at the time of the visit following a period of rain.
- 4.19.4 Channel width was recorded as circa 4m with an average depth of < 0.5m. The channel is cut into Weald Clay and the bed substrate comprised clay with superficial silt deposits.
- 4.19.5 The channel was heavily shaded by both tree canopy and riparian vegetation both with trailing branches that would have provided cover for fish. Downstream the

channel became more open (less shading) and emergent macrophytes were present within the channel.

- 4.19.6 There were numerous debris dams along the course of the channel, that would have impeded fish passage during average and low flow conditions. These debris dams resulted in the channel becoming impounded and flows breaking the banks at various points along the channel.
- 4.19.7 Upstream the channel passed under a road culvert (TQ 23170 22132) above which the channel narrowed considerably. Downstream the stream flows into an ornamental lake (TQ 22819 22230) via two buried pipes. The channel immediately upstream of the lake was impounded by the structures controlling the inflow to the lake and the channel widened and would have likely formed a permanently wetted area.
- 4.19.8 **Fisheries appraisal:** The channel is likely to be frequented by minor species such as three-spined sticklebacks, and occasionally when water depths are sufficient in periods of high flow, by adult coarse fish that are able to negotiate the downstream lake inlet pipes and migrate upstream. As flow however recedes in the summer months these larger specimens are likely to drop back downstream or become stranded.
- 4.19.9 Fisheries habitat in the reach is not considered optimal, however the minor species including eel have the potential to be present, with abundance greater during high flow periods.
- 4.19.10 **Mitigation:** The methodology proposed for the cable crossing is trenchless and should not disturb the banks or bed of the water course. Works should be compliant with guidance on preventing pollution from construction sites e.g. PPG5: Works and Maintenance in or Near Water (Environment Agency, 2007) (also see **Table 5-1**). Potential mitigation measures include:

N Water Quality.

#### Graphic 4-53 Downstream crossing site STRX-20





**Graphic 4-54 Twin pipes at inlet to downstream lake**



**Graphic 4-55 Impounded reach upstream of lake below proposed crossing site STRX-20**







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## 5. Summary

- 5.1.1 A summary of the fisheries habitats and recommended mitigation for each of the proposed onshore cable crossing sites is presented in **Table 5-1** and **Table 5-2**. Fisheries habitats are assessed as None, Poor, Moderate or Good based on professional opinion following site visits on the 24 to 26 May 2021 (**Table 5-1**) and 06 April 2023 (**Table 5-2**).
- 5.1.2 This appendix considers the temporary construction works that will affect watercourses and ditches along the route of the Proposed Developments onshore cable. Mitigation is identified to minimise and mitigate the effects on habitat and fish populations. This mitigation has been used to underpin the assessment of streams and wet ditches and fisheries within **Chapter 22: Terrestrial ecology and nature conservation, Volume 2** of the ES (Document Reference: 6.2.22).

**Table 5-1 Summary of fish habitat at each of the proposed crossing sites surveyed in 2021 and recommended mitigation**

Site	Potential fisheries habitat	Proposed crossing method	Proposed mitigation (see Table 3-1 for key)
RVX-01	Good	Trenchless	N
STRX-02	None	Trenchless	E, N
STRX-03	None	Open cut trenching	N
STRX-04	None	Trenchless	N
STRX-05	Moderate	Trenchless	N
STRX-06	Poor	Open cut trenching	N
STRX-09	Poor	Open cut trenching	N
STRX-10	None	Open cut trenching	None
RVX-02	Good	Trenchless	N
STRX-14	Moderate	Open cut trenching	A, B, C, D, E, F, G, H, I, L, M, N
STRX-15	Moderate	Open cut trenching	A, B, C, D, E, F, G, H, I, L, M, N
STRX-16	Moderate	Open cut trenching	A, B, C, D, E, F, G, H, I, L, M, N

Site	Potential fisheries habitat	Proposed crossing method	Proposed mitigation (see Table 3-1 for key)
STRX-18	Good	Trenchless	N
STRX-19	Poor	Open cut trenching	N
STRX-20	None	Trenchless	N

**Table 5-2 Summary of fish habitat at each of the proposed crossing sites surveyed in 2023 and recommended mitigation**

Site	Potential fisheries habitat	Proposed crossing method	Proposed mitigation (see Table 3-1 for key)
DTX-11	Poor	Open cut trenching	A, B, C, D, L, M
STRX-01	Poor	Trenchless	J
DTX-14	Poor	Open cut trenching	A, B, C, D, N



## 6. Glossary of terms and abbreviations

**Table 6-1** Glossary of terms and abbreviations

Term (acronym)	Definition
<b>Environment Agency: National Fish Population Database (NFPD)</b>	The National Fish Populations Database (NFPD) holds information collected from fisheries monitoring work on rivers, lakes and transitional and coastal waters. This monitoring work is undertaken by the Environment Agency. All the relevant data associated with NFPD freshwater fish surveys, such as survey information, site information, the numbers and species of fish caught, fish lengths, weights and ages (where available), can be obtained from these relational datasets.
<b>Horizontal directional drilling (HDD)</b>	A trenchless crossing engineering technique using a drill steered underground without the requirement for open trenches. This technique is often employed when crossing environmentally sensitive areas, major water courses and highways. This method is able to carry out the underground installation of pipes and cables with minimal surface disruption.
<b>Public Rights of Way (PRoW)</b>	Public Rights of Way include footpaths, byways and bridleways.
<b>Water Framework Directive (WFD)</b>	A substantial piece of EU water legislation that came into force in 2000, with the overarching objective to get all water bodies in Europe to attain Good or High Ecological Status. River Basin Management Plans have been created which set out measures and potential mitigation to ensure that water bodies in England and Wales achieve 'Good Ecological Status'.



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## 7. References

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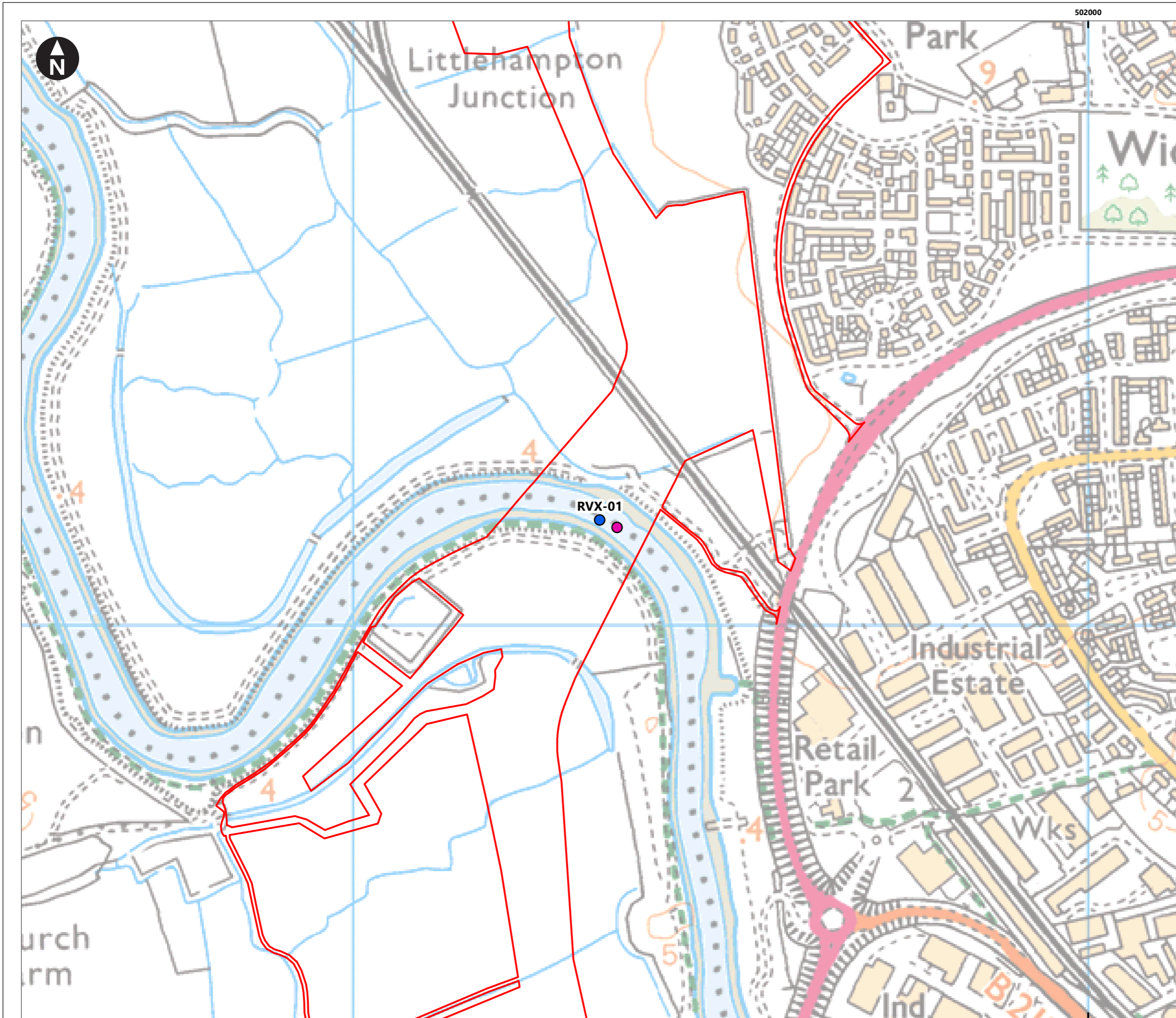


# Annex A Figures

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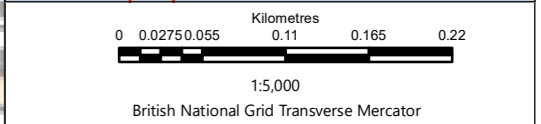
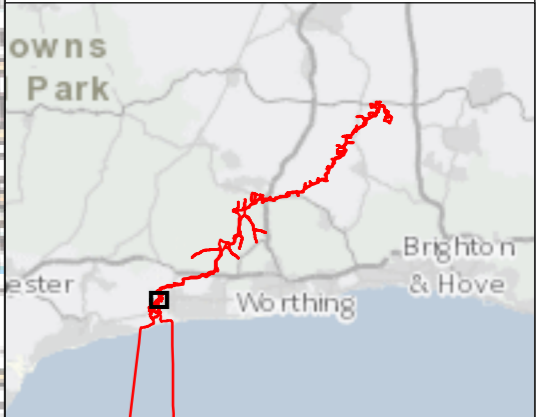


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**Key**

- Proposed DCO Order Limits
- Watercourse crossing location
- Survey location

**Please note**  
 The crossing matrix references all include a middle section of '1de' – for clarity on figures this has been shortened in this appendix, i.e. RVX-1de-01 = RVX-01



Rampion Extension Development

Rampion 2 Offshore Wind Farm  
 Figure 22.6.1a Watercourse crossings subject to survey - River Arun  
 Fisheries Habitat Survey Report  
 Environmental Statement

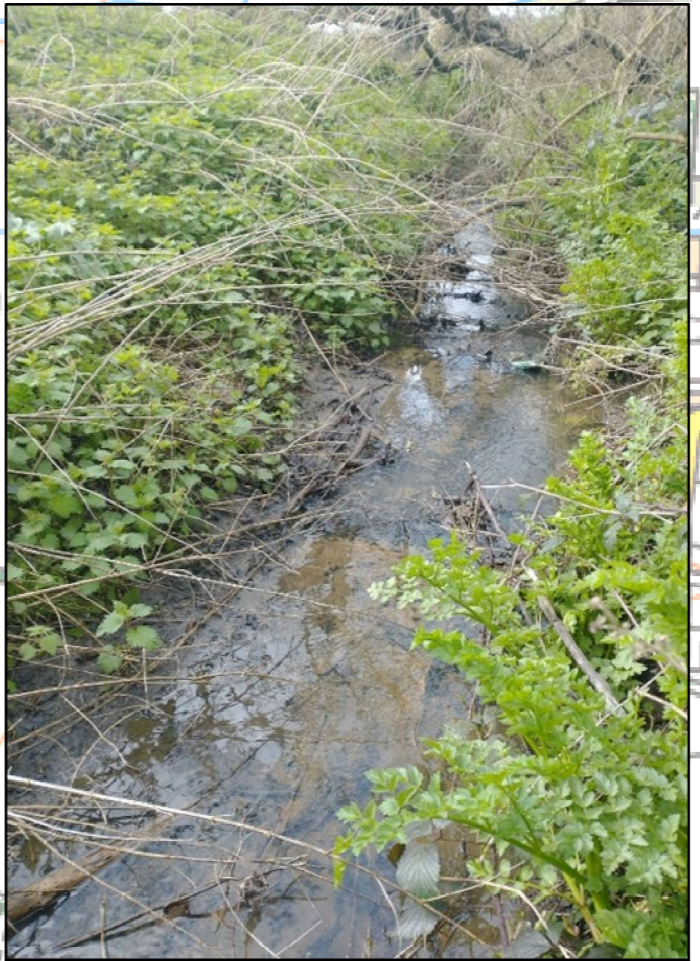
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Company: WSP	Drawn By: HADJE	Chk/Prvd: SUTET	Drawn Date: 03/08/2023	Status: FINAL
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Onshore cable crossing site DTX-11



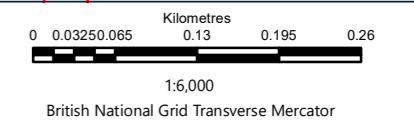
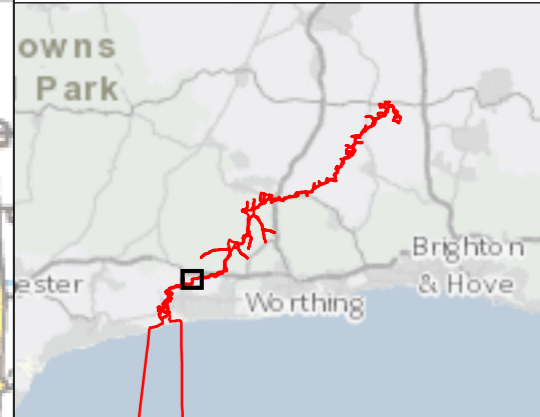
Onshore cable crossing site DTX-11

**Key**

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Rampion 2 Offshore Wind Farm

Figure 22.6.1b Watercourse crossings subject to survey - Calceto Lane

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WSP	HADJE	SUTET	03/08/2023	FINAL



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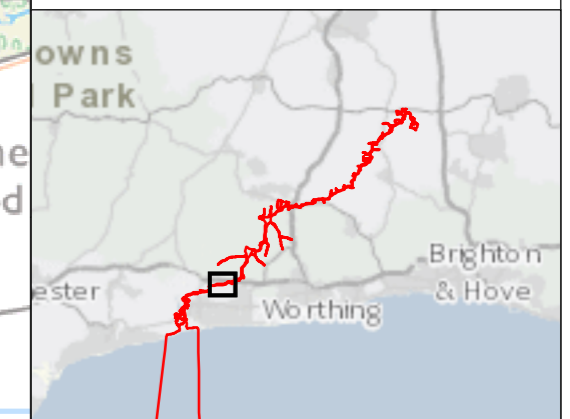
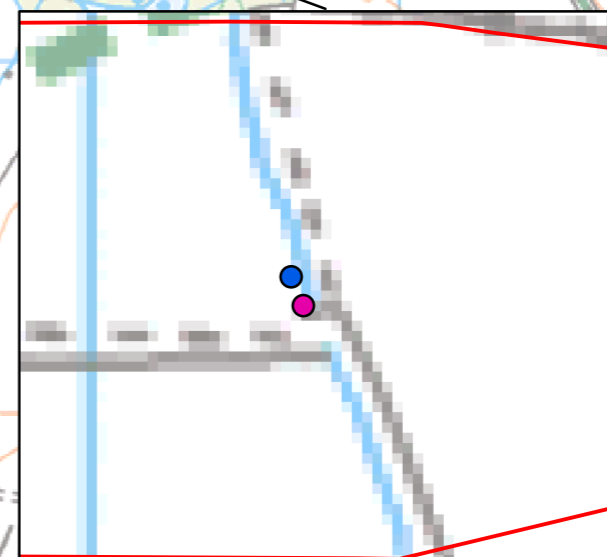
Onshore cable crossing DTX-14



Unnamed channel feeding into site DTX-14



Onshore cable crossing DTX-14



0 0.045 0.09 0.18 0.27 0.36  
Kilometres

1:8,000

British National Grid Transverse Mercator

Rampion Extension Development



Rampion 2 Offshore Wind Farm

Figure 22.6.1c Watercourse crossings subject to survey - The Vinery Industrial Estate

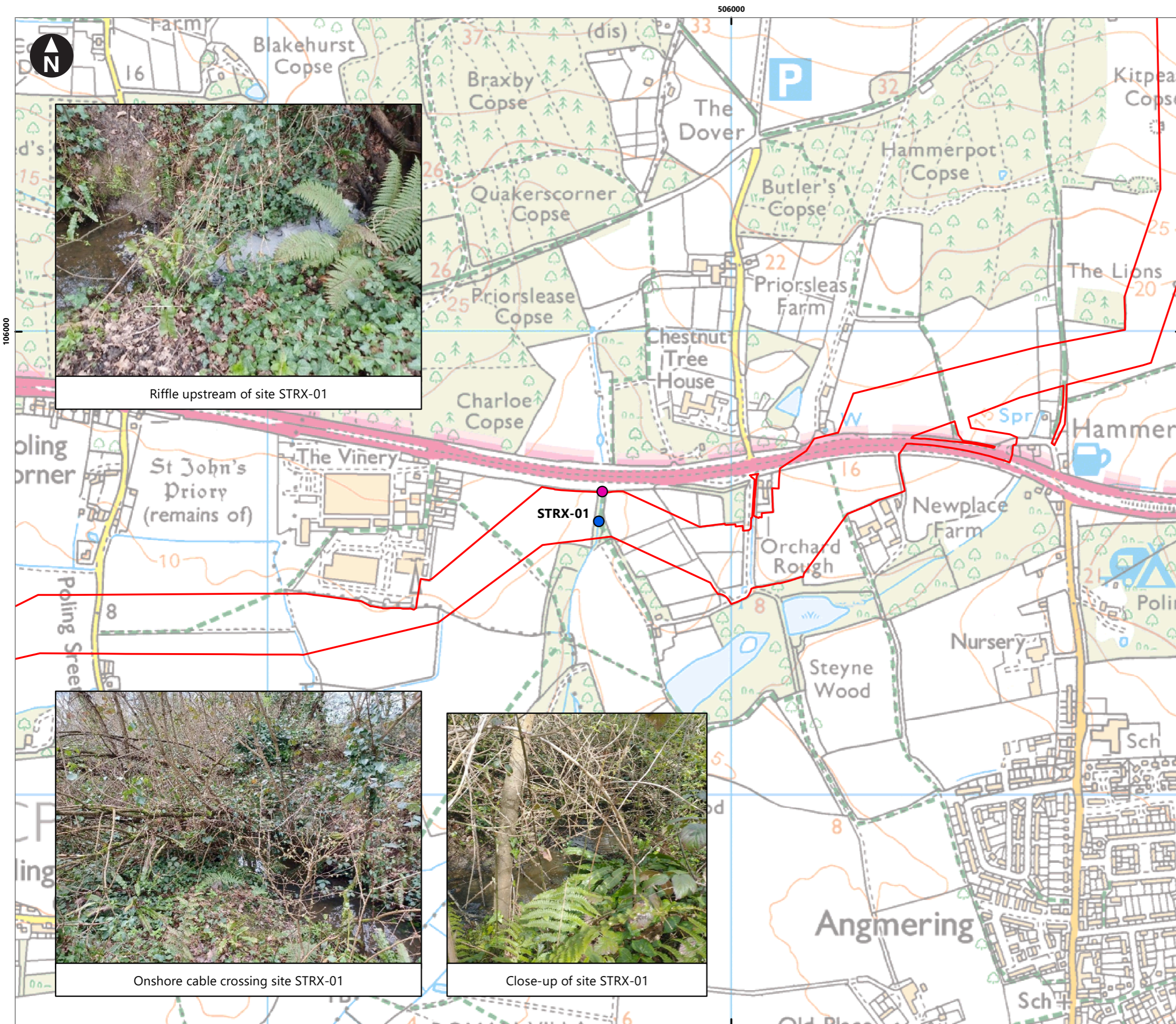
Fisheries Habitat Survey Report

Environmental Statement

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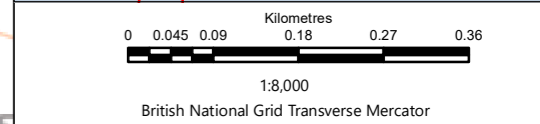
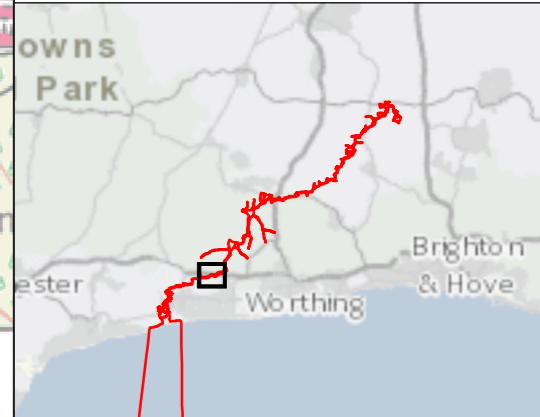




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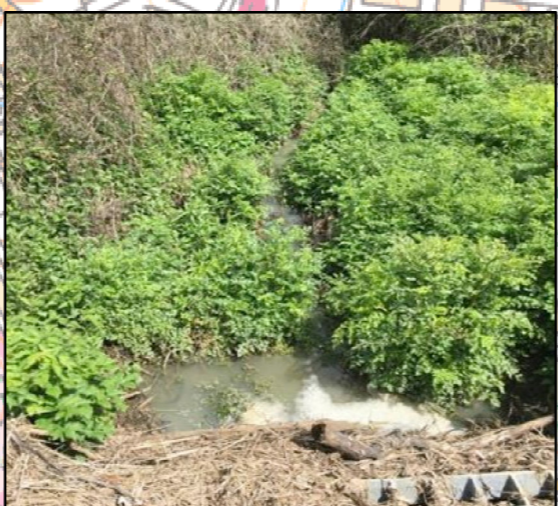
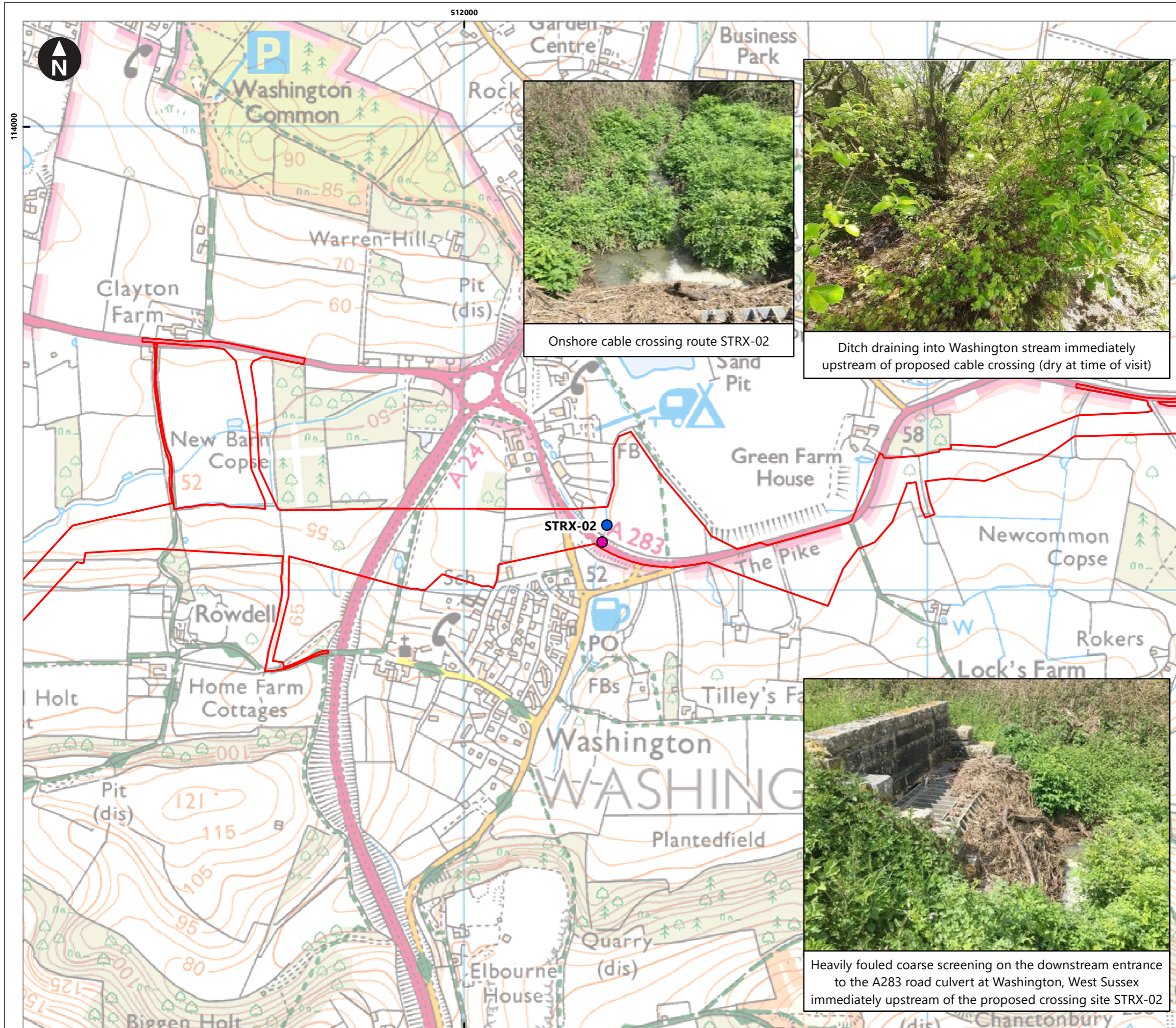
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Rampion 2 Offshore Wind Farm  
 Figure 22.6.1d Watercourse crossings subject to survey - Arundel Road  
 Fisheries Habitat Survey Report  
 Environmental Statement

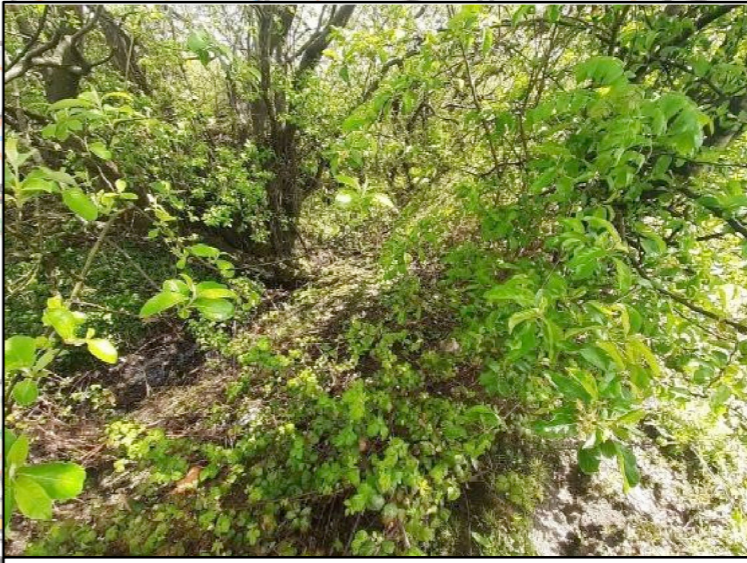
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Onshore cable crossing route STRX-02



Ditch draining into Washington stream immediately upstream of proposed cable crossing (dry at time of visit)

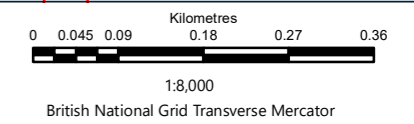
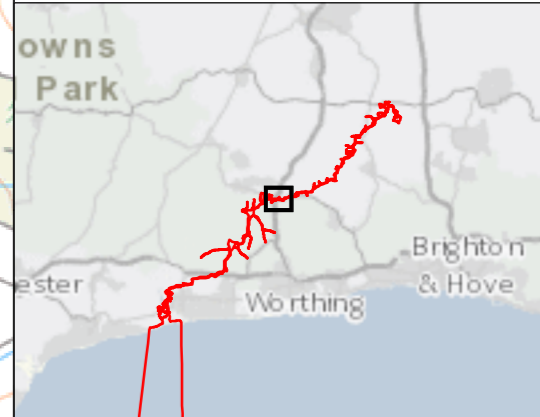


Heavily fouled coarse screening on the downstream entrance to the A283 road culvert at Washington, West Sussex immediately upstream of the proposed crossing site STRX-02


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Rampion Extension Development



Rampion 2 Offshore Wind Farm

Figure 22.6.1e Watercourse crossings subject to survey - Washington Road

Fisheries Habitat Survey Report

Environmental Statement

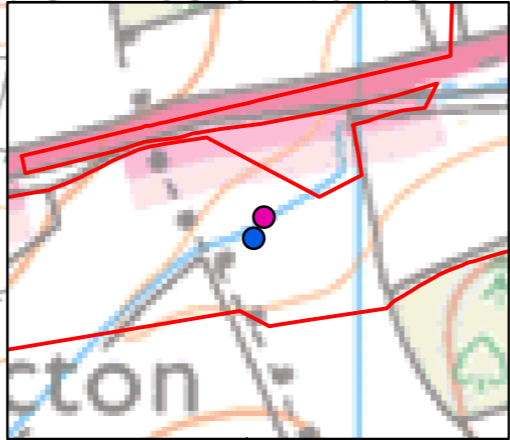
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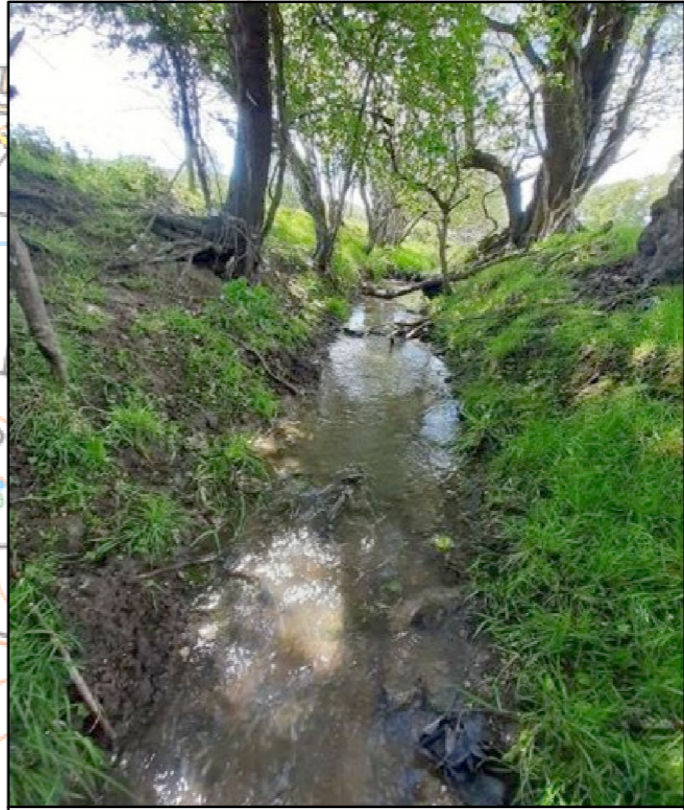




Onshore cable crossing site STRX-03



Chancton Farm stream

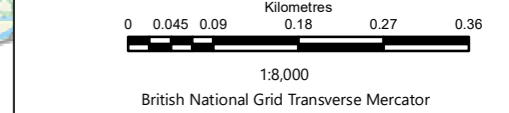


Debris dams Chancton Farm stream

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- Key**
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  - Survey location

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Rampion Extension Development  


Rampion 2 Offshore Wind Farm  
 Figure 22.6.1fi Watercourse crossings subject to survey - Chancton Farm stream

Fisheries Habitat Survey Report  
 Environmental Statement

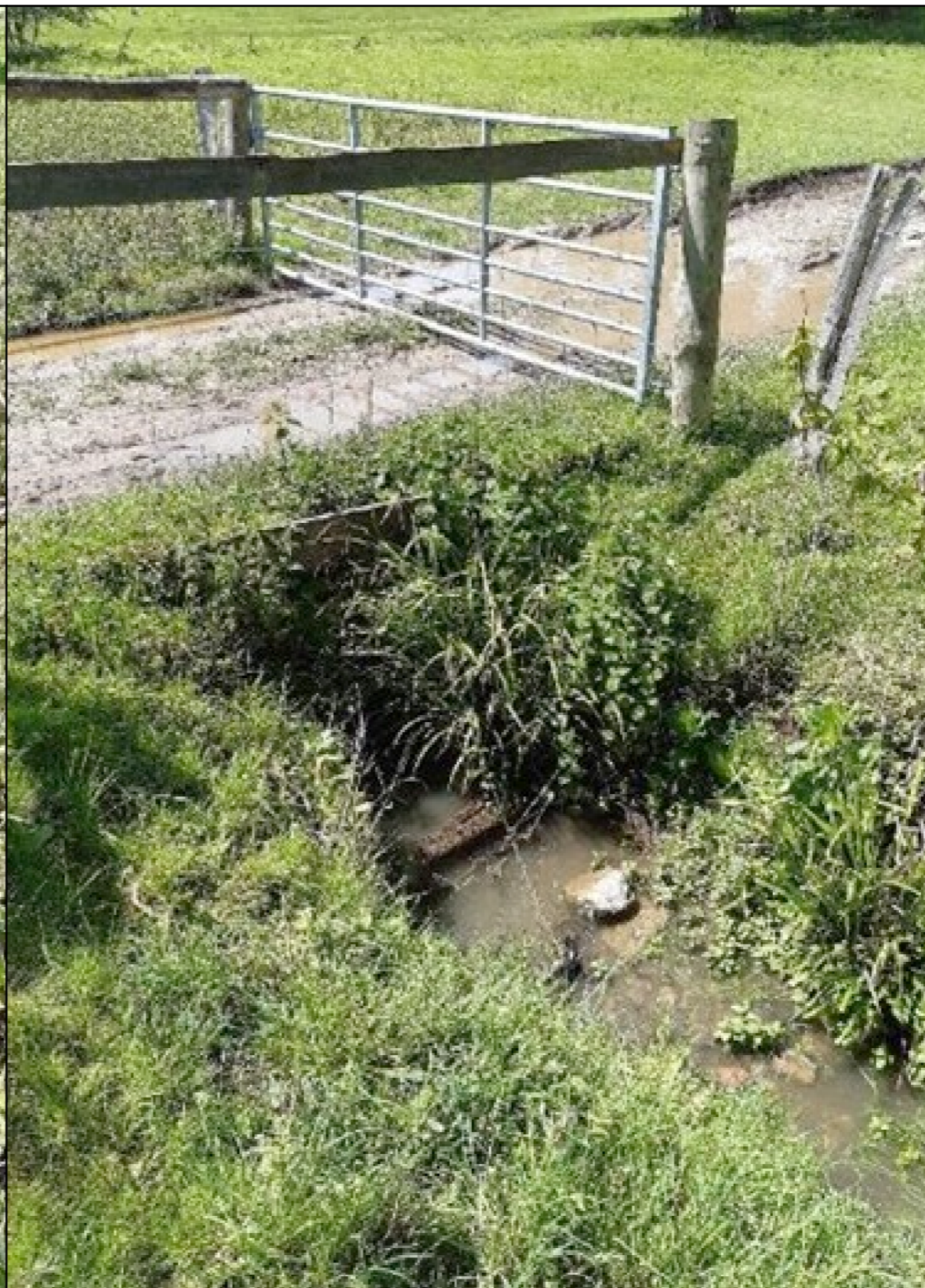
System Identifier: 42285-WSP-ES-ON-FG-OO-8999	Version: 1.0
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Riparian vegetation Chancton Farm stream



Culvert Chancton Farm stream

**Please note**

The crossing matrix references all include a middle section of '1de' – for clarity on figures this has been shortened in this appendix, i.e. RVX-1de-01 = RVX-01

Rampion Extension Development



Rampion 2 Offshore Wind Farm

Figure 22.6.1fii Watercourse crossings subject to survey - Chancton Farm stream

Fisheries Habitat Survey Report

Environmental Statement

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514000

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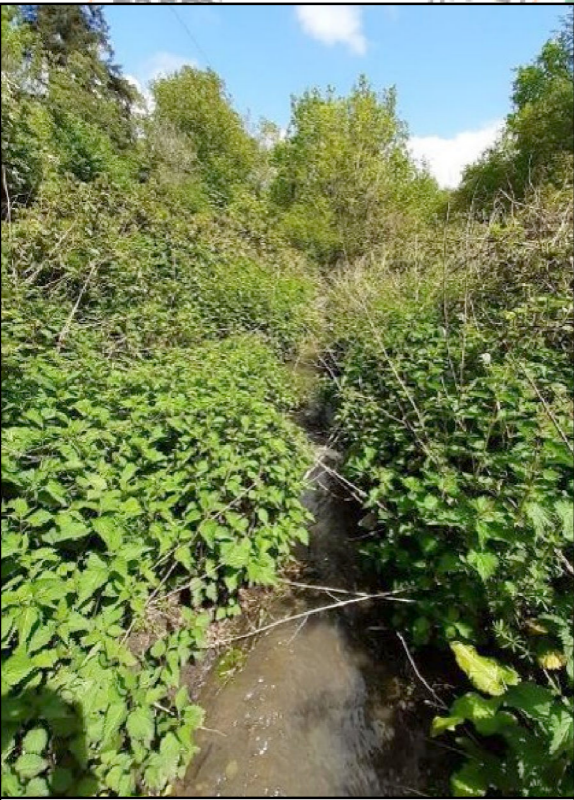
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**Key**

-  Proposed DCO Order Limits
-  Watercourse crossing location
-  Survey location

**Please note**

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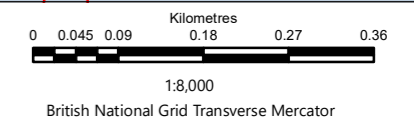
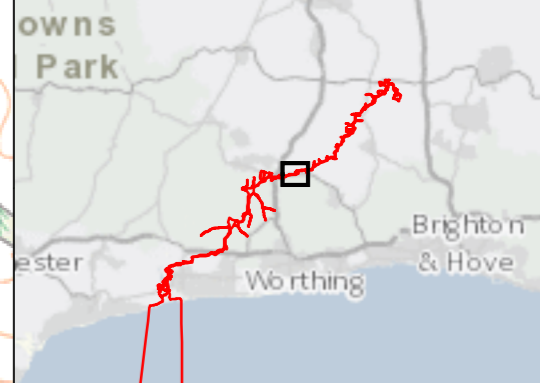
Riparian vegetation, Washington road



Onshore cable crossing route STRX-04



Road culvert, Washington road



Rampion Extension Development



Rampion 2 Offshore Wind Farm

Figure 22.6.1g Watercourse crossings subject to survey - Wiston Stream, Washington Road

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Company: WSP	Drawn By: HADJE	Chk/Prvrd: SUTET	Drawn Date: 03/08/2023	Status: FINAL
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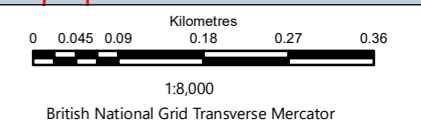
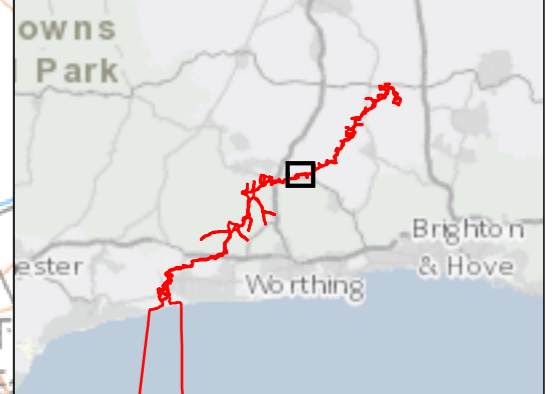


**Key**

- Proposed DCO Order Limits
- Watercourse crossing location
- Survey location

**Please note**

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Rampion Extension Development



Rampion 2 Offshore Wind Farm

Figure 22.6.1h Watercourse crossings subject to survey - Wiston Stream

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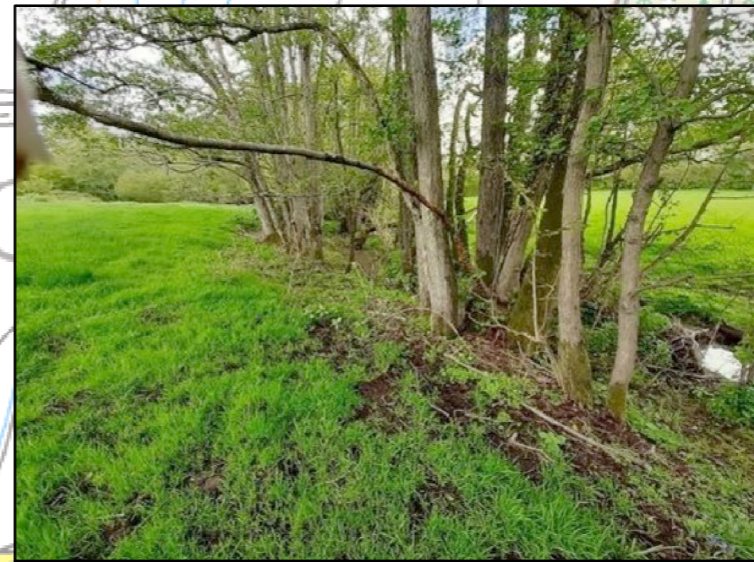
Environmental Statement

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Tree root systems extended into the channel providing fish cover / habitat at site STRX-05



Adjacent grassland and tree-lined banks providing ~70% canopy cover at site STRX-05



Onshore cable crossing route STRX-05

114000

514000



516000

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Onshore cable crossing route STRX-06

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0 0.045 0.09 0.18 0.27 0.36  
Kilometres

1:8,000  
British National Grid Transverse Mercator

Rampion Extension Development



Rampion 2 Offshore Wind Farm

Figure 22.6.1ii Watercourse crossings subject to survey - Guessgate Farm

Fisheries Habitat Survey Report

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Debris dam Guessgate Farm stream





Perched culvert Guessgate Farm stream



Permanently wetted channel downstream of proposed cable crossing site

**Please note**

The crossing matrix references all include a middle section of '1de' – for clarity on figures this has been shortened in this appendix, i.e. RVX-1de-01 = RVX-01

Rampion Extension Development



Rampion 2 Offshore Wind Farm

Figure 22.6.1iii Watercourse crossings subject to survey - Guessgate Farm

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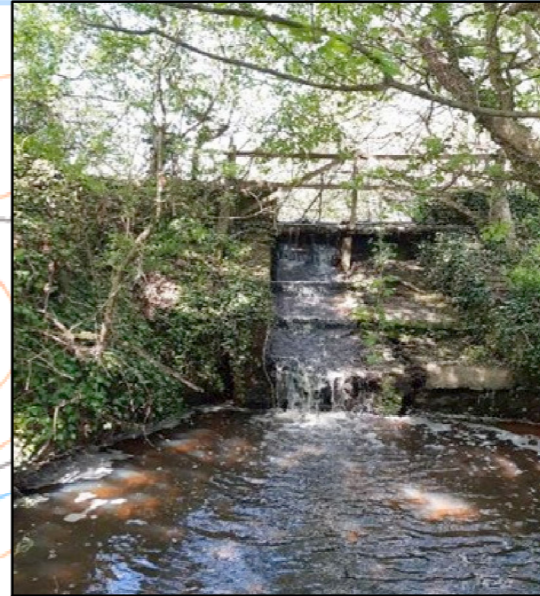
Environmental Statement

System Identifier: 42285-WSP-ES-ON-FG-OO-8999				Version: 1.0
Company: WSP	Drawn By: HADJE	Chk/Aprvd: SUTET	Drawn Date: 03/08/2023	Status: FINAL





Onshore cable crossing site STRX-09



Sluice outlet to lakes upstream of STRX-09

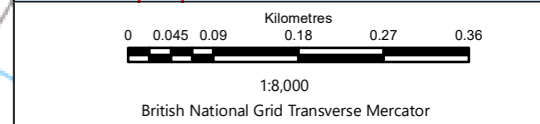
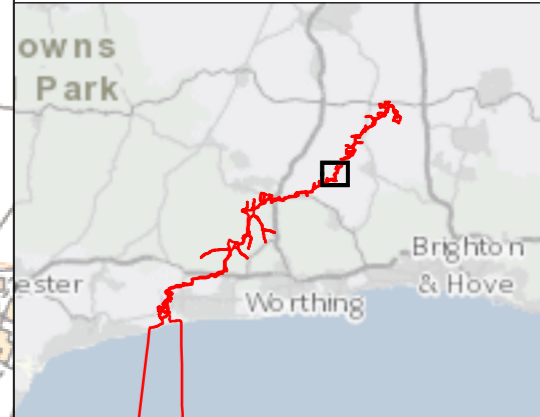


Lakes adjacent to proposed crossing point STRX-09

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- Key**
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Rampion Extension Development

Rampion 2 Offshore Wind Farm  
 Figure 22.6.1ji Watercourse crossings subject to survey - Ashurst Stream

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Perched culvert STRX-09

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The crossing matrix references all include a middle section of '1de' – for clarity on figures this has been shortened in this appendix, i.e. RVX-1de-01 = RVX-01

Rampion Extension Development



Rampion 2 Offshore Wind Farm

Figure 22.6.1jii Watercourse crossings subject to survey - Ashurst Stream

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Company: WSP	Drawn By: HADJE	Chk/Aprvd: SUTET	Drawn Date: 03/08/2023	Status: FINAL





Reach upstream of crossing point STRX-09



Small weir Ashurst stream

**Please note**

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Rampion 2 Offshore Wind Farm

Figure 22.6.1jiii Watercourse crossings subject to survey - Ashurst Stream

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System Identifier: 42285-WSP-E-ON-FG-OO-8999				Version: 1.0
Company: WSP	Drawn By: HADJE	Chk/Prvd: SUTET	Drawn Date: 03/08/2023	Status: FINAL

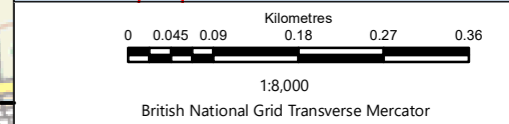
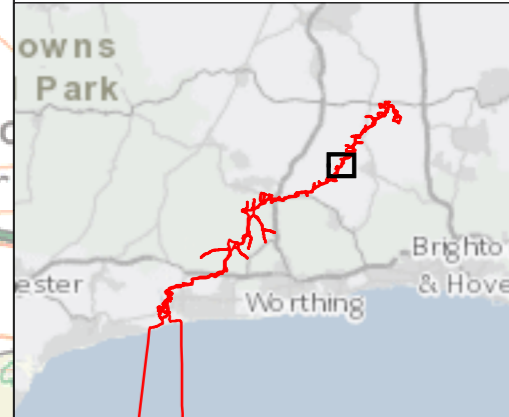




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- Key**
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Rampion Extension Development

**Rampion 2 Offshore Wind Farm**

Figure 22.6.1ki Watercourse crossings subject to survey - Robertsfield Farm Stream

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Upper reach Robertsfield Farm stream

**Please note**

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Rampion Extension Development



Rampion 2 Offshore Wind Farm

Figure 22.6.1kii Watercourse crossings subject to survey - Robertsfield Farm Stream

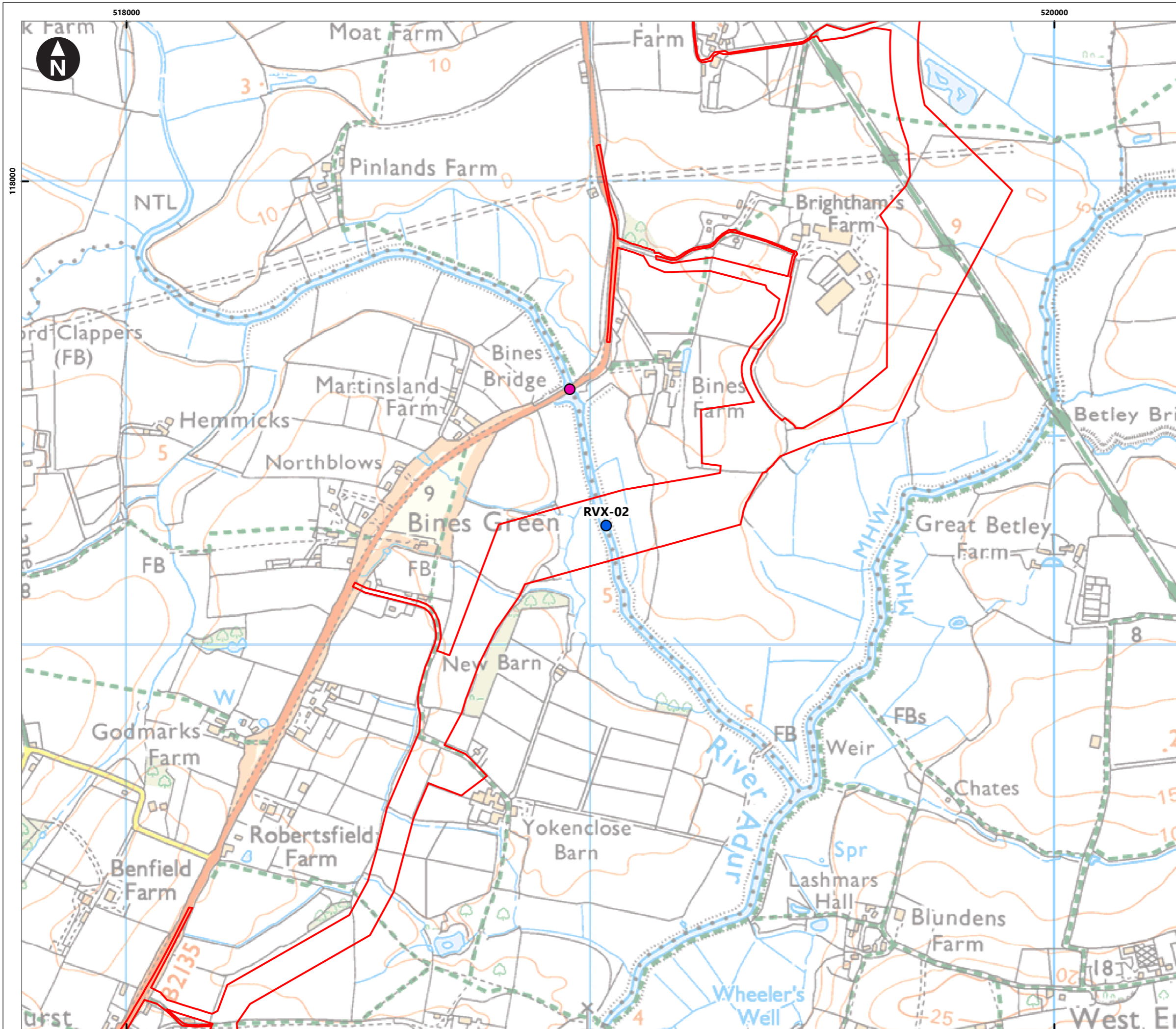
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0 0.045 0.09 0.18 0.27 0.36  
 Kilometres  
 1:8,000  
 British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 Offshore Wind Farm

Figure 22.6.11 Watercourse crossings subject to survey - Bines Bridge

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Drawn Date: 03/08/2023	Status: FINAL	





Culvert and tidal flap at confluence with River Adur



Onshore cable crossing at site STRX-14

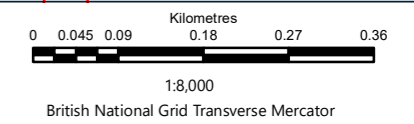
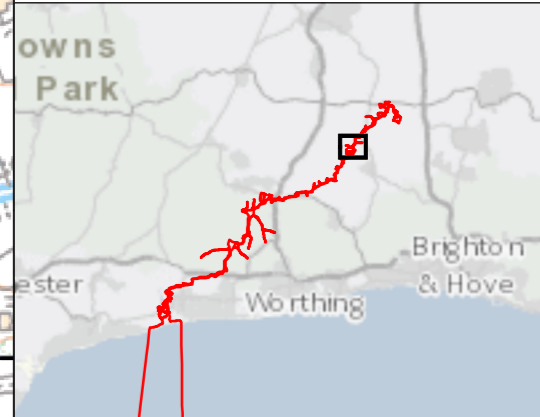


Upstream of proposed crossing site STRX-14


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Rampion Extension Development



Rampion 2 Offshore Wind Farm

Figure 22.6.1mi Watercourse crossings subject to survey - Homelands Farm

Fisheries Habitat Survey Report

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Site of proposed cable crossing STRX-14 and Homelands Farm

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Rampion Extension Development



Rampion 2 Offshore Wind Farm

Figure 22.6.1mii Watercourse crossings subject to survey - Homelands Farm

Fisheries Habitat Survey Report

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Company:	Drawn By:	Chk/Aprvd:	Drawn Date:	Status:
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Onshore cable crossing site STRX-15

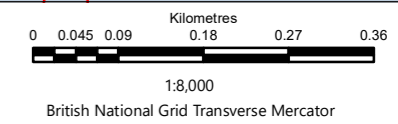
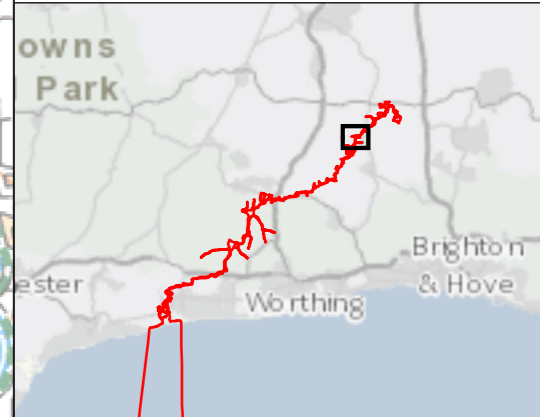


Road culvert upstream of proposed cable crossing site STRX-15


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Rampion Extension Development



Rampion 2 Offshore Wind Farm

Figure 22.6.1n Watercourse crossings subject to survey - Partridge Green

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 1:8,000  
 British National Grid Transverse Mercator

Rampion Extension Development

Rampion 2 Offshore Wind Farm

Figure 22.6.1o Watercourse crossings subject to survey - Partridge Green

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Cable crossing at site STRX-16





Onshore cable crossing site STRX-18



Farm crossing culvert upstream of site STRX-18



Upstream of site STRX-18

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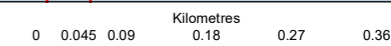
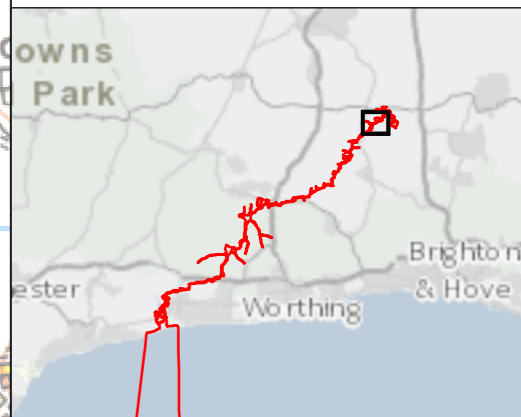
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**Key**

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- Survey location

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1:8,000

British National Grid Transverse Mercator

Rampion Extension Development



Rampion 2 Offshore Wind Farm

Figure 22.6.1p Watercourse crossings subject to survey - Cowfold Stream

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Tree roots obstructing flow upstream of crossing point STRX-19



Onshore cable crossing site STRX-19

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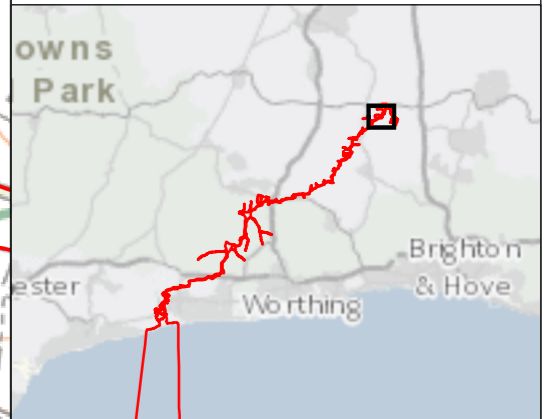
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1:8,000  
British National Grid Transverse Mercator

Rampion Extension Development



Rampion 2 Offshore Wind Farm

Figure 22.6.1q Watercourse crossings subject to survey - Kings Lane

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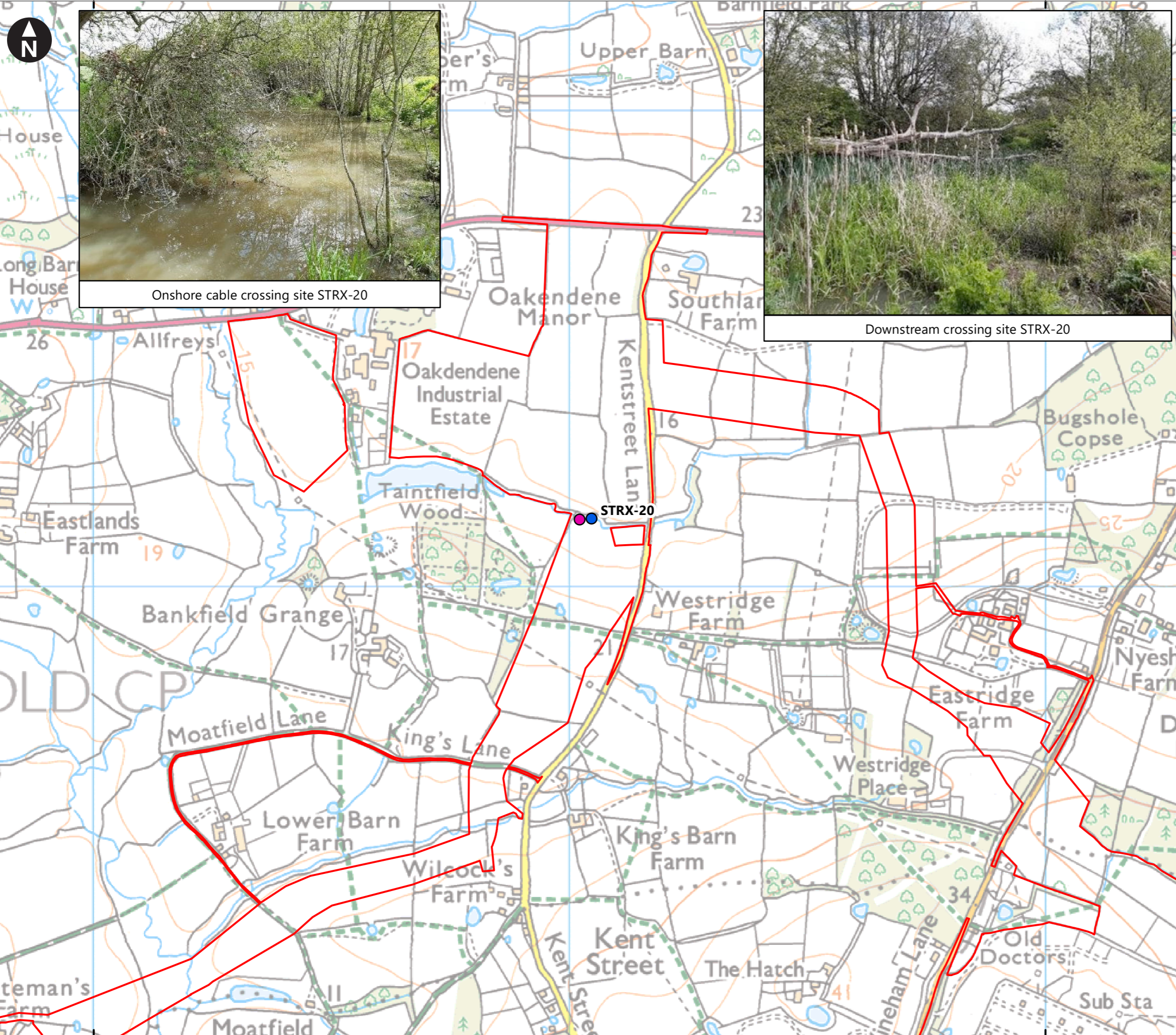
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Onshore cable crossing site STRX-20



Downstream crossing site STRX-20

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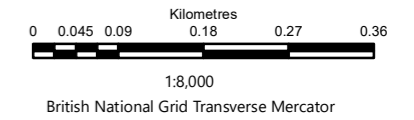
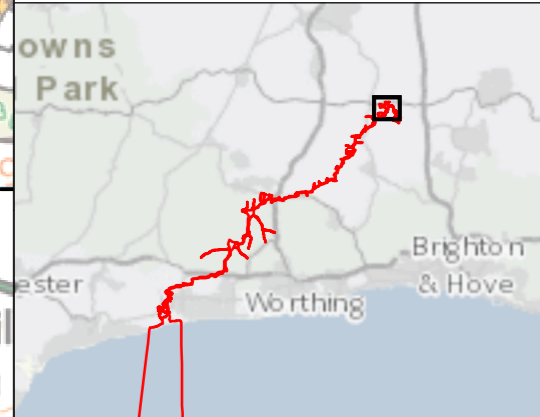
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**Key**

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Rampion Extension Development



Rampion 2 Offshore Wind Farm

Figure 22.6.1ri Watercourse crossings subject to survey - Downstream Kent Street

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Impounded reach upstream of lake below proposed crossing site STRX-20



Twin pipes at inlet to downstream lake

**Please note**

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Rampion Extension Development



Rampion 2 Offshore Wind Farm

Figure 22.6.1rii Watercourse crossings subject to survey - Downstream Kent Street

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