

Oath to Burrowbridge Dredging and Associated Activities

Volume 3: Appendices Part 5



APPENDIX 6F: INVERTEBRATES

Report to: -
Somerset Drainage Boards Consortium
Bradbury House
33-34 Market Street
Highbridge
TA9 3BW

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**RESULTS OF A SURVEY FOR
HAIRY CLICK-BEETLE
SYNAPTUS FILIFORMIS ON
THE RIVER PARRETT,
SOMERSET**

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Unit 14B The Avenue  
High Street  
Bridgwater TA6 3QE  
[www.aecol.co.uk](http://www.aecol.co.uk)

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Report author & final proof: James McGill PhD.

Review & initial proof: Henry Andrews MSc MCIEEM.

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## RESULTS OF A SURVEY FOR THE HAIRY CLICK-BEETLE *SYNAPTUS FILIFORMIS* ON THE RIVER PARRETT IN SOMERSET

### 1. SUMMARY

- 1.1.1 The River Parrett flows through the counties of Dorset and Somerset in South West England. From its source in the Thorney Mills springs in the hills around Chedington in Dorset, the river assumes a broadly north-western flow through Somerset and the Somerset Levels to its mouth at Burnham-on-Sea.
- 1.1.2 Dredging is proposed within the Somerset section of the river, upstream from Burrowbridge. This section is known to hold a population of the hairy click-beetle *Synaptus filiformis*.
- 1.1.3 The UK population of the hairy click-beetle is considered 'Endangered' under pre-1994 criteria defined by the International Union for Conservation of Nature (IUCN) and is listed as a Section 41 Species of Priority Importance under the criteria of the *Natural Environment and Rural Communities (NERC) Act 2006*.
- 1.1.4 In order to better understand the current status of the hairy click-beetle on the River Parrett, and thereby inform a due-diligence safeguarding strategy to mitigate the impacts of the dredging operation upon the population, AEcol were commissioned by the Somerset Drainage Boards Consortium to establish the status of the species within seven locations where there are historic records.
- 1.1.5 The survey was performed by AEcol in-house entomologist, Dr James McGill, on three dates, comprising: 21<sup>st</sup>, 22<sup>nd</sup> and 23<sup>rd</sup> May 2018 and recorded 26 adults from 21 locations along the River Parrett between 500 m downstream of Oath Lock and 250 m downstream of Burrowbridge. The species was found to be associated with shallowly sloping tidal terraces, where dense stands of reed canary-grass are subject to flooding on the highest tides. Of an overall seven locations in which the species has historically occurred, it was recorded at three in 2018.
- 1.1.6 Bank reprofiling can be predicted to have a significant impact upon the hairy click-beetle population. This is based on the unmitigated dredging plans. Mitigation is proposed to ameliorate these effects, although the methods are untested and their efficacy is unknown. Therefore, a surveillance programme is also recommended to attempt to assess the effect of the dredging impacts on the species status in the longer term and explore the possibility of capturing larvae in baited traps.

### Section 1 – End

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## 2. BACKGROUND

- 2.1.1 Dredging is proposed within the Somerset section of the River Parrett, upstream from Burrowbridge. This section of the river is known to hold a population of the hairy click-beetle.

### 2.2 The hairy click-beetle

#### Description

- 2.2.1 The adult hairy click-beetle is typically 9-12 mm in length and covered with greyish pubescence. It is fully-winged. An image of an adult is provided at Photo 1.



**Photo 1. Adult hairy click-beetle © W.Urwin**

#### Ecology

- 2.2.2 Hairy click-beetle larvae are thought to be herbivorous root-feeders (although the possibility that they might be omnivorous has not yet been excluded) and in Britain, all records of adult hairy click-beetle have been made in association with reed canary-grass *Phalaris arundinacea* and common reed *Phragmites australis* (Foster *et al.* 2007). Based on a study by Mendel (2003a) it is thought that, as adults are active in May and June, eggs are laid at this time. Pupation takes place in late summer or early autumn of the second or third year after the eggs were laid and the larvae spend 2-3 years around the roots of the host grass. Adults emerge in early autumn but remain in the soil until the following May or June.

### Phase 1 habitats occupied

- 2.2.3 All records of hairy click-beetle have been made in *F2.1 – Swamp, marginal and inundation / Marginal and inundation / Marginal vegetation*. However, within this broad habitat type the species is restricted to tall vegetation encompassing the probable larval food-plants, growing along rivers with brackish influence.

### Conservation status

- 2.2.4 The UK population of the hairy click-beetle is considered ‘Endangered’ under the pre-1994 criteria defined by the International Union for Conservation of Nature (IUCN) (see Appendix A for full criteria) and is listed as Section 41 Species of Priority Importance under the criteria of the *Natural Environment and Rural Communities (NERC) Act 2006*.

### Distribution

- 2.2.5 Hairy click-beetle has always had a very limited distribution in the British Isles. Since 1900, published localities have been limited to five locations, comprising: Walton/Sunbury on the River Thames (Fowler & Donisthorpe 1913 – N.B. not recorded since); the River Severn in Gloucestershire (Alexander 2007); the River Wye in Monmouthshire (Mendel 2003b); Rusland Pool in Cumbria (Read 2004, Foster 2007); and the River Parrett in Somerset (Payne 1977).
- 2.2.6 All Somerset records of the species occur on the River Parrett. The River Parrett flows through the counties of Dorset and Somerset in South West England. From its source in the Thorney Mills springs in the hills around Chedington in Dorset, the river assumes a broadly north-western flow through Somerset and the Somerset Levels to its mouth at Burnham-on-Sea. The upper tidal limit of the river is at Oath and it may be that this delineates the upper range of the hairy click-beetle.
- 2.2.7 Based on previous records, the potential range occupied by hairy click-beetle on the banks of the River Parrett in Somerset extends over approximately 4.5 km between Oath (the upper tidal limit of the River Parrett) at Ordnance Survey grid reference ST 38309 27880, and Burrowbridge at ST 35717 30521.

## **2.3 Instruction**

- 2.3.1 In order to better understand the current status of the hairy click-beetle on the River Parrett, and thereby inform a due-diligence safeguarding strategy to mitigate the impacts of the dredging operation upon the population, AEcol were commissioned by the Somerset Drainage Boards Consortium to establish the status of the species within seven locations in which it has been historically thought to occur, and other sections of the river within the range of these records.

## **Section 2 – End**

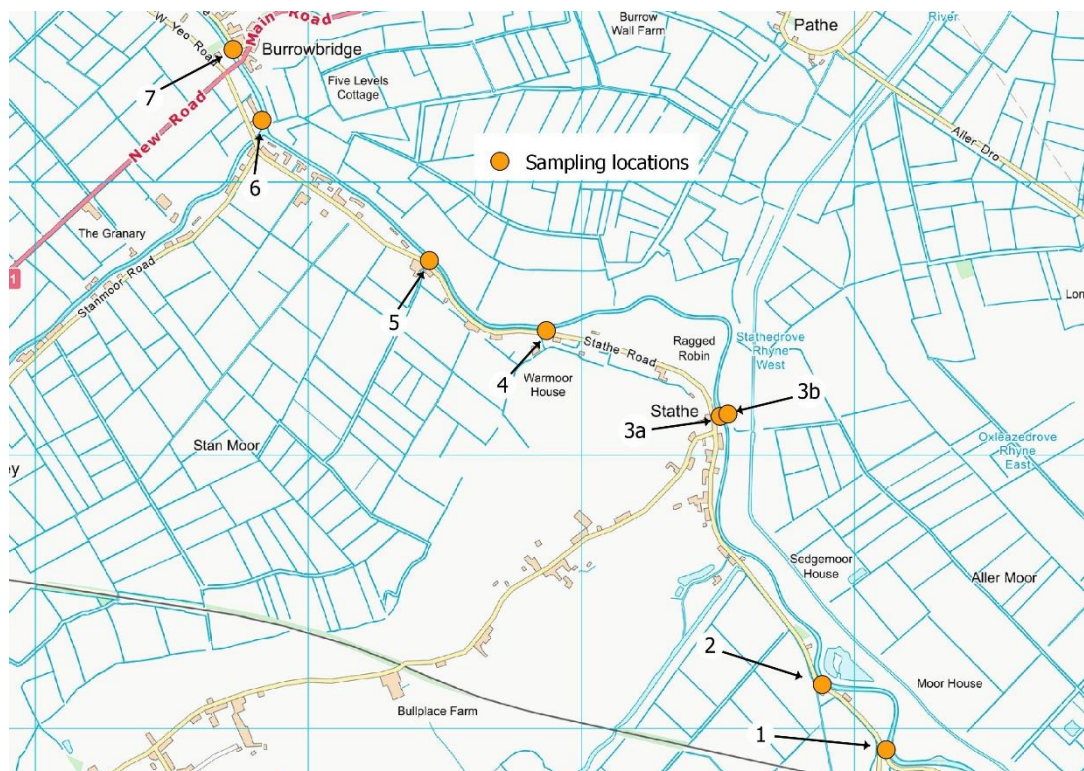
### 3. DESK-STUDY

#### Pre-existing species information

3.1.1 The Environment Agency supplied seven locations on the River Parrett where hairy click-beetle has been encountered, comprising: -

1. Red Hill junction;
2. Stathe Cottage;
3. Stathe Bridge: -
  - a. West bank; and
  - b. East bank.
4. Parrett Cottage;
5. Parsonage Farm;
6. Walkeys Farm; and
7. Riverside Road.

3.1.2 The locations that the species has occurred in historically are shown at Figure 1.



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**Figure 1. Locations in which hairy click-beetle records have been historically made on the River Parrett.**

- 3.1.3 The Environment Agency performs surveillance at locations 6 and 7 annually but has only recorded individual beetles at location 6 within the past nine years. Unfortunately, the data provided were incomplete and lacked the name of the recorder and the dates the species was encountered. No meaningful negative data was provided (i.e. when surveys might have been performed and the species not encountered). However, Somerset Environmental Records Centre may hold additional data.

### **Section 3 – End**

## **4. STATUS ASSESSMENT**

### **4.1 Surveyor**

- 4.1.1 The status assessment was performed by AEcol's in-house entomologist, Dr James McGill.
- 4.1.2 James has completed surveys of terrestrial and freshwater invertebrate assemblages for Ecological Impact Assessment, and Biodiversity Action Plan (BAP) species surveys, and his doctoral thesis investigated outcomes of conservation management and habitat creation for assemblages of invertebrates associated with Open Mosaic Habitat on Previously Developed Land (McGill 2018).

### **4.2 Objectives of the status assessment**

- 4.2.1 Status assessment objectives were threefold, comprising: -
1. Establish presence/absence of hairy click-beetle at the locations along the River Parrett where it has historically been recorded;
  2. Where access was practicable, establish the status of the species across a wider area, including the dredging zone where possible. The overall sampling area extended from 250 m upstream of the Parrett/Tone confluence, 250 m along the Parrett downstream of the confluence, and 200 m upstream of the dredging location. Where access for sweep net survey was not practicable, the habitat was to be assessed visually;
- and
3. Provide advice on mitigation to protect known populations of hairy click-beetle during the dredging programme.

### **4.3 Sampling methods**

- 4.3.1 In accordance with recommended best practice guidance, as set out by Mendel (2003a) and Foster *et al.* (2007), the status assessment methods comprised: -
- Sweep-netting targeting hairy click-beetle adults; and
  - Soil sampling targeting hairy click-beetle larvae.

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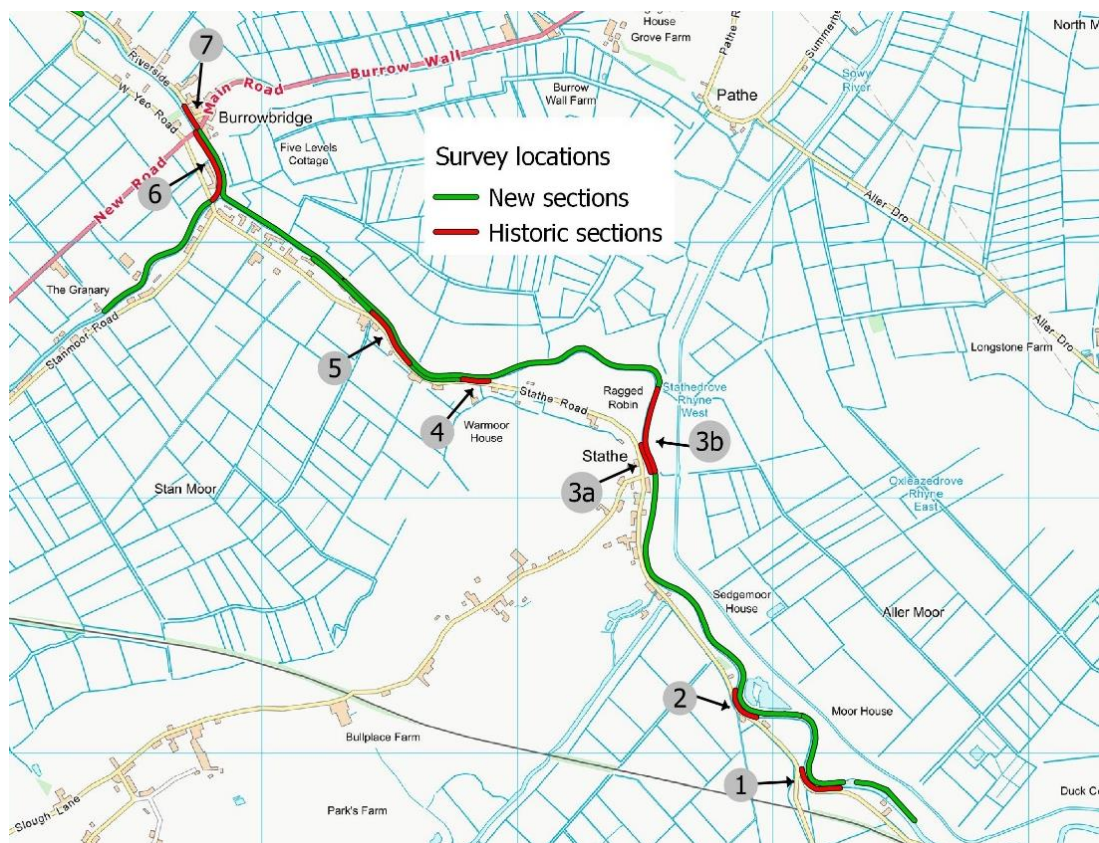
### Sweep-netting

- 4.3.2 Sweep-netting involves passing a sweep-net through vegetation in a figure-of-eight motion (Drake *et al.* 2007). The net was 50 cm in diameter and 50 cm in depth, made of stout canvas, to sample dense stands of reed canary-grass.
- 4.3.3 Sweep-net samples were taken continuously along the river bank through reed canary-grass, keeping the net low in the vegetation while walking at a moderate pace. The invertebrates captured were inspected every 10 sweeps. If any hairy click-beetles were swept, a grid reference was recorded at the middle of the route travelled during the previous 10 sweeps.

### Soil-sampling

- 4.3.4 Soil-dwelling invertebrates can be sought by crumbling and sieving the organic soil horizons. As research has identified dense reed canary-grass above the frequently flooded area of soft silt in the lower channel as productive for hairy click-beetle in the soil (Mendel, 2003a), soil sampling was performed in the locations in which the species has historically been recorded. 'Soil-pits' were excavated by digging up soil around the roots of reed canary-grass to a depth of 25 cm. The spoil was crumbled by hand, searched by eye on a sheet, and sifted through a sieve with 0.5 cm mesh. An area of 0.5 m<sup>2</sup> was searched at each soil sampling location. This took approximately 30 minutes for each sample.
- 4.3.5 At six of the seven localities with previous records of hairy click-beetle, soil-pits were excavated in the reed canary-grass zone in the same area as adults were encountered, or, if no adults were encountered, in the densest stands of reed canary-grass available. There were no excavations on the Stathe Bank near Oath Lock (Sample location 1), due to a lack of accessible reed canary-grass. Therefore, in order to complete the full complement of seven soil samples, the banks described in Section 6.2.1 were substituted for the Burrowbridge bank of the River Parrett immediately upstream from Stathe Bridge.
- 4.3.6 The 7.9 km on the River Parrett that was sampled for the occurrence of hairy click-beetle in May 2018 is shown at Figure 2.





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**Figure 2. Locations on the River Parrett that were sampled for the occurrence of hairy click-beetle in May 2018.**

#### 4.4 Survey dates & weather conditions

- 4.4.1 The emergence of the adults was confirmed on 18<sup>th</sup> May 2018. Emergence having been established, the seven locations with historic records and the wider area were sampled on 21<sup>st</sup>, 22<sup>nd</sup> and 23<sup>rd</sup> May 2018. Table 1 sets out the date and weather conditions for each survey.

**Table 1. Date and weather conditions for each visit.**

| DATE     | WEATHER CONDITIONS |            |           |              |
|----------|--------------------|------------|-----------|--------------|
|          | Temp (°C)          | Wind (BFT) | Rain (MM) | Cloud (8THS) |
| 21/05/18 | 21                 | 0          | 0         | 0            |
| 22/05/18 | 21                 | 0          | 0         | 0            |
| 23/05/18 | 23                 | 0          | 0         | 0            |

## **4.5 Identification**

- 4.5.1 Adult hairy click-beetle can be recognised in the field based on a combination of size, shape, pubescence, and the enlarged fourth tarsal segment on each leg.

## **4.6 Constraints**

- 4.6.1 Due to lack of public access, it was not possible to sample all sections of the river bank that would be affected by the proposed dredging. While this prevents conclusive confirmation of the species status in some situations, the suitability of habitat was established based on captures elsewhere and this was used to predict the suitability of sections that could not be physically accessed. On balance, it is concluded that the assessment is adequate to inform a due-diligence safeguarding strategy.

## **Section 4 – End**

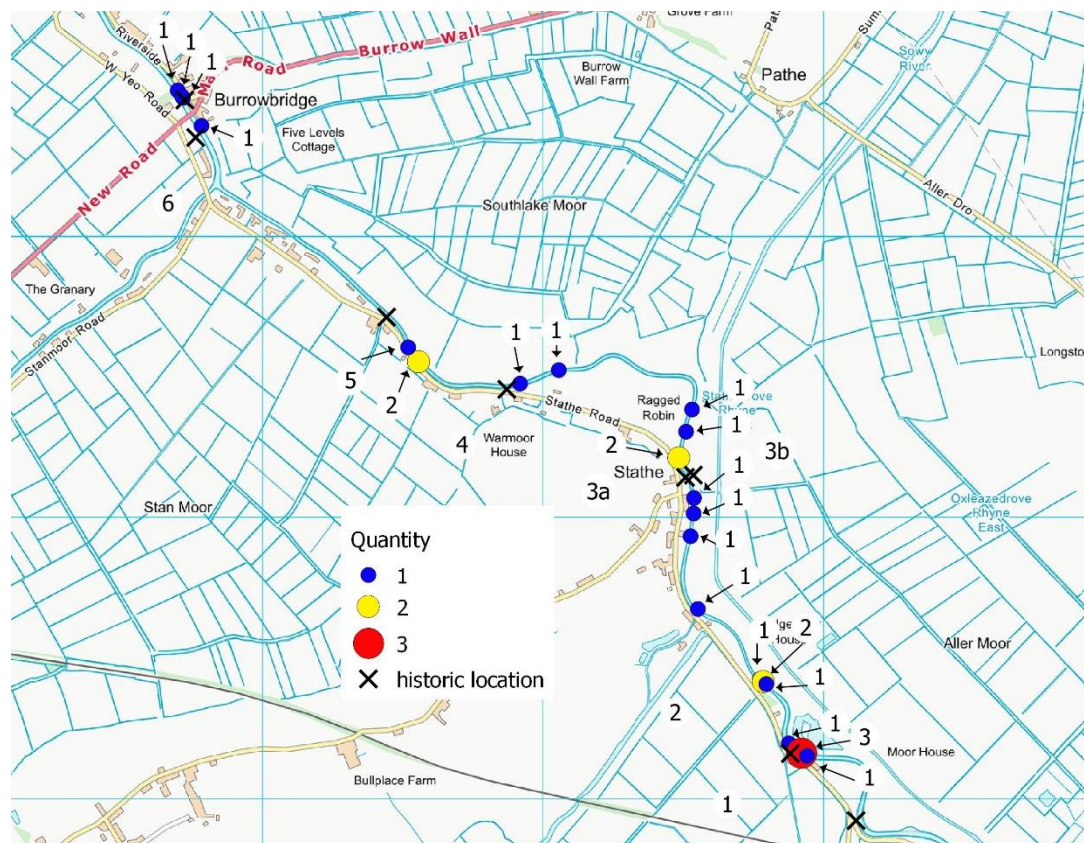
## 5. STATUS ASSESSMENT RESULTS

### Data

- 5.1.1 Twenty-six adult hairy click-beetle were swept from 21 locations between Oath and Burrowbridge in May 2018. Of the seven locations in which historic records have been made, three held the species in 2018 and numerous additional records were also made. Table 2 and Figure 3 summarise this data.

**Table 2. Locations with adult hairy click-beetle.**

| <b>SAMPLE LOCATION</b>     | <b>GRID REFERENCE</b> | <b>QUANTITY</b> | <b>STAGE</b> | <b>DATE</b> | <b>BANK</b> |
|----------------------------|-----------------------|-----------------|--------------|-------------|-------------|
| <b>Historic location 3</b> | ST 37485 29213        | 2               | Adult        | 18/05/18    | West        |
| <b>Historic location 3</b> | ST 37511 29306        | 1               | Adult        | 21/05/18    | East        |
| <b>New location</b>        | ST 37539 29070        | 1               | Adult        | 21/05/18    | East        |
| <b>New location</b>        | ST 37538 29015        | 1               | Adult        | 21/05/18    | East        |
| <b>New location</b>        | ST 37527 28934        | 1               | Adult        | 21/05/18    | East        |
| <b>New location</b>        | ST 37553 28675        | 1               | Adult        | 21/05/18    | East        |
| <b>New location</b>        | ST 37779 28420        | 1               | Adult        | 21/05/18    | East        |
| <b>New location</b>        | ST 37786 28417        | 2               | Adult        | 21/05/18    | East        |
| <b>New location</b>        | ST 37797 28408        | 1               | Adult        | 21/05/18    | East        |
| <b>New location</b>        | ST 37877 28197        | 1               | Adult        | 21/05/18    | East        |
| <b>New location</b>        | ST 37923 28162        | 3               | Adult        | 21/05/18    | North       |
| <b>New location</b>        | ST 37934 28161        | 1               | Adult        | 21/05/18    | North       |
| <b>Historic location 3</b> | ST 37532 29385        | 1               | Adult        | 22/05/18    | East        |
| <b>New location</b>        | ST 37057 29525        | 1               | Adult        | 22/05/18    | North       |
| <b>New location</b>        | ST 36919 29477        | 1               | Adult        | 22/05/18    | North       |
| <b>Historic location 5</b> | ST 36557 29555        | 2               | Adult        | 22/05/18    | South       |
| <b>Historic location 5</b> | ST 36520 29606        | 1               | Adult        | 22/05/18    | South       |
| <b>New location</b>        | ST 35783 30394        | 1               | Adult        | 23/05/18    | East        |
| <b>Historic location 7</b> | ST 35716 30495        | 1               | Adult        | 23/05/18    | East        |
| <b>Historic location 7</b> | ST 35717 30494        | 1               | Adult        | 23/05/18    | East        |
| <b>Historic location 7</b> | ST 35714 30499        | 1               | Adult        | 23/05/18    | East        |



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**Figure 3. Locations on the River Parrett where adult hairy click-beetles were recorded in 2018, and historically.**

## Section 5 – End

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## 6. HABITAT ASSESSMENT RESULTS

### 6.1 General river channel character

6.1.1 The river channel divides into three or four zones, depending on the bank management regime. These comprise: -

**Zone 1:** Closest to the river is a zone of soft silt, which reed-sweet grass is growing into and beginning to stabilise. The substrate is semi-fluid and floods regularly, daily or less regularly depending on height.

**Zone 2:** Above Zone 1 there is a 1-3 m wide band of reed-sweet grass, the extent mostly determined by the profile of the bank. This is consolidated by reed canary-grass roots, organic litter and flood refuse. The largest stands of reed canary-grass develop on gently sloping terraces that are above the neap tide level, but which are still flooded on the highest tides.

**Zone 3:** Above Zone 2 there is a 2-5 m wide band of tall ruderal vegetation, particularly stinging nettle *Urtica dioica*, as well as broad-leaved dock *Rumex obtusifolius* and common comfrey *Symphytum officinale*.

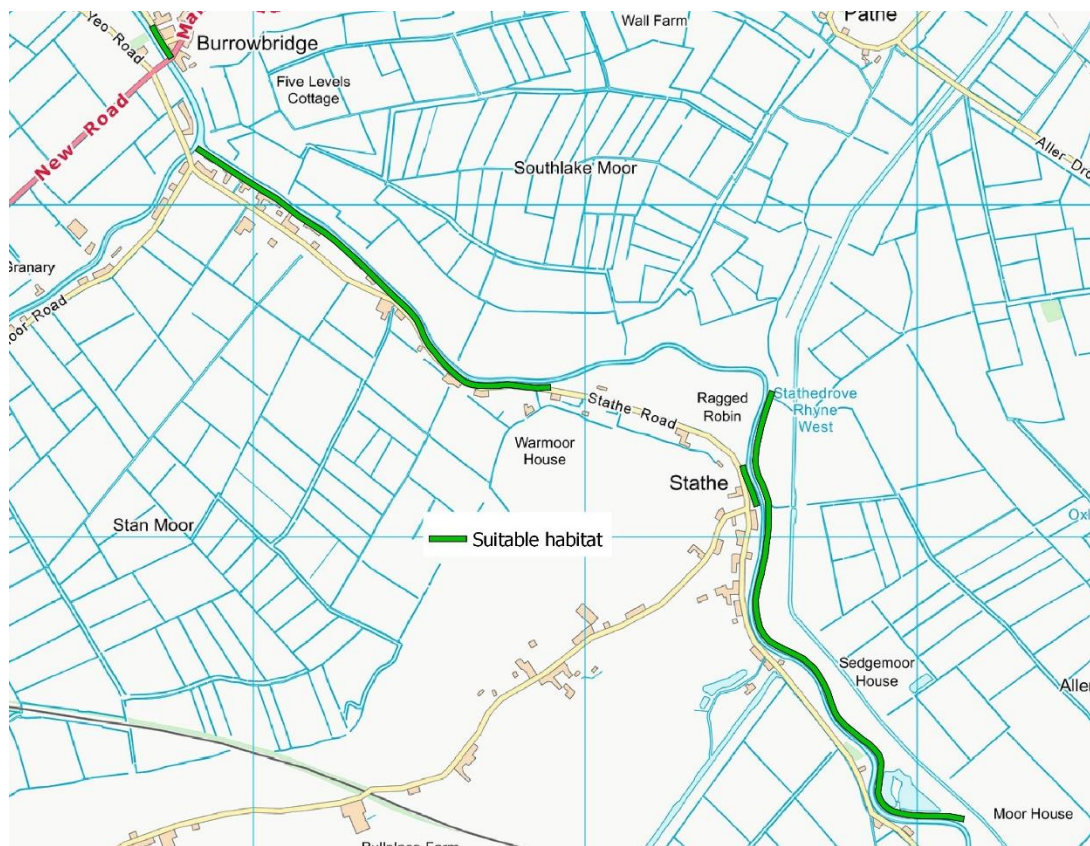
**Zone 4:** Above Zone 3 the vegetation is mown on many sections of bank and comprises short turf.

6.1.2 This zonation is modified by grazing, which reduces reed canary-grass to a 50 cm strip at the water margin. Above this is a mixture of bare ground, short turf and occasional ruderal species.

### 6.2 Overall summary of habitat suitability

6.2.1 Based on observations of habitat where hairy click beetles were recorded, and absent, it is possible to characterise typical habitat for adult hairy click beetle as gently sloping tidal terraces with dense, wide stands of reed canary-grass (Zone 2). These locations are shown on Figure 4.





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**Figure 4. Suitable habitat for hairy click beetle on the banks of the River Parrett in 2018.**

### 6.3 Sample Location 1 – Red Hill junction

- 6.3.1 Sample Location 1 comprised a 200 m section of the River Parrett bank upstream from the junction of Stathe Road and Red Hill. This was surveyed from the Stathe bank, from ST 38113 27940 to ST 38262 27865. Despite historic records, in 2018 the habitat comprised little in the way of reed canary-grass on a steep lower channel face (c. 45°) and is not typical of the vegetation structure with which the species is associated. No hairy click-beetle adults were recorded.

### 6.4 Sample Location 2 – Stathe House

- 6.4.1 Sample Location 2 comprised a 200 m section of the River Parrett bank upstream from Stathe House. This was surveyed from the Stathe bank, from ST 37853 28256 to ST 37937 28145. As with Sample Location 1, this is a locality with previous records of hairy click-beetle, but the habitat composition and structure were materially identical

to Location 1 and no adults or larvae were recorded. Photo 2 illustrates the character of the habitat present in Sample Location 2.



**Photo 2. River Parrett Sample Location 2 upstream from ST 37870 28182; showing a steep substrate, poor habitat structure and reed canary-grass limited to a narrow fringe on the water margin.**

## **6.5 Sample Location 3 – Stathe Bridge**

6.5.1 Sample Location 3 was surveyed on both the west and east banks.

### Sample Location 3a – West bank

6.5.2 On the Stathe bank, Sample Location 3 comprised a 120 m section of the River Parrett bank downstream from Stathe Bridge from ST 37524 29098 to ST 37483 29210. The habitat here broadly accords with that known to be exploited by the species, comprising a monotypic 2-3 m belt of unmanaged reed canary-grass growing on a shallow lower channel face with a gentle *c.* 10-20° slope (see Photo 3). This is a locality with previous records of hairy click-beetle, and in 2018 two adults were swept



in one 10 m stretch. In addition, three possible hairy click-beetle larvae were exposed at 20 cm depth in a soil pit.



**Photo 3. River Parrett Sample Location 2 downstream from ST 36557 29555; where two adult hairy click-beetle were swept.**

#### Sample Location 3b – East bank

- 6.5.3 On the Burrowbridge bank, a 400 m section downstream from the Stathe bridge from ST 37538 29099 to ST 37557 29471 was surveyed. The habitat here broadly accords with that known to be exploited by the species, comprising a monotypic 2-3 m belt of unmanaged reed canary-grass growing on a shallow lower channel face with a gentle *c.* 10-20° slope. This is a locality with previous records of hairy click-beetle, and in 2018 two adults were recorded but no larvae were encountered in a soil-pit.

### **6.6 Sample Location 4 – Parrett Cottage**

- 6.6.1 Sample 4 comprised a 100 m section downstream from War Moor towards the confluence with the River Tone from ST 36889 29461 to ST 36778 29464. Here the habitat is typical of that known to be exploited by the species and comprises a



monotypic 2-3 m belt of unmanaged reed canary-grass growing on a shallow lower channel face with a gentle *c.* 15-30° slope. Despite historic records of hairy click-beetle, no adults or larvae were recorded.

## **6.7 Sample Location 5 – Parsonage Farm**

- 6.7.1 Sample Location 5 comprised a 250 m section of the River Parrett bank downstream from War Moor towards the confluence with the River Tone from ST 36571 29527 to ST 36197 29937. Here again, the habitat is typical of that known to be exploited by the species and comprises a monotypic 2-3 m belt of unmanaged reed canary-grass growing on a shallow lower channel face with a gentle *c.* 15-30° slope. This is a locality with previous records of hairy click-beetle, and in 2018 three adults were recorded but no larvae were encountered in a soil-pit.

## **6.8 Sample Location 6 – Walkeys Farm**

- 6.8.1 Sample Location 6 comprised a 280 m section upstream of Burrowbridge from ST 35741 30425 to ST 35805 30164. Although the lower channel face is shallow with a *c.* 20° slope and has good quantities of reed canary-grass, much of the vegetation has been cut close to the river channel and is therefore not typical of the habitat structure exploited by hairy click-beetles. Despite annual records of hairy click-beetle from Environment Agency surveillance between 2010 and 2016, no adults or larvae were recorded. Photo 4 illustrates the habitat present.



**Photo 4. River Parrett Sample Location 6 downstream from ST 35795 30341; the reed canary-grass had recently been cut close to the river channel.**

## **6.9 Sample Location 7 – Riverside Road**

- 6.9.1 Sample Location 7 comprises a 250 m section of the River Parrett bank downstream of Burrowbridge from ST 35749 30449 to ST 35602 30641. This sample was surveyed on the Burrowbridge side alone. The habitat here comprised a 3-4 m belt of unmanaged reed canary-grass dominated vegetation with common reed, growing on a shallow lower channel face with a *c.* 20-30° slope. This is a locality with previous records of hairy click-beetle, and three adults were recorded in 2018, but no larvae were encountered in a soil-pit. Photo 5 illustrates the habitat present in 2018.





**Photo 5. Sample Location 7 downstream from ST 35720 30493; where three adult hairy click-beetle were swept.**

## **6.10 Other locations on the River Parrett**

### River Parrett upstream from Oath Lock

- 6.10.1 A 300 m section of the Burrowbridge bank upstream of Oath lock from ST 38275 27886 to ST 38659 27639 was surveyed. This section is grazed and had a different character to the river downstream from the lock, with reed canary-grass largely replaced by reed sweet-grass *Glyceria maxima*. No adult hairy click-beetles were recorded.

### River Parrett to Oath Lock

- 6.10.2 A 430 m section of river bank to Oath Lock was surveyed on the Burrowbridge side, from ST 38119 28143 to ST 38275 27886. The habitat here comprises dense ruderal vegetation on the upper bank, and scattered reed canary-grass along a largely bare 1-1.5 m strip above the river channel (see Photo 6). No adult hairy click-beetles were recorded.



**Photo 6. River Parrett downstream from ST 38143 22977; unmanaged bank with poorly developed reed canary-grass zone.**

#### River Parrett at Oath

- 6.10.3 The Stathe bank of the River Parrett between ST 37937 28143 and ST 38113 27943 was visually inspected from adjacent sections, and the opposite bank. This section was heavily grazed by cattle, with limited growth of reed canary-grass (see Photo 7) and the habitat is not typical of that known to be exploited by hairy click-beetles.





**Photo 7. River Parrett upstream from ST 37946 28141; heavy poaching from cattle grazing, with limited growth of reed canary-grass.**

River Parrett upstream from Stathe Bridge

- 6.10.4 A 1.3 km section of river bank upstream from the eastern end of Southlake Moor was surveyed on the Burrowbridge side, from ST 37538 29099 to ST 38119 28143. The habitat here comprises a monotypic 1-3 m belt of unmanaged reed canary-grass growing on a shallow lower channel face with a *c.* 20-30° slope (see Photo 8). Fourteen adult hairy click-beetle were recorded, but no larvae were encountered in a soil-pit.



**Photo 8. River Parrett downstream from at ST 37923 28162; where an adult hairy click-beetle was swept.**

#### River Parrett at War Moor

- 6.10.5 Access permissions that would have allowed the survey of the totality of the bank at War Moor were not gained. As a result, the Stathe bank was not fully surveyed. However, a visual assessment found a 350 m section between ST 37483 29210 and ST 37473 29501 held a monotypic 2 m belt of unmanaged reed canary-grass, which is typical of habitat known to be exploited by hairy click-beetles. The remaining 600 m downstream between ST 37473 29501 and ST 36889 29461 was grazed by horses, poached, and held only scattered reed canary-grass.

#### River Parrett adjacent to Southlake Moor

- 6.10.6 A 2.2 km section of river bank upstream from Burrowbridge was surveyed on the Burrowbridge side, from ST 35811 30348 to ST 37550 29427. The habitat throughout was heavy poached due to cattle grazing on Southlake Moor, and reed canary-grass was present as a fringe less than 1 m wide, with culms grazed down, and large patches of bare ground and compacted soil (see Photo 9). Two adult hairy click-beetles were recorded opposite the western half of War Moor, one of which was covered in mud.



It is likely that its underground overwintering site was compressed by cattle trampling. This is in contrast to the other 25 adult specimens during this survey which had pristine pubescence. There is no information available about the effects of cattle trampling on hairy click-beetle larvae, although there is some research about other invertebrates. Numbers of larvae for the soil-inhabiting crane-fly *Molophilus ater* were lower in trampled peat along a footpath than in adjacent untrampled ground (Bayfield, 1979). Two out of fourteen soil cores produced adults, compared with nine out of fourteen from undisturbed ground (Bayfield, 1979). It seems likely that hairy click-beetle larvae might be killed by heavy compaction from grazing, as click beetle larvae in the present survey were found at shallow depths (c. 10-20 cm).



**Photo 9. River Parrett downstream from ST 37194 29553; poaching from cattle grazing, with limited growth of reed canary-grass.**

#### River Parrett between Stathe and the River Tone confluence

- 6.10.7 Access permissions that would have allowed survey of a 400 m stretch of the River Parrett bank between Stathe and the River Tone confluence on the Stathe bank were not obtained. However, the habitat between ST 36197 29937 to ST 35839 30175 was assessed from the opposite bank and comprised a monotypic 2-3 m belt of unmanaged reed canary-grass, growing on a shallow lower channel face with a c. 20-30° slope.

The upper bank had been cut recently by the Environment Agency. Given the presence of hairy click-beetle downstream in Burrowbridge, and upstream towards War Moor, presence is entirely possible in this section as the habitat was typical of that known to be exploited by the species.

#### River Parrett below King Alfred Inn

- 6.10.8 A 100 m section of the River Parrett bank upstream from Burrowbridge was surveyed on the Burrowbridge side, from ST 35754 30436 to ST 35811 30348. The habitat here comprises diverse ruderal vegetation and a 1-2 m belt of unmanaged reed canary-grass. The lower channel profile is steep (*c.* 45°), with a slightly shallower mid-slope (*c.* 35°) (see Photo 10). One adult hairy click-beetle was recorded.



**Photo 10. River Parrett downstream from ST 35784 30389; where an adult hairy click-beetle was swept.**

#### River Parrett downstream from Saltmoor pumping station

- 6.10.9 A 200 m stretch of the River Parrett bank downstream from Saltmoor pumping station from ST 35286 30894 to ST 35166 30967 was surveyed from the Saltmoor side. The habitat comprised a 2 m belt of unmanaged reed canary-grass and common reed on a



shallow lower channel face with a *c.* 25-40° slope. Although the habitat composition and structure are typical of that known to be exploited by hairy click-beetles, no adults were recorded.

#### River Parrett downstream from Saltmoor Farm

- 6.10.10 A 200 m stretch of the River Parrett bank downstream from Saltmoor Farm from ST 34962 31252 to ST 34867 31366 was surveyed from the Saltmoor side. The habitat comprised a 2 m belt of unmanaged reed canary-grass with common reed on a shallow lower channel face with a *c.* 25-40° slope. Although the habitat composition and structure are typical of that known to be exploited by hairy click-beetles, no adults were recorded.

### **6.11 River Tone**

#### River Tone upstream of confluence with River Parrett

- 6.11.1 A 620 m stretch of the River Tone bank upstream from the confluence with the River Parrett was surveyed on the north side, from ST 35793 30158 to ST 35390 29747. The habitat comprised a monotypic 2-3 m belt of unmanaged reed canary-grass growing on a shallow lower channel face with a *c.* 20-30° slope, with the upper bank cut by the Environment Agency (see Photo 11). Although the habitat composition and structure are typical of that known to be exploited by hairy click-beetles, no adults were recorded.

#### River Tone downstream of confluence with River Parrett

- 6.11.2 The habitat on the south bank of the River Tone between ST 35798 30144 and ST 35396 29721 comprised a monotypic 2-3 m belt of reed canary-grass growing on a shallow lower channel face with a *c.* 20-30° slope. Although the habitat composition and structure are typical of that known to be exploited by hairy click-beetles, access permissions had not been gained and no survey was performed. The status of the species in this location therefore remains unknown.



**Photo 11. River Tone downstream from ST 35617 29955; with a 2 m belt of reed canary-grass left unmanaged, after cutting on the upper bank.**

## **Section 6 – End**

## 7. IMPACTS OF PROPOSED DREDGING & BANK REPROFILING

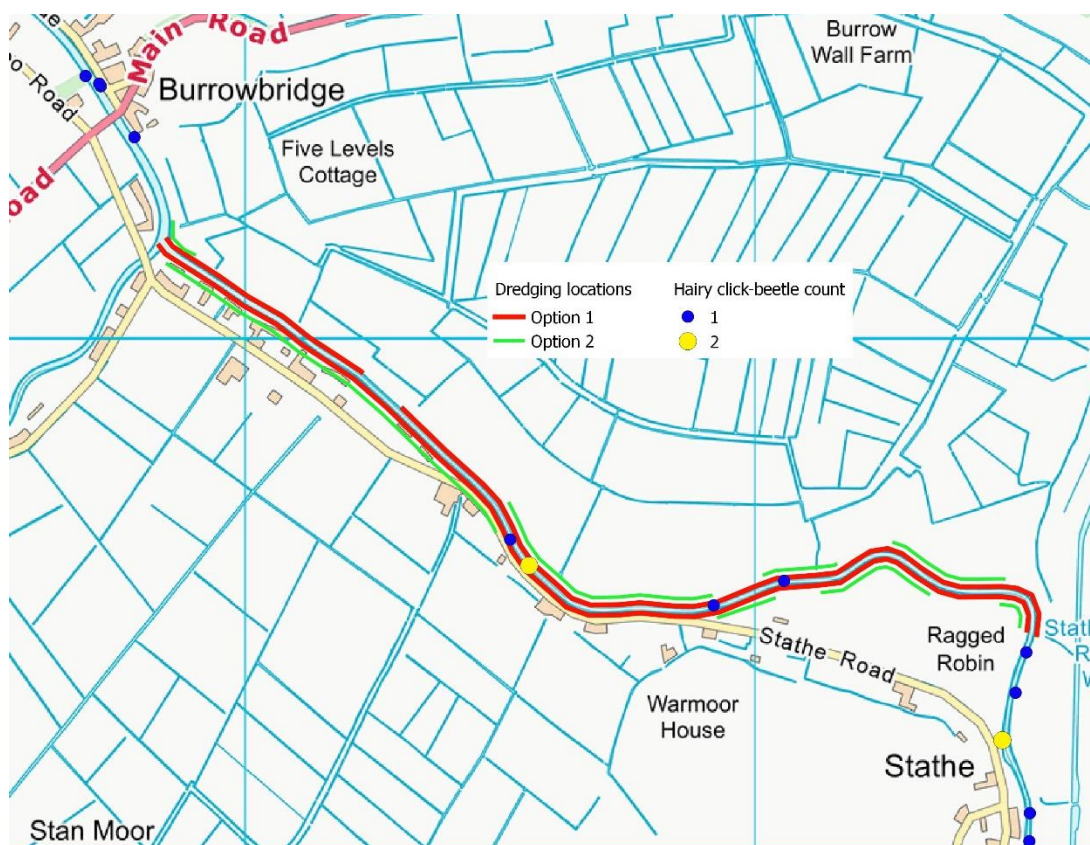
### 7.1 Dredging / reprofiling programme description

#### Timing

- 7.1.1 A one-off dredging programme on the River Parrett is planned by the Somerset Drainage Boards Consortium in September and October 2018, including bank reprofiling.

#### Extent

- 7.1.2 Dredging is proposed in the sections of channel shown on Figure 5. There are two options: -
1. Option 1 – Maximum flood risk benefit of works; and
  2. Option 2 – Single bank only mitigation.



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**Figure 5. The sections of the River Parrett where dredging is proposed, and the locations where hairy click-beetles were recorded in 2018.**

## **7.2 Potential impacts of proposed dredging on hairy click-beetle**

- 7.2.1 Any maintenance operations affecting the reed-sweet grass zone have potential to affect the hairy click-beetle.

### **Habitat loss**

- 7.2.2 The potential loss of habitat depends on the precise dredging locations. Option 1 would result in the loss of 39% (1,320 m) of the habitat typical of that known to be exploited by the hairy click-beetle between Oath and Burrowbridge, at least for as long as it takes reed canary-grass to re-establish on the river bank. The proposed dredging zone is contiguous with areas of limited habitat suitability on the grazed banks of Southlake and War Moors. As a result, the maximum distance from the centre of the dredging zone to habitat typical of that exploited by hairy click-beetle would be 1,025 m.
- 7.2.3 Option 2 would result in the loss of 28% (948 m) of the habitat typical of that known to be exploited by the hairy click-beetle between Oath and Burrowbridge, at least for as long as it takes reed canary-grass to re-establish on the river bank. As it is proposed to dredge on the Burrowbridge bank around Parrett Cottage, the maximum distance from the centre of the dredging zone to habitat typical of that exploited by hairy click-beetle would be 500 m.
- 7.2.4 The remainder of the proposed dredging is either on the Burrowbridge bank, or the Stathe bank adjacent to War Moor. The impact on suitable habitat for hairy click-beetle here should be minor, as the vegetation and habitat structure here is not typical of most locations where the species was recorded.

### **Mortality**

- 7.2.5 Adult hairy click-beetles have wings but have only been observed to fly over 1-2 m. As the dredging will take place in September and October, the risk to adults will comprise those that are in the transformation stages between larvae and adulthood and would emerge in the spring of 2019. The remaining members of the populations will be in the larval stages. All the beetles will therefore be within 20 cm of the ground surface around the succulent roots of reed canary-grass. As a result, the dredging will take place when adults and larvae are vulnerable, although it is more likely that adults might find an alternative hibernation site in autumn or spring than winter, when temperatures are lower.

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### 7.3 Constraints to mitigation

- 7.3.1 There are two significant constraints to defining effective mitigation, comprising: -
1. A paucity of knowledge regarding the need for intervention, which encompasses:
    - 
    - a. A lack of data in respect of how long it takes reprofiled banks to re-vegetate;
    - b. Whether the soils left by reprofiling are in fact suitable for reed canary-grass; and
    - c. What the migration distances over which hairy click-beetles might travel to re-colonise habitat following recovery actually are.
  2. A paucity of knowledge regarding the efficacy of mitigation action.
- 7.3.2 At present, it is unknown how long following reprofiling it will take before the vegetation composition and structure is typical of that exploited by the hairy click-beetle. Similarly, it is unknown whether the soils and substrate that is left by the reprofiling will be suitable for colonisation by reed canary-grass, or whether the grass needs a degree of silting before it can spread to dredged areas.

### 7.4 Recommendations for mitigation during works

- 7.4.1 Due to the constraints identified at Subsection 7.3, recommendations for mitigation in respect of the September and October 2018 dredging and reprofiling are limited to 'common sense' recommendations alone.

#### Excavated material

- 7.4.2 It is planned to place spoil on the landward side of the Burrowbridge bank on Southlake Moor. This will not affect any hairy click-beetle that might be present in the Burrowbridge bank on the channel side, although the reed canary-grass zone here is poorly developed.
- 7.4.3 Where reed-sweet grass is removed, it is likely to contain live hairy click-beetle larvae and adults. As the larvae recorded in the present study and previous research (Mendel 2003a) were within 20 cm of the ground surface, the impacts upon them might be mitigated by digging out turves of vegetation at a depth of at least 50 cm. Material might then be placed upright on the bank to maximise the likelihood that it may continue to grow and therefore support the larvae that depend upon it. In order to guard against frost penetration, the turves should be as large as possible and placed against each other in as large a mat as is practical. Turves with reed canary-grass should not be buried beneath other dredgings.

### Livestock fencing

- 7.4.4 If practical, bank sections and any excavated turves should be fenced to keep cattle out, in order that the substrate is undisturbed and the reed canary-grass has the best chance of re-establishing.
- 7.4.5 Fencing might also be reinstated on the Stathe bank of War Moor, to restrict access of horses to a smaller section of the river channel. This might help the vegetation and habitat structure develop, to resemble most locations where the species was recorded.

### Reprofiling

- 7.4.6 Based on observations of reed canary-grass and hairy click-beetle at the River Parrett, reprofiling should seek to create shallowly sloping tidal terraces, maximising the zone that is subject to flooding on the highest tides.

### Cutting

- 7.4.7 The cutting regime could be altered on the Stathe bank between Burrowbridge and the Saltmoor road bridge. There are recent records of hairy click-beetle on the bank here and it was found directly opposite below the King Alfred Inn. As no dredging is planned on this section, it should be managed to maximise habitat suitability for hairy click-beetle and thereby provide a robust donor population for the dredged and reprofiled sections. This should follow the prescription adopted on the River Tone upstream of the confluence with the River Parrett, where 2-3 m beside the channel is left uncut when the upper bank is mown.

### Pilot larval translocation

- 7.4.8 Although soil sampling has been largely ineffective in the present study, and previous research (Mendel 2003a), it is possible that a more efficient method could be developed to capture larvae, such as the use of baited stocking or pitfall traps. These have been used in surveillance of other click beetle species in agricultural fields (Morales-Rodriguez *et al.* 2017). If trapping could be developed to be successful for live larvae, it would open-up the possibility of removing the species from habitat before dredging takes place. Larvae could be relocated to areas which will not be impacted by dredging, potentially strengthening the population in these areas.



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## 7.5 Recommendations for defining robust mitigation.

- 7.5.1 The presence of the beetle and the need for dredging and reprofiling provide an opportunity for data-collection that might be used to inform mitigation action more widely in the UK. It is therefore recommended that the following be performed in order to define robust mitigation for future dredging and profiling operations: -
1. Data-collection and review;
  2. Vegetation surveillance; and
  3. Hairy click-beetle surveillance.

### Data-collection and review

- 7.5.2 The first stage of the mitigation design should be to contact the bodies responsible for the maintenance of the water-courses upon which other populations of hairy click-beetle are known to occur, to see whether they have already defined effective mitigation methods. Regardless, an information network should be established to share knowledge across all populations of the species, in order to ensure rapid transfer of information and the best possible safeguarding.
- 7.5.3 The second stage should be to collect and collate all data in respect of the lifecycles, propagation, methods by which they spread to new areas, and environmental requirements for both: -
1. Reed canary-grass (to include Ellenberg Indicator Values etc.); and
  2. Hairy click-beetle.
- 7.5.4 Understanding the life-cycle and propagation will inform the time of year when dredging and reprofiling is likely to be least damaging. Understanding the method of spread might lead to more effective ways of safeguarding the beetles (i.e. by using displacement to encourage mobile adults to migrate to areas outside the Zone of Influence of the dredging) and will give an insight into how the grass may again recolonise the reprofiled substrate. This information might also give some idea over what distance the beetles might move to recolonise habitat as it recovers, and what length of hostile ground might represent a barrier to movement. Understanding the environmental requirements will enable an assessment to be made as to what soils and substrate will support reed canary-grass, and which will not. Comparisons might also be investigated in respect of reprofiled banks where livestock do and do not have access.
- 7.5.5 A basic principle management for invertebrates is rotational management, where *“only a fraction of a site is managed in any one operation”* (Kirby 1992). However, there is no universally applicable ideal plot size, as this is defined by the objectives of individual management schemes (Kirby 1992).

- 7.5.6 Having reviewed the ecology of reed canary-grass and the hairy click-beetle, the most effective mitigation method would be a dredging programme that was performed in a zoned rotation. The number, width of zones and dredging interval would be defined by the length of time it takes the reed canary-grass to recolonise the reprofiled substrate and the beetles to recolonise the vegetation.

### Vegetation Surveillance

- 7.5.7 Following the dredging and reprofiling it is recommended that the stretch of the River Parrett be divided into surveillance zones as follows: -
1. Undisturbed banks where hairy click-beetle were recorded in 2018;
  2. Undisturbed banks where hairy click-beetle were not recorded in 2018;
  3. Dredged and reprofiled areas where hairy click-beetle were recorded in 2018; and
  4. Dredged and reprofiled areas where hairy click-beetle were not recorded in 2018.
- 7.5.8 Two replicates of each zone with as similar angles of slope as possible should be chosen and surveillance performed to record the following: -
1. Species composition of vegetation (using DAFOR);
  2. Vegetation height;
  3. Presence of livestock; and
  4. Density (defined on two levels, comprising: a) thick (no bare ground visible through sward); and, b) thin (ground visible through sward).
- 7.5.9 Surveillance should continue for a minimum of five years or until a reed canary-grass dominant sward with a thick density has been recorded in any un-grazed zone that was subject to dredging and reprofiling in autumn 2018. During this time, the feasibility of hydroseeding of reed canary-grass on the reprofiled banks might also be explored.

### Hairy click-beetle surveillance

- 7.5.10 It is recommended that hairy click-beetle surveillance be performed annually in all vegetation surveillance zones for five years, or until the species is encountered (whichever is sooner) to assess recolonisation by hairy click-beetle in any reprofiled habitat.
- 7.5.11 Particular consideration should be given to how the migration distance of the species might be established. This information would be of significant value in determining the width of rotation zones.



- 7.5.12 If the surveillance results are negative, consideration should be given to reintroducing larvae following the maturation of the habitat on reprofiled banks, subject to the development of an effective translocation methodology.

## **Section 7 – End**

## **8. CONCLUSION**

- 8.1.1 The hairy click-beetle occurs along the River Parrett in Somerset between 500 m downstream of Oath Lock and 250 m downstream of Burrowbridge. The species is associated with shallowly sloping tidal terraces, where dense stands of reed canary-grass establish and are subject to flooding on the highest tides.
- 8.1.2 Of an overall seven locations in which it is suggested that the species has historically occurred, it was only recorded in three in 2018, although fifteen new locations were also discovered.
- 8.1.3 The proposed dredging can be predicted to have a significant negative impact upon the hairy click-beetle population in the sections affected. Mitigation is proposed to ameliorate these effects. However, the mitigation methods are untested and their efficacy is unknown. Therefore, a surveillance programme is also recommended to attempt to assess the effect of the dredging impacts on the species status in the longer term and explore the possibility of capturing larvae in baited traps.

### **Section 8 – End**

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**APPENDIX A. RARITY STATUS CATEGORIES DEFINITIONS & CRITERIA.**

For the purposes of evaluating invertebrate faunas and priorities for conservation action, invertebrates are attributed various rarity status categories, the meanings of which are given below. Definitions and criteria are taken from Drake *et al.* (2007).

**A1. RED DATA BOOK****A1.1 Red Data Book Category 1 RDB1 – ENDANGERED**Definition

A1.1.1 Taxa which are in danger of extinction in Britain, and whose survival is unlikely if the causal factors continue operating.

A1.1.2 Taxa included in this category comprise: -

- Taxa whose numbers have been reduced to a critical level or whose habitats have been so dramatically reduced that they are deemed to be in immediate danger of extinction; and
- Taxa which are possibly extinct.

Criteria

A1.1.3 The criteria for selection into Red Data Book Category 1 comprise: -

- Species, which are known or believed, to occur as only a single population within one 10km square of the National Grid.
- Species, which only occur in habitats known to be especially vulnerable;
- Species, which have shown a rapid and continuous decline over the last twenty years and are now estimated to exist in five or fewer 10 km squares.
- Species which are possibly extinct but have been recorded this century but which if rediscovered would need protection.

**A2. REFERENCES**

Drake C, Lott D, Alexander K & Webb J 2007. *Surveying terrestrial and freshwater invertebrates for conservation evaluation*. Natural England Research Report NERR005. Natural England, Sheffield.

## SOMERSET LEVELS DRAINAGE BOARDS CONSORTIUM

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### River Parrett

## Oath to Burrowbridge: Benthic Macroinvertebrates

### 1 INTRODUCTION

John Associates was commissioned by the Somerset Drainage Board Consortium (SDBC) to undertake benthic macroinvertebrate sampling at four sample points between Oath Lock (the tidal limit of the River Parrett), and the confluence with the River Tone. All samples were preserved for subsequent laboratory identification to species level (where possible).

### 2 SITE LOCATION AND CONTEXT

Proposals to dredge approximately 4km of the River Parrett between Burrowbridge (at National Grid Reference [NGR] ST 35842 30207) and Oath (NGR ST 38308 27900) have the potential to impact a range of ecological habitats and associated species if these are not considered early in the planning process. The potential impacts of the proposals on the existing benthic macroinvertebrate assemblage was considered as part of this particular study.

The section of the River Parrett channel between Oath Lock and its confluence with the River Tone is considered to be broadly homogenous along its length, comprising the following physical habitat features<sup>1</sup>:

- Artificial channel with relatively simple planform and sinuosity resulting in (generally) a reduced physical habitat diversity in comparison with more semi-natural river systems (but recognizing this is characteristic of many watercourses in the Somerset Levels and Moors).
- Tidal influence resulting in at least diurnal vertical changes in the extent of bank features submerged and accessible to macroinvertebrates (depending on tidal state).
- All four macroinvertebrate sample points are located within the tidal influence and therefore some fluctuations in salinity will occur. Pure freshwater conditions will not occur at any time.
- A near absence of overhanging tree canopy resulting in virtually no shading or inputs of tree-sourced organic detritus (e.g. leaf litter), with water volume/ depth and transparency being the key regulators of water temperature.

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<sup>1</sup> Taken from "Draft Fish Habitat Technical Note", Johns Associates, 2018.

- A near absence of submerged trees or shrubs, including exposed roots.
- A near absence of coarse woody debris, log jams or leaf litter.
- Generally, an extensive presence of tall vegetation on the embanked upper river bank (above typical high tide levels), providing habitat for certain life-stages of aquatic macroinvertebrates e.g. damselfly adults.
- Generally, an extensive presence of submerged fine-leaved macrophytes that can be fully submerged or more exposed depending on river flows/tidal state. These stands also influence flow character with a greater influence on lower water column flow velocities and restricting flows across the wetted width, concentrating velocities between stands. Presence of other rooted macrophytes. These features provide a wider range of habitats for macroinvertebrate colonisation.
- Some variation in lower bank stability as a result of weathering and erosional activities. These are typically more notable below Stathe Bridge. Slab/cantilever and slump failures cause a more irregular bank form resulting in small backwaters or embayments (where collapsed sediment has been transported downstream). Narrower cross-sections or pinch points are present in the lower reaches, where bank failures have become stabilized and vegetated, which increase flow velocities under lower tidal states. Some overhangs are present causing some limited areas of shading, and some submerged overhangs are present as well.
- The bed substrate is dominated by clay with overlying silt.

The surrounding landscape is predominantly coastal and floodplain grazing marsh with areas of lowland meadows and semi-improved and improved neutral grassland (Figure 1). Numerous ditches and drains are present within the immediate local area, with permanently wet and ephemeral ponds and other standing waterbodies.



Figure 1: Location of the benthic macroinvertebrate sample points (S1, S2, S3 and S4). Sample point S1 is located just downstream of Oath Lock



## 3 METHODOLOGY


### 3.1 RATIONALE

An assessment of the macroinvertebrate assemblage present in a watercourse is a reliable indicator of the overall biological quality of the watercourse at that time. The use of British Monitoring Working Party (BMWP) scores highlights potential organic pollution within an aquatic system.

### 3.2 METHOD

Samples were taken on 6<sup>th</sup> June 2018, which represents a late-spring sample. Seasonal sampling maximizes the likelihood of capturing macroinvertebrate species from a watercourse given their relatively short life-cycles. Taking spring and autumn samples is generally accepted as the best practice method. Sampling in one season only carries with it the risk of missing key species, as certain life-cycle stages may not be aquatic at that time.

Macroinvertebrate samples were taken from four discrete locations downstream of Oath Lock (see Figure 1), as shown in Table 1.

| Site Number | Longitude      | Latitude       | Site Photograph                                                                      |
|-------------|----------------|----------------|--------------------------------------------------------------------------------------|
| S1          | 51° 3'38.03" N | 2° 53'33.54" W |   |
| S2          | 51° 3'41.03" N | 2° 54'01.10" W |  |

| Site Number | Longitude      | Latitude       | Site Photograph                                                                     |
|-------------|----------------|----------------|-------------------------------------------------------------------------------------|
| S3          | 51° 3'48.40" N | 2° 54'30.70" W |   |
| S4          | 51° 3'59.80" N | 2° 54'54.73" W |  |

**Table 1: Sample points**

Owing to the nature of the channel, (i.e. deep water and clay substrate), samples were obtained using a combination of methods, including 3 no. hauls of a naturalist's dredge of the substrate, followed by a 1-minute sweep of mid-channel floating and submerged macrophytes and marginal vegetation/ woody debris using a standard long-handled pond net. A sample of the sediment was taken at each location using a grab to approximately 10cm depth; this was washed through the pond net and added to the sample in order to maximize the chances of sampling burrowing species.

All samples were preserved using 70% industrial methylated spirit (IMS) and sealed in plastic pots for subsequent laboratory analysis.

Analysis was undertaken by experienced entomologist Dr. Bill Bellamy, with macroinvertebrates identified to species level (where possible). BMWP and Average Score Per Taxon (ASPT) were calculated for each sample.

## 4 RESULTS

The macroinvertebrate species contained in each of the four samples are shown in Table 2 below.

**Table 2: Macroinvertebrate Survey Results**

| Latin Name                     | Common Name           | BMWP Score | Number of Individuals |     |     |    |
|--------------------------------|-----------------------|------------|-----------------------|-----|-----|----|
|                                |                       |            | S1                    | S2  | S3  | S4 |
| Worms                          |                       |            |                       |     |     |    |
| Oligochaeta                    | Aquatic worm          | 1          | 1                     | 8   | 1   | 1  |
| Leeches                        |                       |            |                       |     |     |    |
| Piscicola geometra             | Fish leech            | 4          | 2                     |     | 3   |    |
| Molluscs                       |                       |            |                       |     |     |    |
| Potamopyrgus antipodarum       | Jenkins' spire shell  | 3          | 1                     | 2   |     | 5  |
| Bithynia tentaculata           | Common Bithynia       | 3          |                       |     | 1   |    |
| Lymnaea peregra                | Wandering snail       | 3          |                       | 1   | 5   |    |
| Physa acuta                    | Acute bladder snail   | 3          | 2                     |     | 3   | 2  |
| Planorbis planorbis            | Ram's horn snail      | 3          |                       |     |     | 1  |
| Anisus vortex                  | Whirlpool ramshorn    | 3          |                       |     |     | 1  |
| Sphaerium corneum              | Fingernail clam       | 3          | 1                     | 3   |     | 1  |
| Crustaceans                    |                       |            |                       |     |     |    |
| Asellus aquaticus              | Water hog-louse       | 3          | 40                    | 9   | 6   |    |
| Gammarus zaddachi              | Freshwater shrimp     | 6          | 175                   | 150 | 429 | 50 |
| Crangonyx pseudogracilis       | Freshwater shrimp     | 6          | 4                     |     |     |    |
| Insects – Damselflies (larvae) |                       |            |                       |     |     |    |
| Ischnura elegans               | Blue-tailed damselfly | 6          | 2                     | 5   | 4   | 3  |
| Calopteryx virgo               | Beautiful demoiselle  | 8          | 1                     |     | 2   | 3  |
| Insects – Alderflies (larvae)  |                       |            |                       |     |     |    |
| Sialis lutaria                 | Yellow alderfly       | 4          | 1                     |     |     |    |
| Insects – Mayflies (larvae)    |                       |            |                       |     |     |    |
| Centroptilum luteolum          | Small spurwing        | 4          | 1                     | 2   |     |    |
| Cloeon dipterum                | Pond olive mayfly     | 4          |                       | 11  | 1   |    |

| Latin Name                            | Common Name             | BMWP Score | Number of Individuals |             |             |             |
|---------------------------------------|-------------------------|------------|-----------------------|-------------|-------------|-------------|
|                                       |                         |            | S1                    | S2          | S3          | S4          |
| <i>Procladius bifidus</i>             | Pale evening dun mayfly | 4          |                       |             | 3           | 2           |
| <i>Caenis luctuosa</i> gp             | Anglers' Curse mayfly   | 7          | 3                     | 2           | 2           | 4           |
| <i>Caenis robusta</i>                 | Anglers' Curse mayfly   | 7          | 4                     | 1           |             |             |
| <b>Insects – Caddisflies (larvae)</b> |                         |            |                       |             |             |             |
| <i>Hydroptila</i> sp.                 | Cased caddisfly         | 6          |                       | 2           |             | 1           |
| <i>Anabolia nervosa</i>               | Cased caddisfly         | 7          | 1                     |             |             | 3           |
| <b>Insects – Water bugs</b>           |                         |            |                       |             |             |             |
| <i>Gerris</i> sp.                     | Pondskater              | 5          |                       |             |             | 1           |
| <b>Insects – Water beetles</b>        |                         |            |                       |             |             |             |
| <i>Halophilus sibiricus</i>           | Diving beetle           | 5          | 1                     |             |             |             |
| <i>Dytiscidae</i> (larvae)            | Diving beetle           | 5          | 1                     |             |             |             |
| <i>Gyrinus substriatus</i>            | Whirligig beetle        | 5          |                       |             | 1           |             |
| <i>Elmidae aenea</i>                  | Riffle beetle           | 5          |                       |             | 1           |             |
| <i>Oulmus tuberculatus</i>            | Riffle beetle           | 5          | 1                     |             | 3           |             |
| <i>Donacia simplex</i>                | Leaf beetle             | -          |                       |             | 1           |             |
| <b>Insects – True flies (larvae)</b>  |                         |            |                       |             |             |             |
| <i>Simulium erythrocephalum</i>       | Blackfly                | 5          | 30                    | 1           |             |             |
| <i>Orthocladinae/ Diamesinae</i>      | Non-biting midge        | 2          | 3                     | 12          | 15          | 5           |
| <i>Chironominae</i>                   | Non-biting midge        | 2          | 5                     | 1           |             |             |
| <i>Ceratopogonidae</i>                | Biting midge            | -          |                       |             |             | 1           |
| <b>TOTAL INVERTEBRATE TAXA</b>        |                         |            | <b>21</b>             | <b>15</b>   | <b>17</b>   | <b>16</b>   |
| <b>BMWP</b>                           |                         |            | <b>81</b>             | <b>49</b>   | <b>60</b>   | <b>64</b>   |
| <b>BMWP TAXA</b>                      |                         |            | <b>18</b>             | <b>12</b>   | <b>14</b>   | <b>14</b>   |
| <b>ASPT</b>                           |                         |            | <b>4.5</b>            | <b>4.08</b> | <b>4.29</b> | <b>4.57</b> |

Samples S3 and S4 also contained low numbers of three-spined stickleback *Gasterosteus aculeatus*, (one individual and 14 individuals respectively), whilst sample S4 also contained two juvenile flounder *Platychthys flesus*, which confirms the saline influence.



## 5 CONCLUSIONS

There were no notable or rare species found in any of the samples and all were characteristic of lowland waterbody habitat at or around the tidal limit with low diversity. However, relatively high numbers of the brackish shrimp *Gammarus zaddachi* were recorded from all four samples, with a maximum count of 429 individuals from sample S3.

BMWP scores were generally low, although sample S1 contained some higher-scoring taxa (including blackfly larvae, water beetles, alderfly larvae and the cased caddisfly larva *Anabolia nervosa*), which explains the higher score of 81. All samples had a very similar ASPT, indicating a similar assemblage across the four sites.

Whilst a number of these species may be lost from the River Parrett as a result of the dredging works, the mobile nature of these species, together with their comparatively short life-cycles (not all of which are aquatic for most species), will mean that recovery will be rapid. Downstream drift of macroinvertebrates may also assist in the re-colonisation of the dredged section of river following completion of the works.

To obtain a more accurate picture of the macroinvertebrate assemblage present within this section of the River Parrett, autumn samples taken from the same sample points could be taken to ascertain whether any additional species are present (including notable species). A 'control' sample taken upstream of Oath Lock would also be useful in assessing the species present which could contribute to re-colonisation.

Author: Liz Johns BSc MSc CEnv MCIEEM MRSB, Director

Johns Associates Ltd  
The Old Brewery  
Newtown  
Bradford on Avon BA15 1NF  
T: 01225 723652  
W: [johnsassociates.co.uk](http://johnsassociates.co.uk)

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## SOMERSET LEVELS DRAINAGE BOARDS CONSORTIUM

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### River Parrett

## Oath to Burrow Bridge: Ramsar Invertebrates

### 1 INTRODUCTION

John Associates was commissioned by the Somerset Levels Drainage Boards Consortium (SLDBC) to undertake a desk-based review of the habitat requirements of a number of Ramsar invertebrates which are known to be present within local designated sites and to assess the likely presence of these species within the proposed stretch of the River Parrett to be dredged.

### 2 STATUS

The Somerset Levels and Moors were designated as a Ramsar wetland in June 1997. Covering an area of 6,388.49 hectares, the Ramsar site is bounded by Bridgewater Bay in the west and the higher ground of Mendips, Dorset Hills, Blackdown Hills, Brendons and Quantocks.

The Ramsar site consists of a series of Sites of Special Scientific Interest (SSSIs) within the largest area of lowland wet grassland and associated wetland habitat remaining in Britain. It covers about 35,000 hectares in the flood plains of the Rivers Axe, Brue, Parrett, Tone and their tributaries. The majority of the site is only a few metres above mean sea level and drains through a large network of ditches, rhynes, drains and rivers. Flooding can affect large areas in winter depending on rainfall and tidal conditions.

The site attracts internationally important numbers of wildfowl in winter and is one of the most important sites in southern Britain for breeding waders. The network of rhynes and ditches support an outstanding assemblage of aquatic invertebrates, particularly beetles.

The Somerset Moors and Levels Ramsar Site supports 17 nationally important species of British Red Data Book invertebrates.

The status of each of the invertebrates to be considered as part of this assessment is outlined in Table 1.

Table 1: Status of each invertebrate species considered as part of this assessment

| Common name ( <i>Latin name</i> )                             | Status                                                                                                                                                                                                 |
|---------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Lesser silver water beetle ( <i>Hydrochara caraboides</i> )   | <ul style="list-style-type: none"> <li>• Wildlife &amp; Countryside Act 1981 (as amended): Schedule 5 Sections 9.1, 9.4a, 9.4b, 9.4c, 9.5a</li> <li>• RedList GB post2001 – Near Threatened</li> </ul> |
| Flowering-rush weevil ( <i>Bagous nodulosus</i> )             | <ul style="list-style-type: none"> <li>• NERC S.41 List</li> <li>• RedList GB Pre94 - Endangered</li> </ul>                                                                                            |
| Orange-horned green soldierfly ( <i>Odontomyia angulata</i> ) | <ul style="list-style-type: none"> <li>• RedList GB Pre94 - Vulnerable</li> </ul>                                                                                                                      |
| Leaf beetle ( <i>Oulema erichsoni</i> )                       | <ul style="list-style-type: none"> <li>• RedList GB post2001 - Endangered</li> </ul>                                                                                                                   |
| Large-mouthed valve snail ( <i>Valvata macrostoma</i> )       | <ul style="list-style-type: none"> <li>• NERC S.41 List</li> </ul>                                                                                                                                     |
| Ornate brigadier true fly ( <i>Odontomyia ornata</i> )        | <ul style="list-style-type: none"> <li>• RedList GB Pre94 - Vulnerable</li> </ul>                                                                                                                      |
| Large marsh grasshopper ( <i>Stethophyma grossum</i> )        | <ul style="list-style-type: none"> <li>• RSPB Priority Species</li> <li>• NERC S.41 List</li> <li>• RedList GB post2001 – Near Threatened</li> </ul>                                                   |
| A snail-killing fly ( <i>Pteromicra leucopeza</i> )           | <ul style="list-style-type: none"> <li>• RedList GB Pre-94 - Vulnerable</li> </ul>                                                                                                                     |
| Sea club-rush hoverfly ( <i>Lejops vittata</i> )              | <ul style="list-style-type: none"> <li>• RedList GB post2001 – Near Threatened</li> </ul>                                                                                                              |
| Soldier beetle ( <i>Cantharis fusca</i> )                     | <ul style="list-style-type: none"> <li>• Not known</li> </ul>                                                                                                                                          |
| Rove beetle ( <i>Paederus caligatus</i> )                     | <ul style="list-style-type: none"> <li>• RedListGB Pre-94 - Rare</li> </ul>                                                                                                                            |
| Water beetle ( <i>Hydaticus transversalis</i> )               | <ul style="list-style-type: none"> <li>• Nationally scarce</li> </ul>                                                                                                                                  |
| Water beetle ( <i>Dytiscus dimidiatus</i> )                   | <ul style="list-style-type: none"> <li>• RedList GB post-2001 – Near Threatened</li> </ul>                                                                                                             |
| Great silver water beetle ( <i>Hydrophilus piceus</i> )       | <ul style="list-style-type: none"> <li>• RSPB Priority Species</li> <li>• RedList GB post2001 – Near Threatened</li> </ul>                                                                             |
| Water beetle ( <i>Limnebus aluta</i> )                        | <ul style="list-style-type: none"> <li>• RedList GB post2001 – Near Threatened</li> </ul>                                                                                                              |
| Water beetle ( <i>Laccornis oblongus</i> )                    | <ul style="list-style-type: none"> <li>• RedList GB post2001 – Near Threatened</li> </ul>                                                                                                              |

### 3 DESK-BASED REVIEW OF INVERTEBRATE SPECIES

This section presents a summary of the habitat requirements of each of the Ramsar invertebrate species being considered, together with an initial assessment of the likelihood of these species being present within (or adjacent to) the stretch of the River Parrett to be dredged. The full text from the preliminary desk-based assessment (performed by entomologist Dr. Bill Bellamy) is contained in Appendix 1 to this report.

#### **Lesser Silver Water Beetle (*H. caraboides*)**

*H. caraboides* is a strong-swimming species living in permanent, well-vegetated ponds and drainage ditches. On the Somerset Levels, it appears to be restricted to swamp areas and ditches associated with peat moors.

##### Habitat Requirements

- Still, or very slow-flowing water;
- Shallow, often seasonally inundated waterbodies;
- Leafy or detritus-rich substrates;
- Clear water, without excessive growth of floating duckweeds;
- Abundant invertebrate prey, especially small Crustacea and *Asellus aquaticus* (water hog-louse); and
- Mats of floating sweet-grass *Glyceria fluitans*.

##### Assessment of Likely Presence

It is considered unlikely that *H. caraboides* would be found in the main River Parrett channel within the dredging area as the habitat is unfavourable. The ditches either side of the R. Parrett are also unlikely to support this species **if the underlying clay is not mantled with peat** but a further review of the local geology is required before this can be confirmed. The NBN Atlas shows the distribution of *H. caraboides* is confined to the northern area of the Somerset Levels above Bridgewater. The nearest record to the dredging site is near Beer.

#### **Flowering-rush Weevil (*B. nodulosus*)**

A very rare weevil associated with the flowering-rush *Butomus umbellatus* with the larvae and pupae found in flowering and vegetative stems. Found in ditches, dykes, ponds and water bodies with little or no flow.

##### Habitat Requirements

- Still, or very slow-flowing water;
- Presence of flowering-rush *B. umbellatus*.

##### Assessment of Likely Presence

It is considered very unlikely that *B. nodulosus* would occur in the main River Parrett within the dredging area as the habitat is unfavourable. The absence of flowering rush in the surrounding ditches would also indicate that it is unlikely to be recorded in the vicinity. There are no local records on the NBN Atlas.



## Orange-horned Green Soldierfly (*O. angulata*)

### Habitat Requirements

The orange-horned green soldierfly was historically known from the Brue valley moors from Street Heath to Edington (Vice-County [VC] 6). It is a wetland species found in old fens and wet commons with pingo pools. It was historically found in a small area of the Somerset Moors where the habitat may have been grazing marsh but could have been more similar to wet fenny heath on peat. Larvae have been recorded from the vegetated edge of pools, and they may be amphibious rather than truly aquatic as some of the pools are ephemeral.

### Assessment of Likely Presence

It is considered very unlikely that *O. angulata* would occur in the main River Parrett within the dredging area as the habitat is unfavourable. There is a need to review the local geology of the surrounding area to establish whether adjacent pools could support the species; however, this is considered unlikely. The closest record of this species on the NBN Atlas is at Westonzoyland.

## The Ornate Brigadier (*O. ornata*)

### Habitat Requirements

Found in vegetated marsh ditches with less intensive agriculture as they are threatened by pesticides and eutrophication in addition to vigorous ditch clearance. This species is nationally scarce, being recorded in less than 40 hectads since 1990. However, the species is not showing a decline.

### Assessment of Likely Presence

It is considered very unlikely to be found in the main River Parrett channel within the dredging area as the habitat is unfavourable. There are unconfirmed reports of *O. ornata* from ditches near Burrowbridge so it may be pertinent to sample suitable ditches adjacent to the dredging site.

## Leaf Beetle (*O. erichsoni*)

### Habitat Requirements

This beetle is found on floating sweet-grass (*Glyceria fluitans*) in wet peat cuttings or trenches with little other vegetation, or on heaths.

### Assessment of Likely Presence

It is considered very unlikely to be found in the main River Parrett channel within the dredging area as the habitat is unfavourable. It is also considered unlikely to be found in adjacent waterbodies/ ditches. There are no records of this species south of Bridgewater.

## Large-mouthed Valve Snail (*V. macrostoma*)

### Habitat Requirements

In the UK, the large-mouthed valve snail is found in still or slowly-flowing hard waters, in drainage ditches on lowland grazing levels. It is very localized.

### Assessment of Likely Presence

It is considered very unlikely to be found in the main River Parrett channel within the dredging area as the habitat is unfavourable. It could be found in the adjacent ditches, although this is unlikely unless there are historic records to suggest previous presence. The NBN Atlas shows a cluster of records near the West Sedgemoor Drain near Stoke St. Gregory.

## **Large Marsh Grasshopper (*S. grossum*)**

### Habitat Requirements

The large marsh grasshopper is a rare species with colonies being located only in Somerset, Wiltshire, Hampshire and Surrey. It only occurs in marshy habitats, the prime habitat being acid bogs with clumps of tussocky grass. The grasshopper's restriction to wet habitats means that it is extremely vulnerable to drainage and was undoubtedly more common 200 years ago. Most surviving colonies are now well protected within nature reserves.

### Assessment of Likely Presence

It is considered very unlikely to be directly affected by the proposed dredging of the River Parrett. All but one of the NBN Atlas records are from north of Bridgewater.

## **A Snail-killing Fly (*P. leucopeza*)**

### Habitat Requirements

This species is very rare. It is found in older traditional wetland systems.

### Assessment of Likely Presence

It is unlikely that this species will be affected by the proposed dredging works. Only one NBN Atlas record exists for the Somerset Levels; near Meare (unconfirmed). There are only 44 records of this species for the whole of the UK.

## **Sea Club-rush Hoverfly (*L. vittata*)**

### Habitat Requirements

A very rare hoverfly of coastal levels and brackish marsh habitat where sea club-rush (*Scirpus maritimus*) is abundant. The adult hoverflies visit the flowers of sea club-rush, *Phragmites* and male *Typha*.

### Assessment of Likely Presence

It is unlikely that this species will be affected by the proposed dredging works, however, locally-occasional stands of sea club-rush were recorded during the Phase 1 Habitat Survey undertaken by Johns Associates in 2018. One unconfirmed NBN Atlas record near Burrowbridge but not on the main R. Parrett channel.

## **Soldier Beetle (*C. fusca*)**

### Habitat Requirements

A rare beetle found in bushes, hedges and meadows. WWT Consulting found soldier beetle individuals whilst undertaking sweep surveys in vegetation in North Somerset in 2014 along with *Odontomyia ornata* (precise location not given).

### Assessment of Likely Presence

This species will not be impacted by the proposed dredging of the River Parrett between Oath and Burrowbridge. However, it may be affected if there is disturbance to bushes and hedges as a result of the dredging operations, although this is considered unlikely. The nearest NBN Atlas records of this species are from Westonzoyland and Stoke St. Gregory.

### **Rove Beetle (*P. caliagatus*)**

#### Habitat Requirements

A very rare beetle found in damp, terrestrial vegetation.

### Assessment of Likely Presence

It is very unlikely that this species will be affected by the proposed dredging works unless the terrestrial margins are significantly affected by the works. There are only 45 NBN Atlas records of this species for the whole of the UK, with two unconfirmed records from the Somerset Levels north of Shapwick.

### **Water Beetle (*H. transversalis*)**

#### Habitat Requirements

*H. transversalis* is found in permanent, densely vegetated pools and ditches. It is fairly common across the Somerset Levels.

### Assessment of Likely Presence

Very unlikely to be impacted by the dredging of the River Parrett but may be present in nearby ditches and pools if well vegetated. There are confirmed NBN Atlas records in waterbodies near Burrowbridge.

### **Water Beetle (*D. dimidiatus*)**

#### Habitat Requirements

*D. dimidiatus* occurs in rich fen vegetation in lowland drains and ponds. Research by Beebee in 2002 noted its preference for rhynes that were at least partly shaded. It has been recorded in every month except December, with numbers peaking in May and August.

### Assessment of Likely Presence

Unlikely to be impacted by the dredging of the River Parrett but may be present in nearby ditches and pools if these are well vegetated. There are confirmed records of this species in water bodies near Burrowbridge on the NBN Atlas.

### **Great Silver Water Beetle (*H. piceus*)**

#### Habitat Requirements

Breeds in permanent, richly vegetated ponds and in dykes or grazing fens.

### Assessment of Likely Presence

Unlikely to be impacted by the dredging of the River Parrett but may be present in nearby ditches and pools if these are well vegetated. There are confirmed records of this species in water bodies near Burrowbridge on the NBN Atlas.

## Water Beetle (*L. aluta*)

### Habitat Requirements

Found in vegetated ponds in dykes or grazing fens and in mud.

### Assessment of Likely Presence

Unlikely to be impacted by the dredging of the River Parrett and unlikely to be present in nearby ditches and pools as all records on the NBN Atlas are from the northern Somerset Levels with the majority in the vicinity of Shapwick.

## Water Beetle (*L. oblongus*)

### Habitat Requirements

Found in mossy pools.

### Assessment of Likely Presence

Unlikely to be impacted by the dredging of the River Parrett and unlikely to be present in nearby ditches and pools as scattered records on the NBN Atlas are from the northern Somerset Levels with the majority in the vicinity of Shapwick.

## 4 CONCLUSIONS

The potential impacts of the proposed dredging works on the Ramsar invertebrate species highlighted in this Technical Note were assessed. Table 2 shows the outcome of this assessment. Note that "Direct Dredging Impacts" include those arising from the operation of sediment removal from the main channel, whilst "Indirect Dredging Impacts" include those arising from impacts to bankside habitat and/or disposal of the dredged sediment.

Note that these impacts were identified assuming all dredged material would be placed on the rear bank face. Should this change, the risk of potential indirect impacts arising from the dredging works may increase for a number of Ramsar invertebrate species.

**Table 2: The magnitude of direct and indirect impacts on Ramsar invertebrates from the proposed dredging of the River Parrett**

| Ramsar Invertebrate Species  | Direct Dredging Impacts | Indirect Dredging Impacts                                     |
|------------------------------|-------------------------|---------------------------------------------------------------|
| <i>Hydrochara caraboides</i> | Low                     | Low                                                           |
| <i>Bagous nodulosus</i>      | Low                     | Low                                                           |
| <i>Odontomyia angulata</i>   | Low                     | Low                                                           |
| <i>Odontomyia ornata</i>     | Low                     | Low<br>(unconfirmed reports from ditches near Burrow Bridge)* |
| <i>Oulema erichsoni</i>      | Low                     | Low                                                           |



| Ramsar Invertebrate Species    | Direct Dredging Impacts | Indirect Dredging Impacts                                                                                                               |
|--------------------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| <i>Valvata macrostoma</i>      | Low                     | Low                                                                                                                                     |
| <i>Stethophyma grossum</i>     | Low                     | Low                                                                                                                                     |
| <i>Pteromicra leucopeza</i>    | Low                     | Low                                                                                                                                     |
| <i>Lejops vittata</i>          | Low                     | Medium<br><br>(confirmed report of sea club-rush from within the 4km stretch to be dredged which is the plant favoured by this species) |
| <i>Cantharis fusca</i>         | Low                     | Low                                                                                                                                     |
| <i>Paederus caligatus</i>      | Low                     | Low                                                                                                                                     |
| <i>Hydaticus transversalis</i> | Low                     | Low<br><br>(confirmed reports from ditches near Burrow Bridge)*                                                                         |
| <i>Dytiscus dimidiatus</i>     | Low                     | Low<br><br>(confirmed reports from ditches near Burrow Bridge)*                                                                         |
| <i>Hydrophilus piceus</i>      | Low                     | Low<br><br>(confirmed reports from ditches near Burrow Bridge)*                                                                         |
| <i>Limnebius aluta</i>         | Low                     | Low                                                                                                                                     |
| <i>Laccornis oblongus</i>      | Low                     | Low                                                                                                                                     |

\*Confirmed/unconfirmed reports of these Ramsar invertebrate species are from ditches outside the proposed working area, which are therefore unlikely to be affected by the works, assuming mitigation proposals will prevent sediment/ run-off from entering these ditches.

One species (*Lejops vittata*) has identified indirect impacts with a potential magnitude of “medium”. As a result, this species was considered further within a matrix previously used by the Environment Agency for identifying the likely magnitude and significance of potential impacts of dredging works before mitigation, together with likely residual effects. The results of this are shown in Table 3. All other species with impacts assessed as having a “low” magnitude were scoped out of further assessment at this stage.

Table 3: Likely magnitude and significance of impacts to *Lejops vittata* before and after mitigation

| Species               | Impact                                                                                    | Sensitivity of receptor | Magnitude of impact before mitigation | Significance and duration before mitigation              | Mitigation                                                                          | Magnitude of impact after mitigation | Residual effect |
|-----------------------|-------------------------------------------------------------------------------------------|-------------------------|---------------------------------------|----------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------|-----------------|
| <i>Lejops vittata</i> | Loss of bankside habitat (sea club rush) as a result of the placement of dredged material | Medium                  | Medium to High                        | Minor to major, temporary, short-medium term and adverse | Sensitive disposal of dredged material away from identified stands of sea club-rush | Low                                  | Low             |

Providing appropriate mitigation measures are incorporated into the dredging works, it is considered unlikely that there will be impacts to any of the Ramsar invertebrate species considered within this Technical Note.

The following mitigation measures have been identified, the implementation of which would further reduce the potential for impacts on Ramsar invertebrate species:

- Careful identification of acceptable areas for placement of dredged material, particularly in the vicinity of identified stands of sea club-rush;
- All dredged material to be placed on the rear of the bank;
- Use of silt fencing as necessary to prevent nutrient-rich run off into nearby ditches; and
- Directing any bank overtopping from the main river channel to one location, with this additional flow being diverted to the River Sowey to prevent mobilization of the dredged silt.

Author: Liz Johns BSc MSc CEnv MCIEEM MRSB, Director

Johns Associates Ltd  
The Old Brewery  
Newtown  
Bradford on Avon BA15 1NF  
T: 01225 723652  
W: [johnsassociates.co.uk](http://johnsassociates.co.uk)

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## 5 APPENDIX 1

## Oath Lock to Burrow Bridge Ecology Surveys – Invertebrates

### *Hydrochara caraboides* (The Lesser Silver Water Beetle)

*H. caraboides* is a strong swimming species living in permanent, well vegetated ponds and drainage ditches. On the Somerset Levels appears to be restricted swamp areas and ditches associated with the peat moors.

Boyce (2004) indicated that 'In the Somerset Levels *Hydrochara* has continued to be recorded in the Brue valley, in the same sites it was found in during the 1920s and 1930s, when Balfour-Browne carried out a detailed survey of the water beetle fauna of the area (Balfour-Browne 1936). This area of the Levels is mantled with deep accumulations of peat. It is striking that on the southern Levels, where the underlying clay is not mantled with peat, the beetle has never been recorded.'

Boyce sampled areas in the Brue valley and found the following:

Shapwick Heath NNR, has been much the most intensively studied site, and has produced the majority of records, with breeding proved to occur in seven discrete sites within the reserve. The best cluster of breeding sites for *Hydrochara* occurs in and around the Roughet, to the east of the minor road crossing the reserve. To the west of the road, near Canada Farm, one further breeding colony has been found, but the habitat in this block of the reserve seems much less favourable for *Hydrochara*. Though less well studied, *Hydrochara* appears to be much less abundant at Catcott Heath and Westhay Moor. These are generally more open, disturbed wetlands than the central area of Shapwick Heath, and the late-successional habitats favoured by *Hydrochara* are much more scattered in their occurrence. Only one breeding population was recorded from either of these sites, this being at Westhay, where a small colony was found in 2002, in a ditch on the fringes of the remnant raised mire. Additionally, a good new breeding site has been found in 2003 in a wooded swamp at Catcott Burtle, immediately to the north of Catcott Heath. The breeding colony here was found in a wooded swamp very similar in character to *Hydrochara*'s prime breeding areas on Shapwick.

No evidence of breeding was recorded from Tealham and Tadhams Moors, and only a single adult was recorded during preliminary surveys in 2000. Though this was much the least intensively surveyed site in the Brue valley, it is again, a much more open site, and suitable breeding habitat appears much more patchy.

#### Key Points

It would be unlikely that *H. caraboides* is found in the main river Parrett channel within the dredging area as the habitat is unfavourable. The ditches either side of the Parrett are also unlikely to support the species **if the underlying clay is not mantled with peat** but you will need to check the geology. The NBN atlas shows the distribution of *H. caraboides* is confined to the northern area of the Somerset Levels above Bridgewater. The nearest record is near Beer. It might be worth trying to incorporate this distribution map at some stage.

The habitat requirements for *H. caraboides* can be summarised as follows:

still, or very slow-flowing water

shallow, often seasonally inundated waterbodies

leafy or detritus-rich substrates

clear water, without excessive growth of floating duckweeds

abundant invertebrate prey, especially small Crustacea and *Asellus aquaticus*

mats of floating sweet-grass *Glyceria fluitans*

On the Somerset Levels, the above combination of habitat requirements are most often met with in seasonally inundated, late-successional ditches with at least some shading from trees, or in areas of wooded swamp. It appears that *Hydrochara* occurred more widely on the Somerset Levels in the past in open ditches. Eutrophication and the concomitant increase in floating duckweeds are the most likely cause of its disappearance from such areas.

#### Sampling

Boyce (2004) sampled swamp areas of approx. 5m x 5m in area and 25m stretches of ditches using a sweep net. The swamp areas and ditches in the current study, adjacent to the River Parrett could be sampled using a sweep net but at much lower intensity than used by Boyce if the habitat is unsuitable.

Adults have been recorded from Mar to Nov but the Somerset population peaks in Apr to May with larvae occurring from May to Aug.

#### Key References

Boyce D C (2004) A study of the distribution and ecology of the lesser silver water beetle *Hydrochara caraboides* on the Somerset Levels, English Nature Research Reports, Report No. 591.

*Hydrochara caraboides* NBN atlas <https://species.nbnatlas.org/species/NBNSYS0000007736>

### *Bagous nodulosus* (The Flowering-rush Weevil)

A very rare weevil associated with the Flowering-rush *Butomes umbellatus* with the larvae and pupae found in flowering and vegetative stems. Found in ditches, dykes, ponds and water bodies with little or no flow.

McGill (2010) investigated several sites where there were growths *Butomes umbellatus* but failed to find *B. nodulosus*.

He wrote:



“*B. nodulosus* was most recently recorded in Somerset in 2007, when Martin Drake took single specimens in two ditches during a survey being undertaken for Buglife – at Tealham on 4 May, and West Sedge Moor on 1 June. These records are rather puzzling, as neither ditch contained any Flowering-rush; *Butomus* is very scarce on West Sedge Moor, although it has been found to be frequent in one ditch on Tealham (ST40374549) quite close to where Martin Drake took his specimen. Andrew Duff (pers. comm.) has both specimens in his collection and confirms that the original identifications were correct. I investigated both these sites in May 2010, along with ditches at Midelney (ST41662357), Curry Moor (ST33362833) and Southlake Moor (ST37022049). **To seek out Bagous weevils a profitable tactic is to net a ditch and bring the debris home for extraction in a Burlese funnel.** This did produce several of the more frequent species, *B. subcarinatus*, *B. glabrirostris* and *B. alismatis*, but there was no sign of *B. nodulosus*. The Curry Moor ditch had large amounts of Flowering-rush in 2008, but unfortunately in 2010 it had all but disappeared following ditch-cleaning operations. The other ditches examined had enough of the food-plant to offer encouragement, and it would certainly be worth carrying out further searches of these areas – one ditch on Curry Moor (ST32402792) looked potentially suitable. There are good amounts of *Butomus* in ditches at Pawlett Hams (ST26524329), and these also may be worth investigating.

While it appears that there are no extant colonies of *B. nodulosus* at any of its British localities, it is too early to say whether this weevil is extinct in England. However, if it does still occur in Somerset, its foothold must surely be a precarious one.”

#### **Key Points**

It is very unlikely that *B. nodulosus* would occur in the main River Parrett within the dredging area as the habitat is unfavourable. The absence of *Butomus*, if this is the case, in the surrounding ditches would also indicate that it is unlikely to be recorded in the nearby vicinity. There are no records present on the NBN atlas

#### **Sampling**

A vegetation survey would indicate the presence, absence, quantity of *Butomus*. Note -to seek out *Bagous* weevils a profitable tactic is to net a ditch and bring the debris home for extraction in a Burlese funnel.

#### **Key References**

McGill J (2010) The status of the Flowering-rush Weevil *Bagous nodulosus* in Somerset, Somerset Archaeology and Natural History

### ***Odontomyia angulata* (The Orange-horned Green Soldierfly)**

*Odontomyia angulata* was historically known from the Brue valley moors from Street Heath to Edington, Somerset (VC6). It is a wetland species found in old fens and wet commons with pingo pools. It was historically found in a small area of the Somerset Moors where the habitat may have been grazing marsh but could have been more similar to wet fenny heath on peat. Larvae have been recorded from the vegetated edges of pools, and they may be amphibious rather than truly aquatic as some of the pools are ephemeral.

*Odontomyia angulata* has been recorded from ten discrete locations in five hectads since 1990 (one after 2011), of which four are older hectads, indicating very localised populations. The sites are fen or similar habitat of high quality, probably related to high and constant levels of ground-water and high water quality. Within each of the sites or clusters of 44 sites, the species is clearly very rare, even though apparently suitable habitat exists in nearby areas. The habitat requirement is therefore much more specific than just fen or pool margins. The sites are also low-lying so there may be a climatic limitation.

#### **Key Points**

It is very unlikely that *B. nodulosus* would occur in the main River Parrett within the dredging area as the habitat is unfavourable. There is a need to check the geology of the surrounding area to establish whether adjacent pools could support the species. Unlikely. The nearest record on the NBN atlas is at Westonzoyland.

#### **Sampling**

Sweep netting for the larvae in the ditches and pools adjacent to the dredged section if deemed required.

#### **Key References**

NERC 2017 A review of the status of Larger Brachycera flies of Great Britain.

### ***Odontomyia ornata* (The Ornate Brigadier)**

Found in vegetated marsh ditches with less intensive agriculture as they threatened by pesticides and eutrophication, in addition to vigorous drainage clearance. Nationally Scarce. Recorded in >40 hectads since 1990, showing no decline.

#### **Key Points**

It is very unlikely to be found in the main River Parrett within the dredging area as the habitat is unfavourable. They are unconfirmed reports from ditches near Burrow Bridge so might require sampling of adjacent ditches.

#### **Sampling**

Sweep netting for the larvae.

### ***Oulema erichsoni* (Leaf Beetle)**

Found on Floating Sweet-grass (*Glyceria fluitans*) in wet peat cuttings or trenches with little other vegetation, or on heaths.

#### **Key Points**

It is very unlikely to be found in the main River Parrett within the dredging area as the habitat is unfavourable. It unlikely to be found in adjacent water bodies. The NBN Atlas shows no records south of Bridgewater.

#### **Sampling**

Sweeping of vegetation in *Glyceria fluitans* is present.

### ***Valvata macrostoma* (The Large-mouthed Valve Snail)**

In the UK the large-mouthed valve snail is found in still or slowly flowing hard waters, in drainage ditches on lowland grazing levels. Very localised.

#### **Key Points**

It is very unlikely to be found in the main River Parrett within the dredging area as the habitat is unfavourable. It could possibly be found in the adjacent ditches but probably unlikely if there is no historic record of the species. Need to check. The NBN Atlas shows a cluster of records near the West Sedgemoor Drain near Stoke St Gregory.

#### **Sampling**

Naturalist dredge or sediment sampling, kick-heel if possible.

### ***Stethophyma grossum* (The Large Marsh Grasshopper)**

The large marsh grasshopper is a rare species with colonies being located only in Somerset, Wiltshire, Hampshire, and Surrey. As its name suggests, the grasshopper only occurs in marshy places, the prime habitat being acid bogs with clumps of tussocky grass. Unlike almost all other grasshoppers, which call or 'stridulate' by rubbing pegs on their hind-legs against their forewings, the male large marsh grasshopper makes its call by tapping the tip of the forewing with its hind tibia. About eight ticks are produced every three to four seconds, and the sound has been likened to that of popping bubbles. Nymphs hatch from eggs in late May and go through four states or 'instars' before maturing into adults at the end of July. The grasshopper's restriction to wet habitats means that it is extremely vulnerable to drainage and was undoubtedly more common 200 years ago. Most surviving colonies are now well protected within nature reserves.

#### **Key Points**

Not directly affected by the dredging of the River Parrett. All but one of the NBN atlas records are north of Bridgewater.

#### **Sampling**

Terrestrial search/sweep net in the summer towards the end of Jul.

### ***Pteromicra leucopeza* (A Snail-killing Fly)**

Very rare. Found in older traditional wetland systems.

#### **Key Points**

Not directly affected by the dredging of the River Parrett. Only one NBN atlas record in the Somerset Levels (unconfirmed) near Meare and only 44 for the UK.

#### **Sampling**

Terrestrial search/sweep net in the summer.

### ***Lejops vittata* (The Sea Club-rush Hoverfly)**

A very rare hoverfly of coastal levels and brackish marsh where sea club-rush (*Scirpus maritimus*) is plentiful. Flowers visited by adults include *Phragmites*, *Scirpus maritimus* and male *Typha*.

#### **Key Points**

Very unlikely to be affected by the dredging of the River Parrett unless sea club-rush is present. One unconfirmed NBN atlas record near Burrow Bridge but not on the main channel.

#### **Sampling**

Vegetation survey to establish the presence/absence of sea club-rush and then possibly sweep netting in the summer.

### ***Cantharis fusca* (Soldier Beetle)**

Rare beetle found in bushes, hedges and meadows. WWT Consulting found in while undertaking sweep surveys in vegetation North Somerset as part of The Landmark Practice in 2014 along with *Odontomyia ornate*. They didn't specify a location. <https://www.wwtconsulting.co.uk/surveys-in-somerset/>

#### **Key Points**

Not impacted directly by the dredging of the River Parrett. May be affected if there is disturbance to bushes and hedges in the operation. Unlikely. Nearest records on the NBN atlas are near Westonzoyland and Stoke St Gregory.

**Sampling**

Terrestrial surveys of the plants and bushes in the vicinity of the work.

***Paederus caligatus* (Rove Beetle)**

Very rare beetle found in damp terrestrial vegetation.

**Key Points**

Unlikely to be impacted by the dredging of the River Parrett unless the terrestrial margins are impacted significantly. Only 45 records on the NBN atlas for the UK with two unconfirmed on the Somerset Levels north of Shapwick.

**Sampling**

Terrestrial survey of the margins on the main channel and surrounding area.

***Hydaticus transversalis* (Water Beetle)**

*H. transversalis* is found in permanent, densely vegetated pools and ditches. Fairly common across the Somerset Levels

**Key Points**

Unlikely to be impacted by the dredging of the River Parrett but may be present in nearby ditches and pools if well vegetated. There are confirmed records in water bodies near Burrow Bridge on the NBN atlas.

**Sampling**

Sweep netting of pools and ditches adjacent the main channel.

***Dytiscus dimidiatus* (Water Beetle)**

*D. dimidiatus* occurs in rich fen vegetation in lowland drains and ponds Beebee (2002) noted its preference for rhynes (Somerset Level ditches) that were at least partly shaded. Recorded in every month except December, peaking in May and August.

**Key Points**

Unlikely to be impacted by the dredging of the River Parrett but may be present in nearby ditches and pools if well vegetated. There are confirmed records in water bodies near Burrow Bridge on the NBN atlas.

**Sampling**

Sweep netting of pools and ditches adjacent the main channel.

**Reference**

Beebee T J C (2002) Twenty years on the North Somerset Levels. *Latissimus*, 15. 9.11.

***Hydrophilus piceus* (The Great Silver Water Beetle)**

Breeds in permanent, richly vegetated ponds and in dykes or grazing fens. Adults peaking in June and August with a distinct dip in July. Larvae have been reported from April to September.

**Key Points**

Unlikely to be impacted by the dredging of the River Parrett but may be present in nearby ditches and pools if well vegetated. There are confirmed records in water bodies near Burrow Bridge on the NBN atlas.

**Sampling**

Sweep netting of pools and ditches adjacent the main channel.

***Limnebius aluta* (Water Beetle)**

Found in vegetated ponds in dykes or grazing fens and in mud.

**Key Points**

Unlikely to be impacted by the dredging of the River Parrett and unlikely to be present in nearby ditches and pools as all records on the NBN atlas are in the northern Somerset Levels with the majority in the vicinity of Shapwick.

**Sampling**

Sweep netting of pools and ditches adjacent the main channel.

***Laccornis oblongus* (Water Beetle)**

Found in mossy pools.

**Key Points**

Unlikely to be impacted by the dredging of the River Parrett and unlikely to be present in nearby ditches and pools as scattered records on the NBN atlas are in the northern Somerset Levels with the majority in the vicinity of Shapwick.

**Sampling**

Sweep netting of pools adjacent the main channel.



## APPENDIX 6G: FISH



## SOMERSET LEVELS DRAINAGE BOARDS CONSORTIUM

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### River Parrett

## Oath to Burrow Bridge Ecology Surveys: Fish Habitat

### 1 INTRODUCTION

Johns Associates was commissioned by the Somerset Levels Drainage Boards Consortium (SLDBC) to undertake an assessment of the likely fish habitat associated with a 4km stretch of the River Parrett upstream of its confluence with the River Tone and Oath Lock (hereafter referred to as the Site). Proposals to dredge this section of the River Parrett have the potential to impact a range of fish habitats and species if not considered early in the planning process.

### 2 LEGAL PROTECTION

Certain species of fish are listed as features of interest associated with legally protected Special Areas of Conservation transposed into UK law through the Conservation of Habitats and Species Regulations 2017 and can also be included as features of interest associated with Sites of Special Scientific Interest notified under the Wildlife and Countryside Act 1981.

The Salmon and Freshwater Fisheries Act 1975 (SAFFA) aims to protect freshwater fish, with a particularly strong focus on salmon and trout. There are many activities that could constitute an offence under SAFFA including direct mortality, barriers to migration and degradation of habitats. Fish passage is also a major issue. In the future, it is likely that fish passage facilities will need to be designed to accommodate all fish species and life stages, with nature-like bypass channels being the most appropriate solution currently available.

The Water Framework Directive (2000/60/EC) includes aims to ensure that inland and coastal waters attain 'good ecological status'. The Directive demands that hydromorphological features are managed to protect the ecology of a watercourse (including fish).

The Eels (England and Wales) Regulations 2009 implement Council Regulation (EC) No 1100/2007 of the Council of the European Union, establishing measures for the recovery of the stock of European eel.

Typically, they apply to:

- Licensed abstractors of water: companies or individuals abstracting and/or discharging water for a wide range of industrial, agricultural and other purposes;
- Impounding works: any dam, weir, or other works by which water may be impounded; and
- Anyone constructing, altering or maintaining a dam, or any other structure in or near water, liable to cause an obstruction to the passage of eels.

Other Regulations and Statutory Instruments also provide certain levels of direct or indirect legal protection to fish and their habitats. A range of penalties exists for offences under this legislation.

### 3 SITE LOCATION & CONTEXT

The Site is located along a section of the River Parrett between Burrowbridge (National Grid Reference [NGR] ST 35842 30207) and Oath (NGR ST 38308 27900). The stretch is approximately 4km in length.

The surrounding landscape is predominantly coastal and floodplain grazing marsh with areas of lowland meadows and semi-improved and improved neutral grassland (Figure 1). Numerous ditches and drains are present within the immediate local area, with permanently wet and ephemeral ponds and other standing waterbodies.

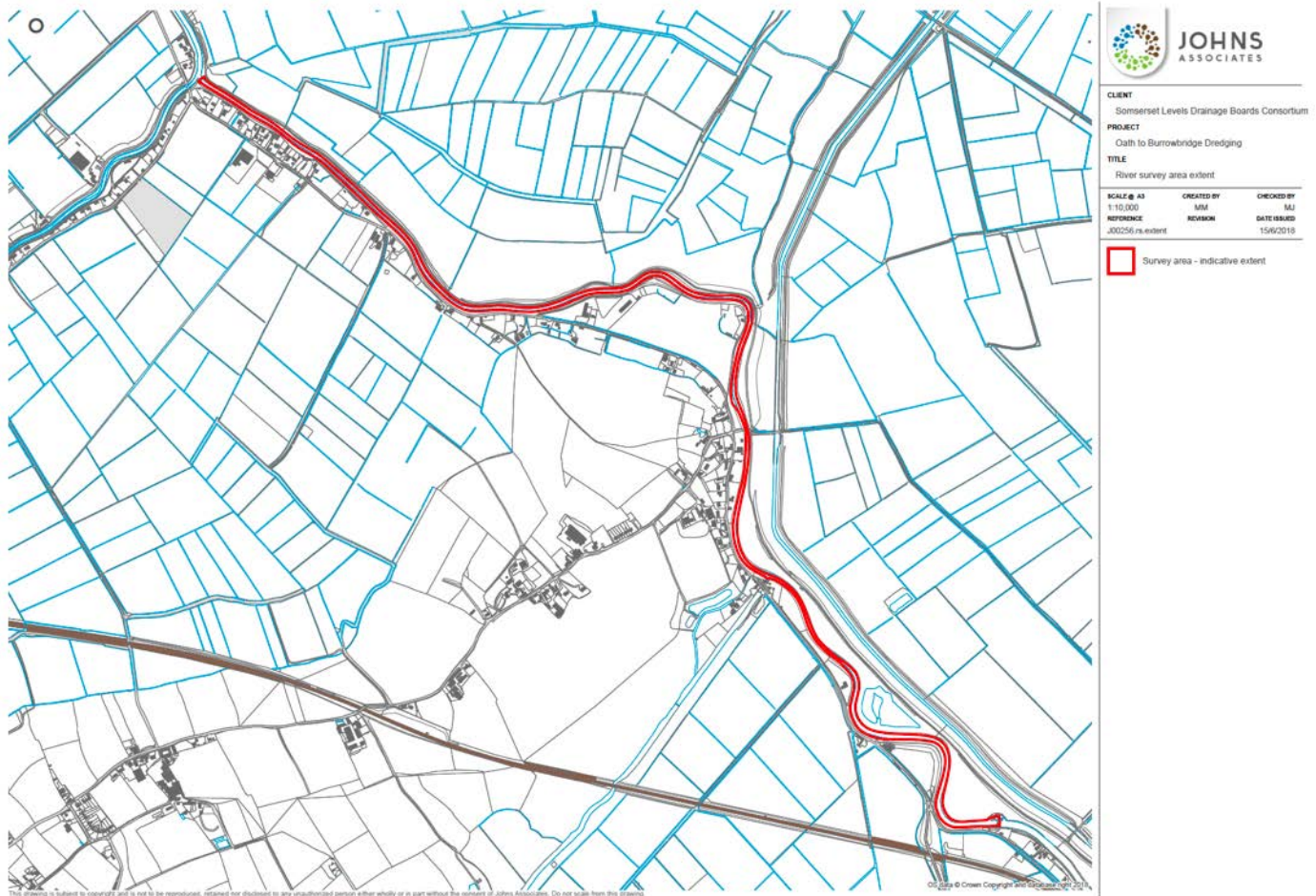


Figure 1: Main Site location between the confluence of the River Tone and the River Parrett to Oath Lock.

## 4 METHODOLOGY

### 4.1 DESK STUDY

A review of habitat requirements of certain fish species identified as previously being present in this part of the River Parrett was completed (using [www.fishbase.org](http://www.fishbase.org)) to support the assessment of suitable promoting and limiting features present in the survey area.

### 4.2 FIELD SURVEY

A boat based visual inspection survey along the entire Site enabled the identification and characterisation of certain in-channel habitat features influencing the distribution, behaviour and presence/absence of fish species. Representative photographs were taken. A structured approach to recording channel and bank physical habitat features, that will influence the type of fish habitat present, was completed using the standard River Habitat Survey<sup>1</sup> method. Aerial

<sup>1</sup> Environment Agency, 2013.

imagery was used to identify riparian and channel features of interest. Please refer to Annex A and B of this document for further details.

### 4.3 LIMITATIONS

The transparency and varying depth of water in the River Parrett (tidal) influenced the visibility of certain features. For example, at lower flows, submerged features were visible. The results of the fish study are valid at the time of writing (June 2018). Should there be delays to the project timetable and/or implementation of the proposed dredging works, an update desk study and/or field survey may need to be completed. In this instance, advice should be sought as to the validity of the data, recommendations and conclusions contained herein.

## 5 RESULTS

### 5.1 DESK STUDY

Information provided by the Somerset Levels Drainage Board Consortium in May 2018 included the results of previous surveys conducted by Loughborough University. The following species of fish were recorded during the course of these surveys:

- Thin-lipped Grey Mullet *Chelon ramada*
- Common Bleak *Alburnus alburnus*
- Roach *Rutilus rutilus*
- Gudgeon *Gobio gobio*
- Bass *Dicentrarchus labrax*
- Pike *Esox lucius*
- Common Bream *Abramis brama*
- Chub *Squalius cephalus*
- Flounder *Paralichthys dentatus*
- European Eel *Anguilla anguilla*
- Perch *Perca fluviatilis*
- Three-spined Stickleback *Gasterosteus aculeatus*
- Rudd *Scardinius erythrophthalmus*

General riverine habitat requirements for these species are listed in Table 5.1.

**Table 5.1: Riverine habitat requirements for fish species**

| Species                   | Biology and habitat requirements                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Thin - lipped Grey Mullet | <p>Adults are pelagic, occurring near shore, entering lagoons and lower reaches of rivers in schools; often in polluted waters between temperatures 8-24°C. Juveniles colonize the littoral zone and estuaries. Adults feed on epiphytic algae, detritus and small benthic or planktonic organisms, pelagic eggs and larvae while juveniles feed on zooplankton until about 3.0 cm SL, then on benthic animals and plants. Spawning takes place at sea near the coast by gathering in groups between September and February. Oviparous, eggs are pelagic and non-adhesive. The eggs develop at sea. The juveniles then colonize the littoral zone and the estuaries. Adults enter the lower parts of the rivers and return to the sea to spawn.</p>                                                                                                                                                                                                                                                                                                                                                                                  |
| Common Bleak              | <p>Inhabits open waters of lakes and medium to large rivers. Forms large aggregations in backwaters and other still waters during winter. Adults occur in shoals near the surface. Larvae live in littoral zone of rivers and lakes while juveniles leave shores and occupy a pelagic habitat, feeding on plankton, drifting insects or invertebrates fallen on the water surface. Feeds mainly on plankton, including crustaceans and insects. Spawns in shallow riffles or along stony shores of lakes, occasionally above submerged vegetation.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Roach                     | <p>Found in a wide variety of habitats, mainly in lowland areas. Most abundant in nutrient-rich lakes and large to medium sized rivers and backwaters. Also recorded from small lowland streams and from brackish coastal lagoons. In fast-flowing rivers, confined to stretches where backwaters or shelters allow for overwintering. Larvae and juveniles live in wide variety of littoral habitats. Preys predominantly on benthic invertebrates, zooplankton, plant material and detritus. May shift from littoral to pelagic habitats and between benthic food and zooplankton when abundance of a specific food item is high or for avoidance of predation and/or competition.</p> <p>Spawns in shoals among dense submerged vegetation in backwaters or lakes, flooded meadows or in shallow, fast-flowing river habitats on plant or gravel bottom. Undertakes short spawning migrations. Stays in backwaters or in deep parts of lakes to overwinter. Produces fertile hybrids with <i>Abramis brama</i>. Pale yellow eggs are found attached to vegetation and tree roots. Eggs are sticky and hatch in about 12 days.</p> |
| Gudgeon                   | <p>Occurs in nearly all types of riverine and lacustrine habitats with sand bottom. Found in small mountain streams, large lowland rivers and large lakes. Inhabits fast flowing rivers with sand or gravel bottom but may also occur in still waters. Forms schools. Feeds on insect larvae, molluscs, and crustaceans. Normally active during the day but if they are disturbed, in particular by predators, they can defer their activity to periods when light intensity is weak. Capable of emitting squeaking sounds. These vocalizations, which is a means by which fish communicate with each other, vary with the degree of activity and the temperature and are independent of the season of reproduction. Breeds in shallow water over stones, sand or plant material. Spawns once a year for several years in low productivity streams, but exhibits multiple spawning within a season in high productivity environments. Eggs are released above substrate and drift with current, sinking to bottom and sticking to substrate. Larvae and juveniles occur on the bottom</p>                                            |



|              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              | and prefer detritus-rich sandy habitats and low current.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Bass         | Adults manifest demersal behaviour, inhabit coastal waters down to about 100m depth but more common in shallow waters. Found in the littoral zone on various kinds of bottoms on estuaries, lagoons and occasionally rivers. They enter coastal waters and river mouths in summer, but migrate offshore in colder weather and occur in deep water during winter in the northern range. Young fish form schools, but adults appear to be less gregarious. Feed chiefly on shrimps and molluscs, also on fishes. Juveniles feed on invertebrates, taking increasingly more fish with age. Adults piscivorous. Spawn in batches. Spawning takes place in the spring near the British Isles, and earlier in its southern range. Eggs are pelagic.                                                                                                                                                                                                                                                                                                                                                                                               |
| Pike         | Occurs in clear vegetated lakes, quiet pools and backwaters of creeks and small to large rivers. Usually solitary and highly territorial. Enters brackish water in the Baltic. Adults feed mainly on fishes, but at times feed heavily on frogs and crayfish. Cannibalism is common. In arctic lakes, it is sometimes the only species present in a given water body. In such cases, juveniles feed on invertebrates and terrestrial vertebrates; large individuals are mainly cannibals. Cannibalistic as juveniles. Faeces of pike are avoided by other fish because they contain alarm pheromones. Deposits faeces at specific locations, distant from its foraging area. Eggs and young are preyed upon by fishes, aquatic insect larvae, birds, and aquatic mammals. Does not generally undertake long migrations, but a few may move considerable distances. Oviparous.                                                                                                                                                                                                                                                               |
| Common Bream | Adults inhabit a wide variety of lakes and large to medium sized rivers. Most abundant in backwaters, lower parts of slow-flowing rivers, brackish estuaries and warm and shallow lakes. Adults occur usually in still and slow-running waters where they travel in large shoals. Larvae and juveniles live in still water bodies, feeding on plankton. At one to two years old juveniles move from backwaters to river to feed. In the absence of opportunity to leave backwaters, juveniles may adapt but have a slower growth and attain maturity at a smaller size. They also drift to brackish water estuaries to forage when water level of flooded areas drops in lower reaches of large rivers. Foraging juveniles in brackish waters stay in lower parts of rivers to overwinter in freshwater. Feed on insects, particularly chironomids, small crustaceans, molluscs and plants. Larger specimens may feed on small fish. Juveniles feed on zooplankton. Able to shift to particle feeding or even filter feeding at high zooplankton abundance. Usually spawn in backwaters, floodplains or lakes shores with dense vegetation. |
| Chub         | Most abundant in small rivers and large streams with riffles and pools. Found along shores of slow-flowing lowland rivers, even in very small mountain streams, and in large lakes, undertaking spawning migration to inflowing streams. Adults are solitary while juveniles occur in groups. Feeding larvae and juveniles live in very shallow shoreline habitats. Feed on a wide variety of aquatic and terrestrial animals and plant material. Large individuals prey predominantly on fishes. Breed in fast-flowing water above gravel bottom, rarely among submerged vegetation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Flounder     | Adults usually prefer hard sandy substrate where they can burrow; can exploit a broad range of lower and mid-estuary habitats including salt marsh creeks and seagrass beds, which usually have muddy or silty substrates, as well as sand flats. Occur in bays, lagoons and shallow coastal waters.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

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|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| European Eel             | <p>Inhabits all types of benthic habitats from streams to shores of large rivers and lakes. Naturally found only in water bodies connected to the sea. Territorial and solitary species; 'schools' of young eels which are observed from time to time are a mass response to outward conditions and not of active assembling. Migrates to the depths of the Sargasso Sea to spawn. Eel larvae (leptocephali) are transparent and ribbon-like. They are brought to the coasts of Europe by the Gulf Stream in 7 to 11 months-time, and can last for up to 3 years. They are transformed into glass eels (6-8 cm length, cylindrical in shape and transparent to slightly pigmented in colour). They enter the estuaries and colonize rivers and lakes. Some individuals remain in estuaries and coastal waters to grow into adults. The glass eel stage is followed by a long feeding period (from the yellow to the silver eel stage) lasting 6-12 years in males and 9-20 years in females. Yellow and silver eels are benthic, found under stones, buried in the mud or in crevices. Yellow eels eventually lose their pigmentation, becoming dark dorsally and silver ventrally (called silver eels). Silver eels are also characterized by a clear contrasting black lateral line and enlarged eyes. At the end of their growth period, they become sexually mature, migrate to the sea and cover great distances during their spawning migration (5,000-6,000 km); with extensive daily vertical migrations between 200 m at night and 600 m during day time, possibly for predator avoidance. Gametogenesis occurs entirely during spawning migration. Average life span is usually 15-20 years. Male eels can grow up to 50 cm TL. Occurs at temperatures ranging from 0-30°C. Its food includes virtually the whole aquatic fauna (freshwater as well as marine) occurring in the eel's area, augmented with animals living out of water, e.g. worms. Best temperature for making eels sexually mature is 20-25°C. Sensitive to weak magnetic fields. Their high fat content and benthic feeding habits in continental waters make them vulnerable to the bioaccumulation of pollutants, such as heavy metals and organic contaminants, that may result in organ damage and impaired migration capability and lowered genetic variability. Review of information supports the view that the European eel population as a whole has declined in most areas, the stock is outside safe biological limits and current fisheries not sustainable.</p> |
| Perch                    | <p>Inhabits a very wide range of habitats from estuarine lagoons, lakes of all types to medium-sized streams. Feeding larvae occur in open water. This is an opportunistic diurnal feeder which preys mainly during sunrise and sunset, using all available prey. Larvae and small juveniles usually feed on planktonic invertebrates. During first summer, many juveniles move near shores to feed on benthic prey. Often feeds on fishes at about 12cm SL. May undertake short spawning migrations. Males attain first sexual maturity at 1-2 years and females at 2-4 years of age. Spawns in February-July. Eggs grouped in long white ribbons (up to 1m) are found over submerged objects. Eggs are laid in sticky strings becoming fixed to aquatic plants and rocks.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Three-spined Stickleback | <p>Adults occur in fresh waters, estuaries and coastal seas. Anadromous, with numerous non-anadromous populations in brackish or pure freshwater, rarely in marine waters. In the sea, confined to coastal waters. In freshwater, adults prefer to live in small streams but may occur in a variety of habitats including lakes and large rivers. Inhabit shallow vegetated areas, usually over mud or sand. Form schools. Young associated with drifting seaweed. Juveniles move to the sea (anadromous populations) or to deeper, larger water bodies (freshwater populations) in July-August, forming large feeding schools. Feed on worms, crustaceans, larvae and adult aquatic insects, drowned aerial insects, and small fishes; has also been reported to feed on their own fry and eggs. Eggs are found in nests constructed from plant material. Males build, guard and aerate the nest where the eggs are deposited. Maximum length in freshwater is 8cm while</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

|      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      | in saltwater is 11cm.                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Rudd | Occurs mainly in nutrient-rich, well vegetated lowland rivers, backwaters, oxbows, ponds and lakes. Feeds mainly on plankton, terrestrial insects and plant material. Breeds on roots or submerged plants. Can adapt to unfavourable environmental conditions. Very sticky, colourless or pale, yellow eggs are found attached to vegetation in shallow water. Males gather at spawning grounds and drive ripe females, often with much splashing, into dense vegetation to spawn. |

## 5.2 FIELD SURVEY

### 5.2.1 Boat Based Visual Inspection

The boat-based visual inspection of in-channel habitats concluded that the River Parrett between Oath to Burrowbridge supports a range of features that are promoting or limiting in terms of fish habitat. In particular, the following features were recorded:

- Artificial channel with relatively simple planform and sinuosity resulting in (generally) a reduced physical habitat diversity in comparison with more semi-natural river systems (but recognising this is characteristic of many watercourses in the Somerset Levels and Moors).
- Tidal influence resulting in at least diurnal vertical changes in the extent of bank features submerged and accessible to fish (depending on tidal state and freshwater flows).
- Influence on tidal / freshwater conditions / flows and migration beyond the Oath Lock during summer periods.
- Influence of freshwater flows on the embanked cross section, notably the contrast between normal low flow conditions (i.e. non-drought) including lower tidal states and the dominance of bare clay dominated lower (submerged) bank and bed in contrast with a large increase in wetted width and water depth/ volume and submerged vegetated upper banks forming a higher flow submerged bankface.
- A near absence of overhanging tree canopy resulting in virtually no shading or inputs of tree sourced organic detritus (e.g. leaf litter), with water volume/depth and transparency being the key regulator of water temperature.
- A near absence of submerged tree or shrubs including exposed roots.
- A near absence of coarse woody debris, log jams or leaf litter.
- Generally, an extensive presence of tall vegetation on the embanked upper river bank (above typical high tide levels), providing habitat for certain life-stages of aquatic macroinvertebrates that could provide a food source for fish.
- Generally, an extensive presence of submerged fine-leaved macrophytes that can be fully submerged or more exposed depending on river flows/tidal state and that provide cover and a lower energy environment for certain fish/life-stages as well as a source of food (direct or as a habitat for prey invertebrates/fish). These stands also influence flow character with a greater influence on lower water column flow velocities and

restricting flows across the wetted width, concentrating velocities between stands. Presence of other rooted macrophytes.

- Some variation in lower bank stability as a result of weathering and erosional activities. These are typically more notable below Staithe Bridge. Slab/cantilever and slump failures cause a more irregular bank form resulting in small backwaters or embayments (where collapsed sediment has been transported downstream). Narrower cross-sections or pinch points are present in the lower reaches, where bank failures have become stabilized and vegetated, which increase flow velocities under lower tidal states. Some overhangs are present causing some limited areas of shading, and some submerged overhangs are present as well.
- Small numbers of larger backwaters are present in the vicinity of flap valves/pumping stations. These tend to be shallower and warmer and are of high value to fry.
- The typically smooth surface of the submerged clay banks/bed result in reduced friction and more elevated velocities, potentially increasing the risk of smaller fish/fry being washed downstream where no suitable refuge habitat is present.

Plates 1 to 10 illustrate some of these features. An aerial image of the site and its planform/general physical habitat can be seen in Annex A.



Plate 1: Oath Lock forming the tidal limit, reducing summer freshwater flow and impeding fish passage



Plate 2: Freshwater flow over control structure at Oath Lock creating attractant flow to support fish passage upstream



Plate 3: Typical view showing re-sectioned and re-aligned planform, influence of tide on water levels, smooth flow, no in-channel habitat/features from trees





Plate 4: Typical view showing increased proximity to upper bank vegetation at higher/freshwater flow tidal states.



Plate 5: Typical view of gentle bend without typical meander geomorphology



Plate 6: Typical appearance of submerged aquatic macrophyte bed at lower flows/tidal states, providing a dense submerged and lower energy habitat for fish and invertebrates with greater flow passing to the side



Plate 7: Bank failure in progress resulting in the provision of fresh sediment in-channel (potential for localised depth reduction until transported) and small embayment/overhang that could develop further during higher energy flow events.





Plate 8: Stabilised and vegetated bank collapse creating shallow backwater/embayment at higher flow conditions and a narrowing/pinch point in the channel at lower flow conditions, locally increasing flow velocity.



Plate 9: Submerged lower energy feature caused by bank failure, adjacent to macrophyte bed



**Plate 10: Rare overhanging/submerged habitat features (depending on tidal/freshwater flow state) associated with bankface willow.**

### 5.2.2 Physical Habitat / River Habitat Survey

River Habitat Survey was completed across the full 4km site. Each RHS site is 500m long and comprises of a series of transect-based observations every 50m and a 'sweep-up' survey across the entire 500m reach. The transects were taken from the EA 2014 Longdin & Browning survey. Eight RHS sites were assessed. The location of each RHS site and each transect can be seen in Annex A. Annex B presents the raw RHS survey data.

This Fish Habitat report should be read in conjunction with the Fixed-Point Photography and Vegetation Cross Sections (Johns Associates, 2018), which provides detailed information each of the cross sections including locational data. and also the Vegetation and Invasive Species report (Johns Associates, 2018) to provide an overall characterisation of the site between Oath lock and Burrowbridge. All three surveys make use of the transect locations in the EA 2014 Longdin & Browning survey prepared for the Environment Agency.

### 5.2.3 RHS Site 1 (most downstream reach at the confluence with the Tone)

The physical habitat within RHS Site 1 provides some diversity that will support a range of fish species as well as the requirements of different fish life stages. Generally, the bed substrate is dominated by clay with overlying silt. The tidally exposed marginal habitat provides some variations in flow velocity and shade/submerged habitats where bank failures have occurred. Small 'backwaters' suitable for fry (or general refuge habitat in higher flows) are present, contracting with narrower sections, where the lower flow cross-section is reduced creating an increase in flow velocity under the normal lower flow conditions. There is a variation in the extent of submerged aquatic macrophytes (in comparison to other upstream reaches), which provide opportunities as fish refuge/cover. There is an absence of overhanging canopy, resulting in no shade or inputs of organic leaf litter/woody debris. Flow type during the survey was smooth, with some occurrence of upwelling in narrower sections or where submerged bank material was present.

#### 5.2.4 RHS Site 2

Fish habitat in RHS Site 2 is similar to that in Site 1 although the channel cross-section is a little more regular. Flow at the time of survey was uniform and characterized by a glide, with tidally influenced depth and submerged features, a lack of tree cover and shade or woody debris. Local bank failures contribute some submerged features which, along with small backwaters, provide shallower, shaded and lower energy areas important for some species of fish and lifestages (e.g. fry). These are small, however, in comparison to the overall area of the main channel under lower flow conditions. The key habitat is probably associated with the conditions created by the submerged aquatic macrophytes and the variation between these and the adjacent open water part of the channel.

#### 5.2.5 RHS Site 3

This Site is similar to Site 2, although there is more consistency in the cross-section of the channel.

#### 5.2.6 RHS Site 4

This Site is similar to Site 3, but with a greater extent of submerged macrophyte cover. There is a reduced amount of bank failure resulting in a reduced extent of physical (fish) habitat diversity associated with the submerged river banks and bed.

#### 5.2.7 RHS Site 5 -7

These Sites are similar to the downstream channels but appear slightly wider at lower flows. There are extensive stands of submerged aquatic macrophytes that provide cover and increase flow velocity between the stands.

#### 5.2.8 RHS Site 8 – Upstream / Oath Lock

The downstream elements of this Site are similar to Sites 5 to 7. The upper sections are influenced by Oath Lock, which significantly restricts downstream flows of freshwater in the summer and forms the tidal limit. A weir controls the flow around the Lock and also provides an attractant flow to fish. An eel pass is present. Upstream, habitat is influenced by the impounding effect of the Lock during summer periods.

## 6 CONCLUSIONS

The artificial, re-aligned and re-sectioned River Parrett between Oath Lock and Burrowbridge appears to present many consistent attributes in terms of fish habitat along its length (e.g. flow control imposed by Oath Lock during the summer; tidal influence and varying exposed extent of bare bank face during lower flow conditions, storm flow and submerging of the upper river banks during elevated flow conditions; virtual absence of any in-channel features associated with trees; and the presence of extensive stands of submerged aquatic macrophytes). However, additional fish habitat diversity has been introduced as a result of bank failure causing localised (but limited) backwaters, overhangs and submerged overhangs, and influences on cross-sectional velocity profiles associated with the lower flow channel area, caused by macrophyte stands and narrower channel cross sections.

Habitat conditions are considered likely to continue to support the range of species previously identified by Loughborough University.

River and sea lamprey ammocoetes could use softer marginal sediments, (for example those associated with the limited backwaters/ embayments), as juvenile habitat but generally the banks are too steep and compact for this purpose.

These species could navigate upstream unimpeded, although no suitable spawning habitat is present within the survey reach. The river isn't designated for lamprey species and as such their habitat is not legally protected within this section of the River Parrett.

It must be remembered that despite its artificial and managed form, the River Parrett remains a dynamic system trying to revert to a state of equilibrium in terms of processes and energy/flow efficiency. As such, deposition and erosion (alongside weathering processes) will continue to occur, together with the growth/dieback of vegetation. As such, more naturalised smaller scale (and as such potentially key) fish habitat features will develop and evolve over time as observed during this survey. Management intervention has a critical role to play in the preservation of these features, as well as the introduction of new features to enhance the quality and diversity of fish habitat in this part of the River Parrett.

Author: Matt Johns BSc MSc CEnv MIFM MCIEEM FGS, Director

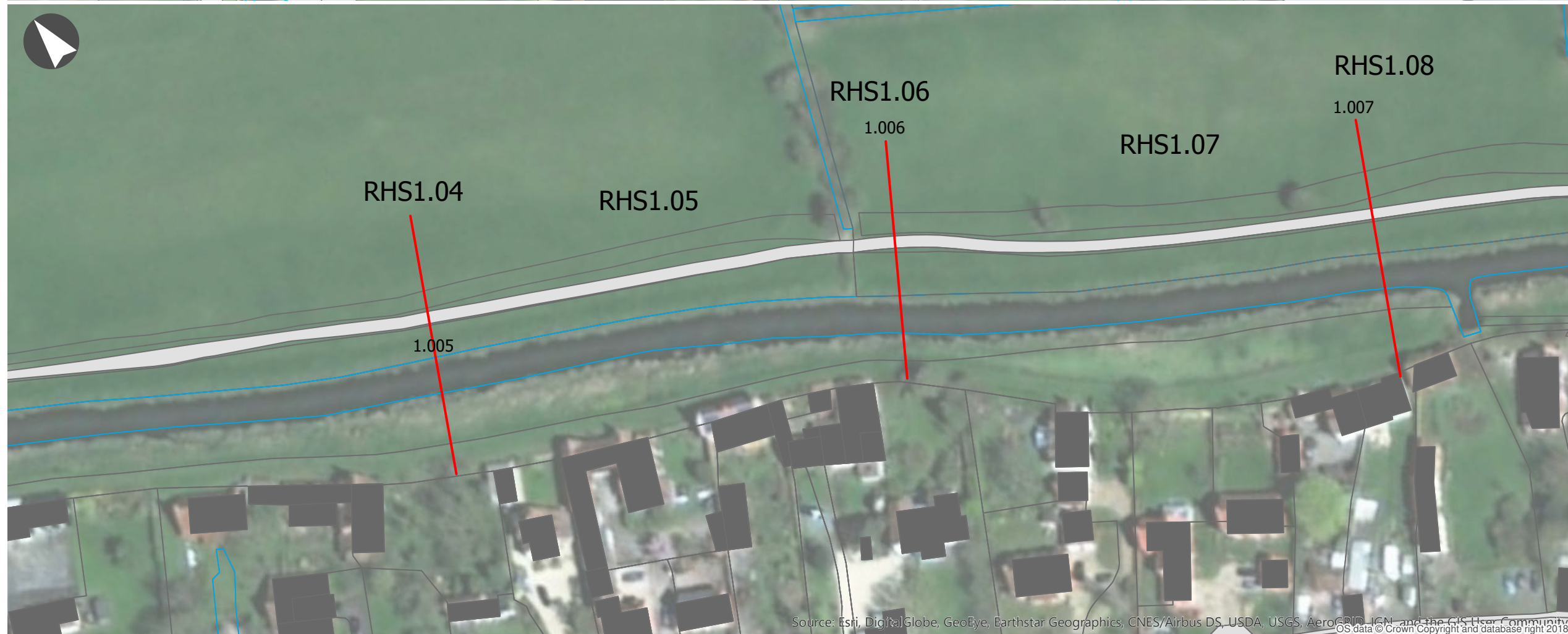
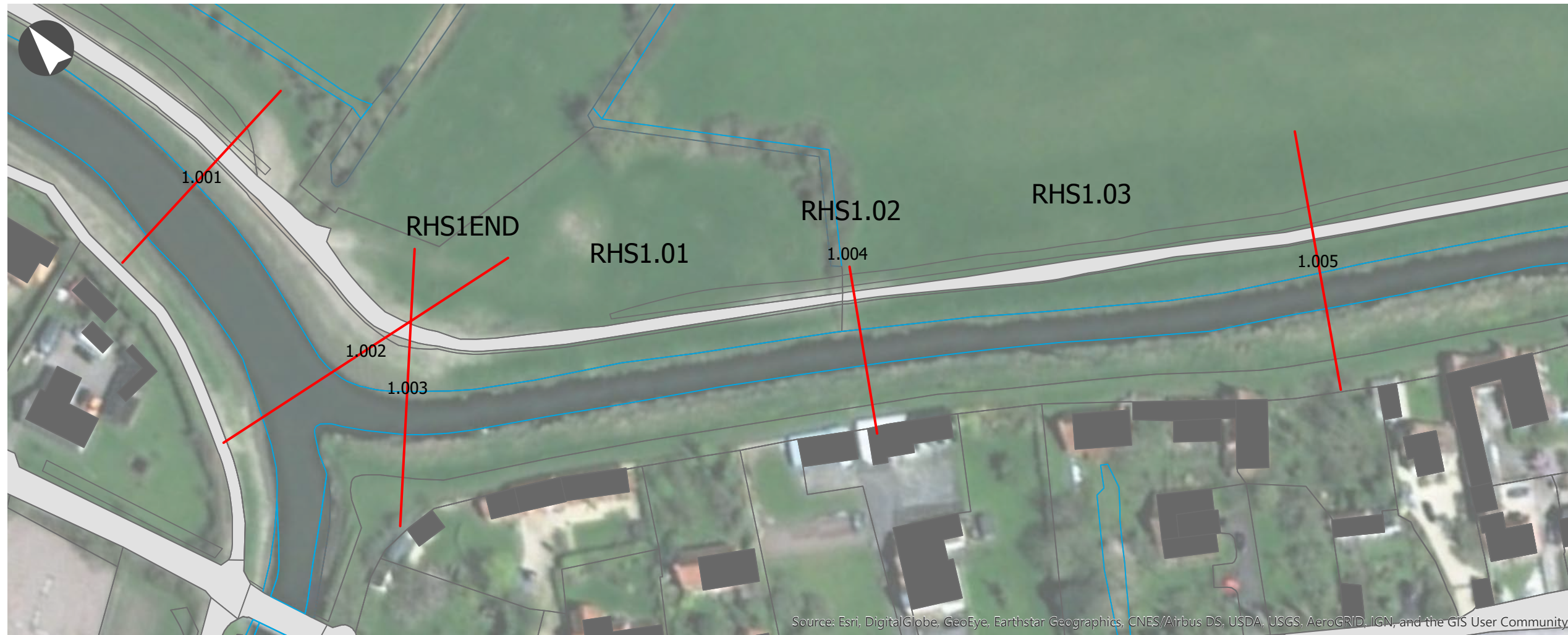
Johns Associates Ltd  
The Old Brewery  
Newtown  
Bradford on Avon BA15 1NF  
T: 01225 723652  
W: [johnsassociates.co.uk](http://johnsassociates.co.uk)

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ANNEX A



**JOHNS**  
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**CLIENT**

Somerset Drainage Boards Consortium

## PROJECT

## Oath to Burrowbridge Dredging

**TITLE**

Survey sheets 1 and 2

SCALE @ A3

1:1,000

**REFERENCE**  
J00256.s1/s2

CREATED BY

MM

## REVISION

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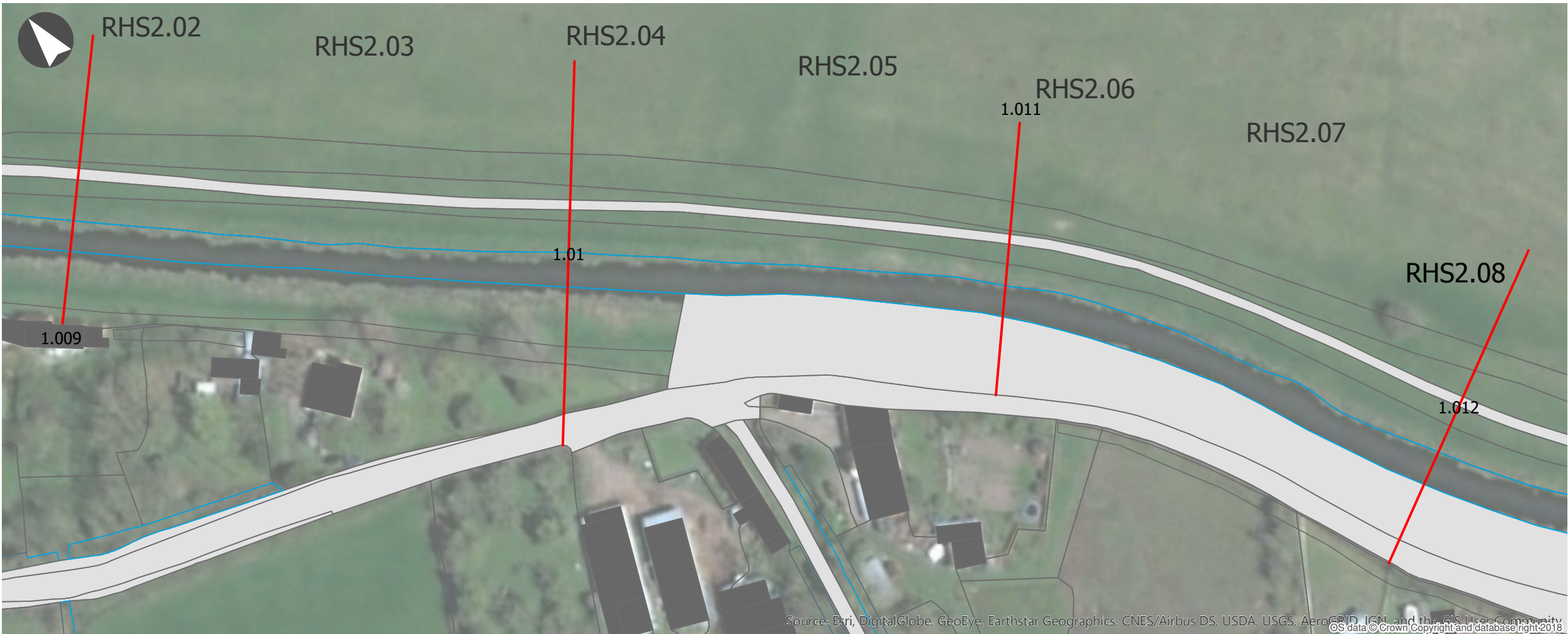
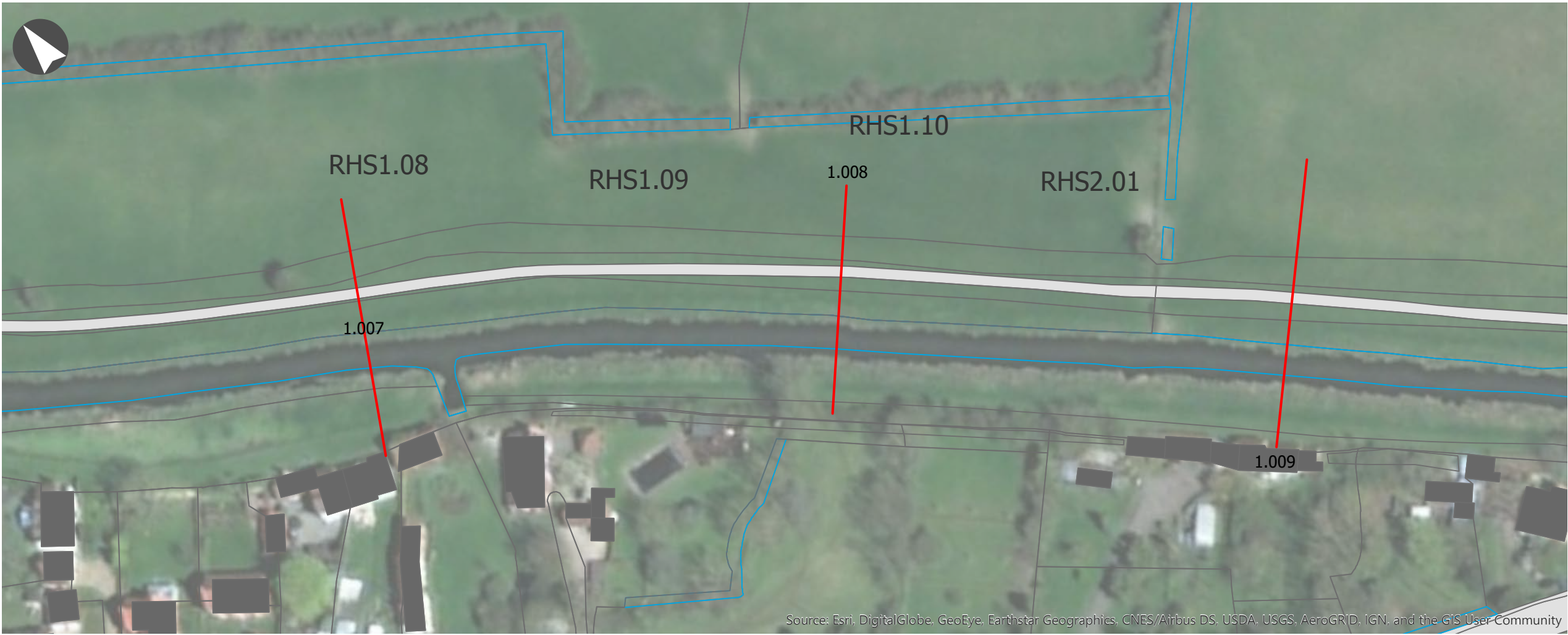
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**DATE ISSUED**  
23/5/2018

## Theme

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|  | Water                             |
|  | Buildings                         |
|  | Buildings,Rail                    |
|  | Rail,Structures                   |
|  | Structures                        |
|  | Rail                              |
|  | Roads Tracks And Paths,Rail       |
|  | Land,Roads Tracks And Paths       |
|  | Buildings,Roads Tracks And Paths  |
|  | Roads Tracks And Paths            |
|  | Roads Tracks And Paths,Structures |
|  | <all other values>                |





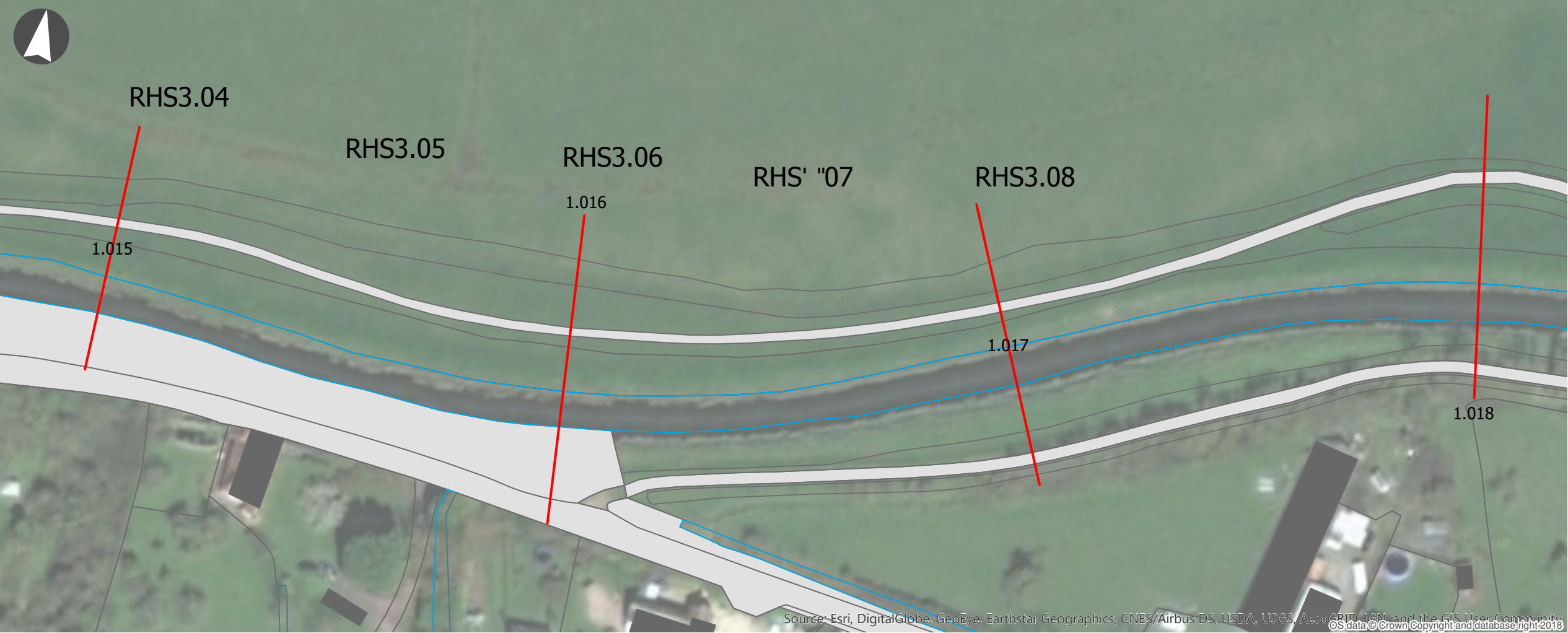
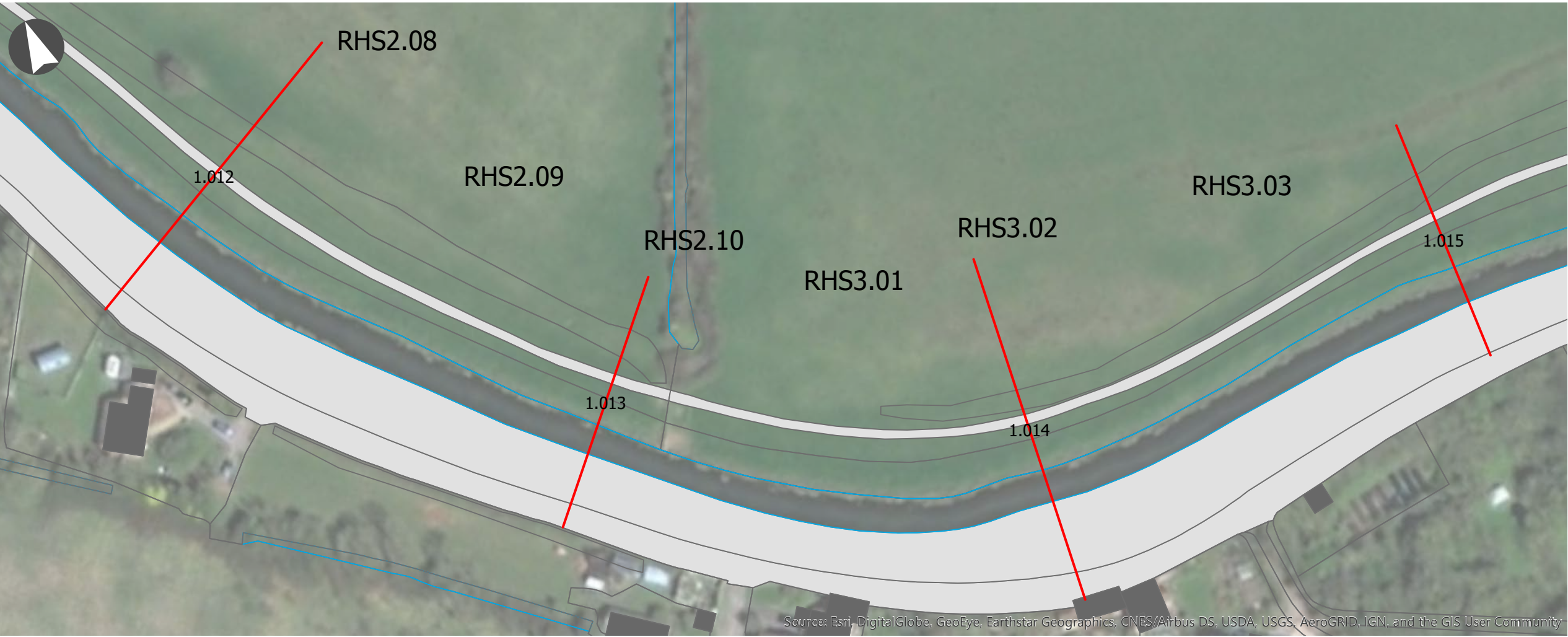
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| CLIENT                              |  |  |
| Somerset Drainage Boards Consortium |  |  |
| PROJECT                             |  |  |
| Oath to Burrowbridge Dredging       |  |  |
| TITLE                               |  |  |
| Survey sheets 2 and 3               |  |  |

|              |            |             |
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| 1:1,000      | MM         | BM          |
| REFERENCE    | REVISION   | DATE ISSUED |
| J00256.s3/s4 |            | 23/5/2018   |

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|-------|-----------------------------------|
|       | Water                             |
|       | Buildings                         |
|       | Buildings,Rail                    |
|       | Rail,Structures                   |
|       | Structures                        |
|       | Rail                              |
|       | Roads Tracks And Paths,Rail       |
|       | Land,Roads Tracks And Paths       |
|       | Buildings,Roads Tracks And Paths  |
|       | Roads Tracks And Paths            |
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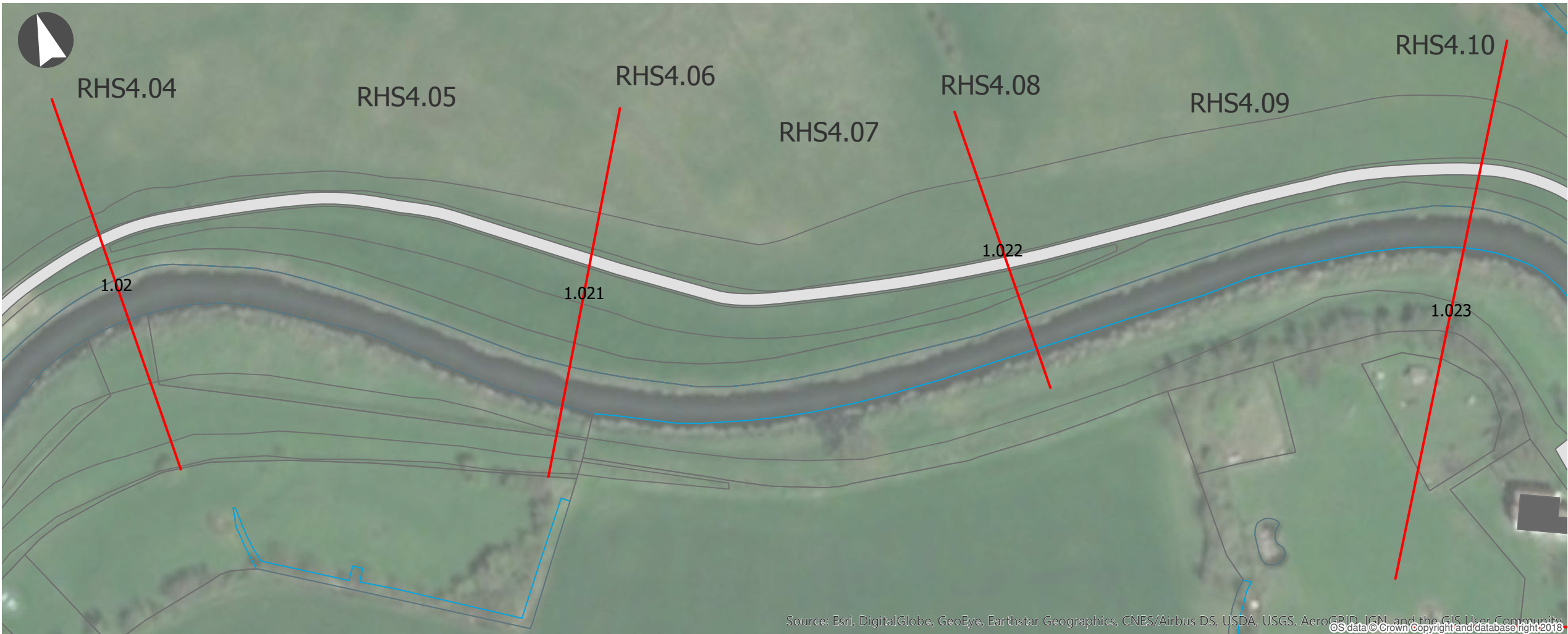
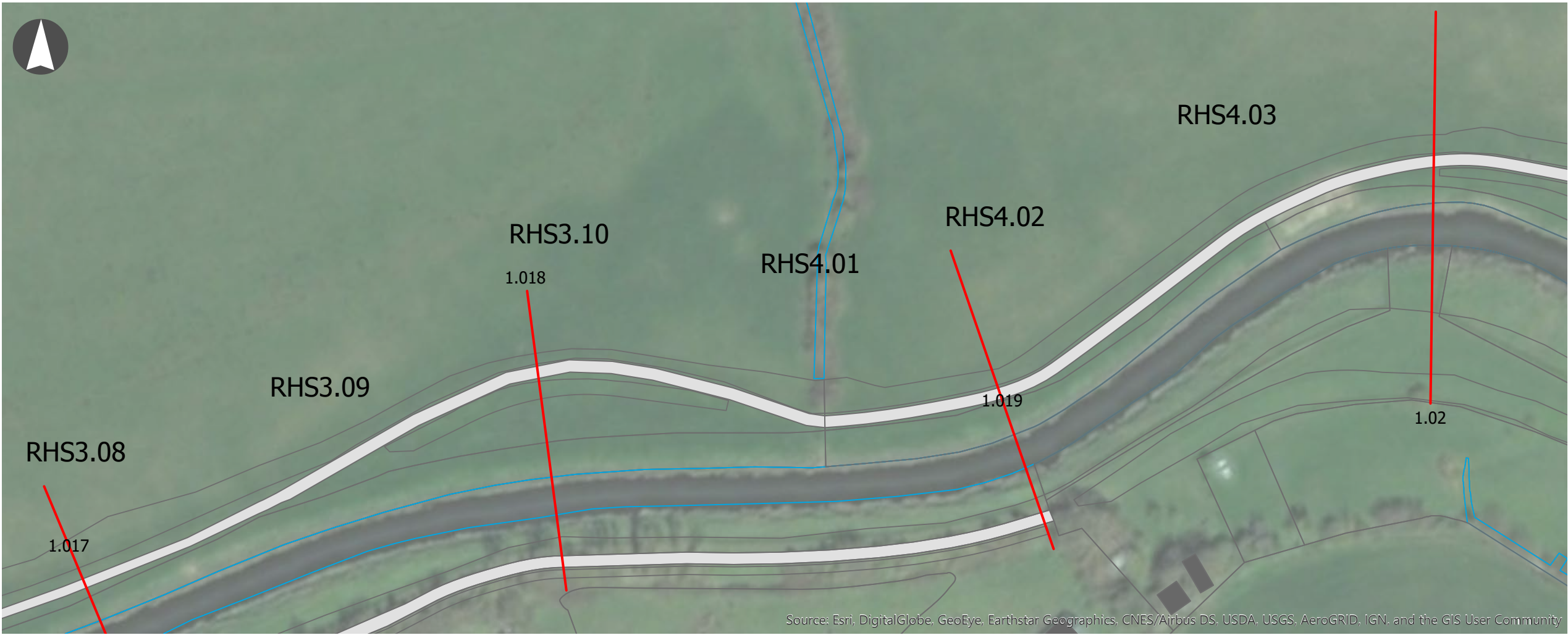
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| CLIENT                              |  |  |
| Somerset Drainage Boards Consortium |  |  |
| PROJECT                             |  |  |
| Oath to Burrowbridge Dredging       |  |  |
| TITLE                               |  |  |
| Survey sheets 5 and 6               |  |  |

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| REFERENCE    | REVISION   | DATE ISSUED |
| J00256.s5/s6 |            | 23/5/2018   |

Theme

- Water
- Buildings
- Buildings,Rail
- Rail,Structures
- Structures
- Rail
- Roads Tracks And Paths,Rail
- Land,Roads Tracks And Paths
- Buildings,Roads Tracks And Paths
- Roads Tracks And Paths
- Roads Tracks And Paths,Structures
- <all other values>







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**CLIENT**  
Somerset Drainage Boards Consortium

**PROJECT**  
Oath to Burrowbridge Dredging

**TITLE**  
Survey sheets 7 and 8

|                                  |                         |                                 |
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| <b>REFERENCE</b><br>J00256.s7/s8 | <b>REVISION</b>         | <b>DATE ISSUED</b><br>23/5/2018 |

**Theme**

Water

Buildings

Buildings,Rail

Rail,Structures

Structures

Rail

Roads Tracks And Paths,Rail

Land,Roads Tracks And Paths

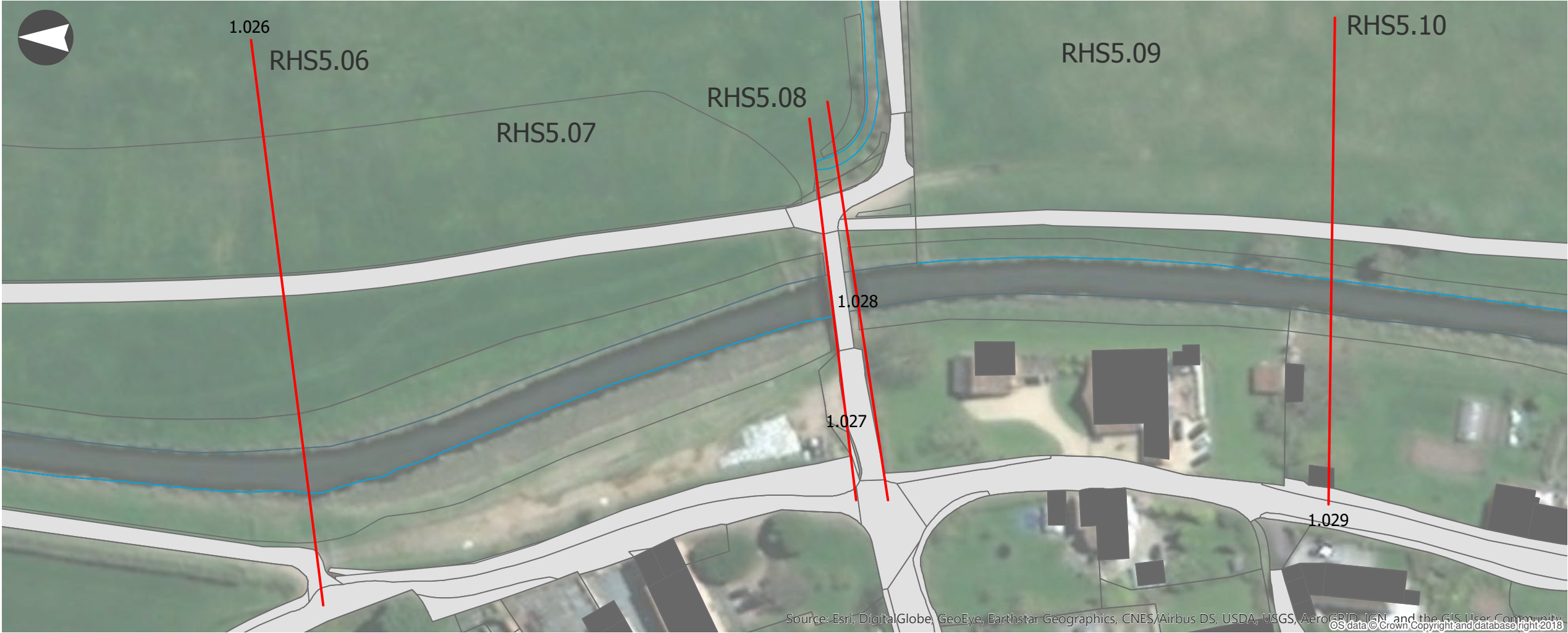
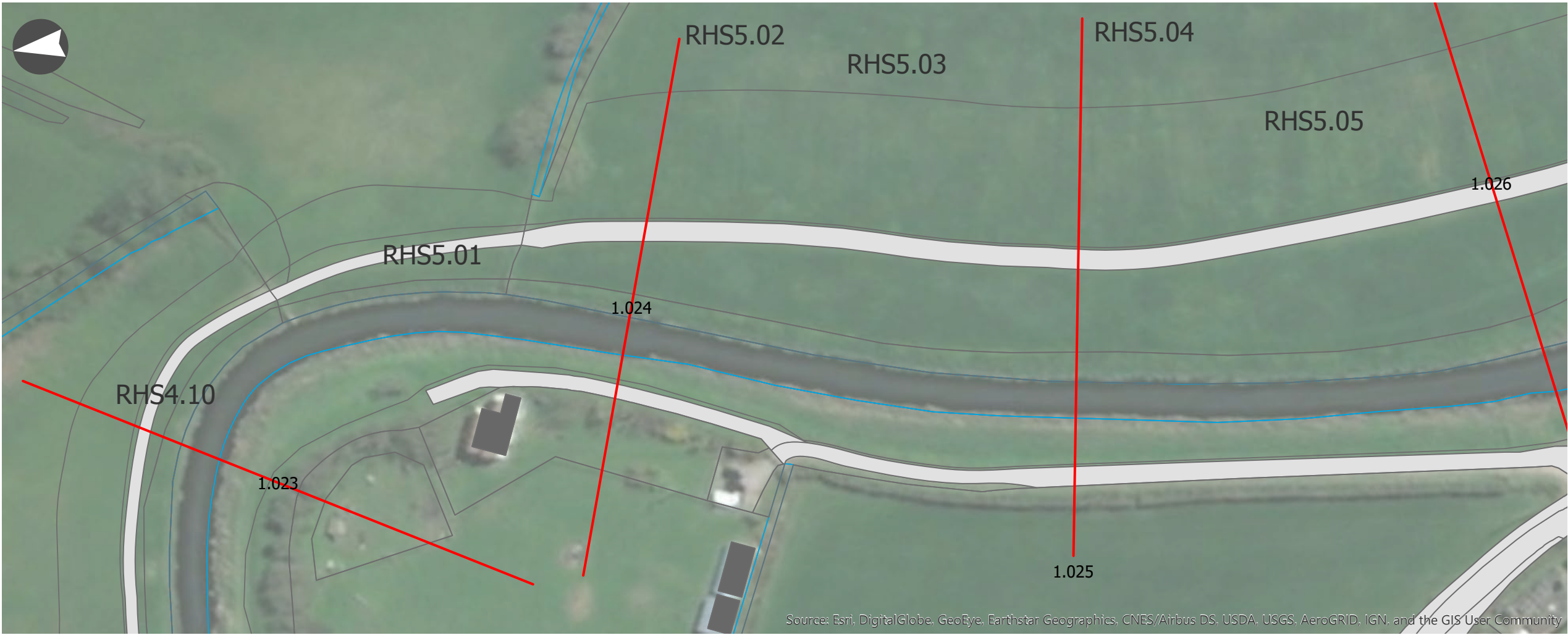
Buildings,Roads Tracks And Paths

Roads Tracks And Paths

Roads Tracks And Paths,Structures

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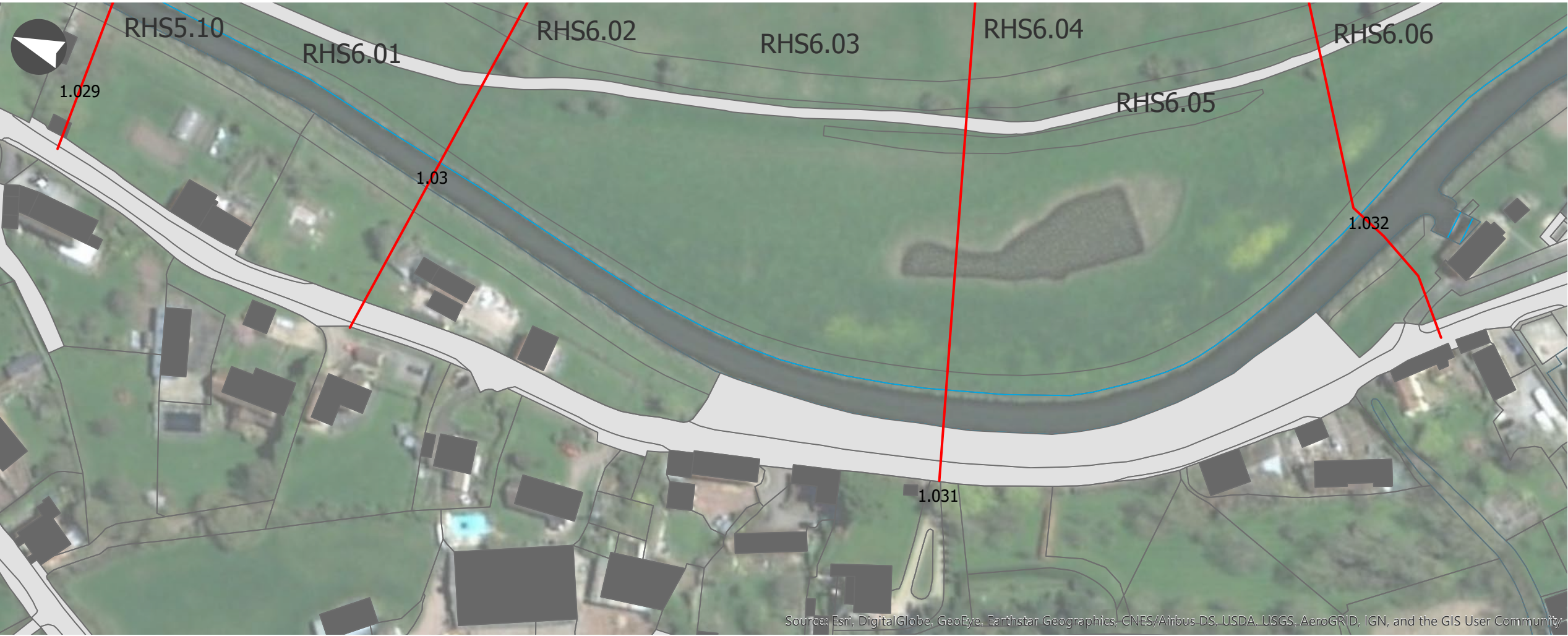
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| <b>CLIENT</b>                       |  |  |
| Somerset Drainage Boards Consortium |  |  |
| <b>PROJECT</b>                      |  |  |
| Oath to Burrowbridge Dredging       |  |  |
| <b>TITLE</b>                        |  |  |
| Survey sheets 9 and 10              |  |  |

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| <b>REFERENCE</b>  | <b>REVISION</b>   | <b>DATE ISSUED</b> |
| J00256.s9/s10     |                   | 23/5/2018          |

| Theme |                                   |
|-------|-----------------------------------|
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|       | Buildings                         |
|       | Buildings,Rail                    |
|       | Rail,Structures                   |
|       | Structures                        |
|       | Rail                              |
|       | Roads Tracks And Paths,Rail       |
|       | Land,Roads Tracks And Paths       |
|       | Buildings,Roads Tracks And Paths  |
|       | Roads Tracks And Paths            |
|       | Roads Tracks And Paths,Structures |
|       | <all other values>                |







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**PROJECT**  
Oath to Burrowbridge Dredging

**TITLE**  
Survey sheets 11 and 12

|                                    |                         |                                 |
|------------------------------------|-------------------------|---------------------------------|
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| <b>REFERENCE</b><br>J00256.s11/s12 | <b>REVISION</b>         | <b>DATE ISSUED</b><br>23/5/2018 |

**Theme**

Water

Buildings

Buildings,Rail

Rail,Structures

Structures

Rail

Roads Tracks And Paths,Rail

Land,Roads Tracks And Paths

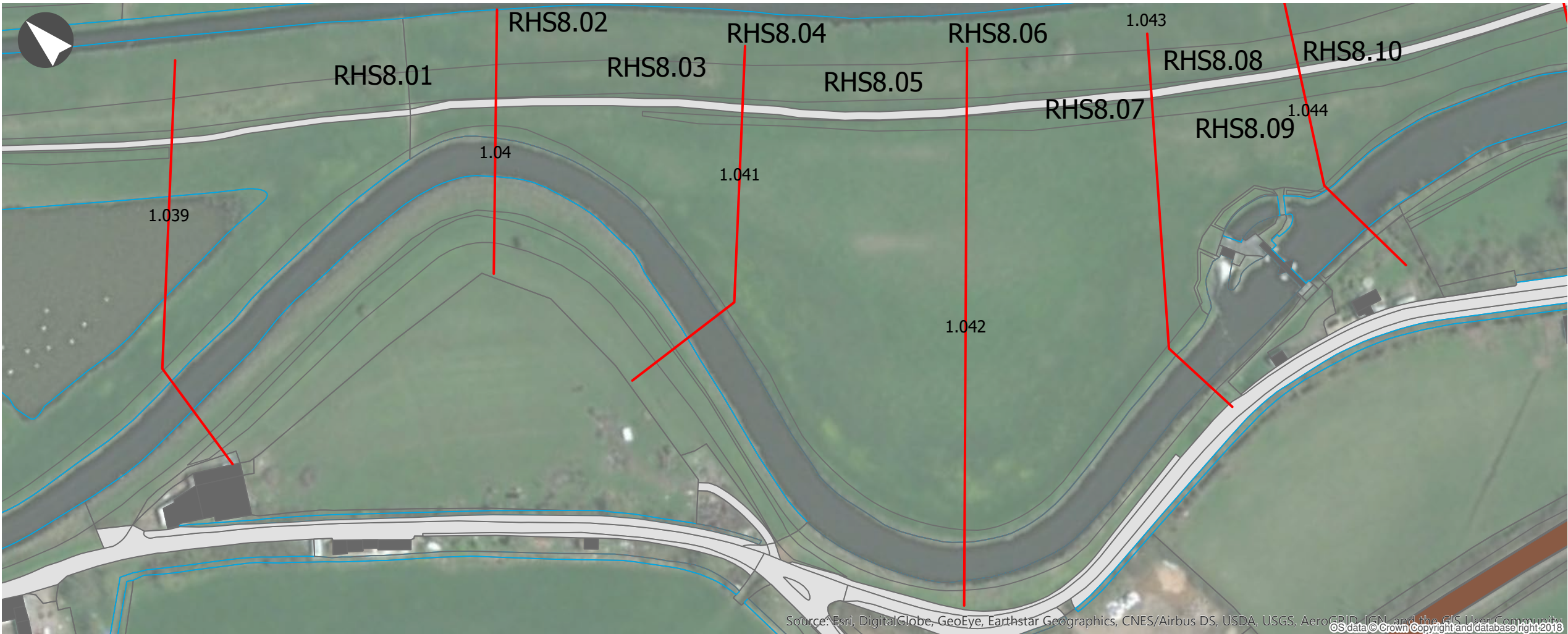
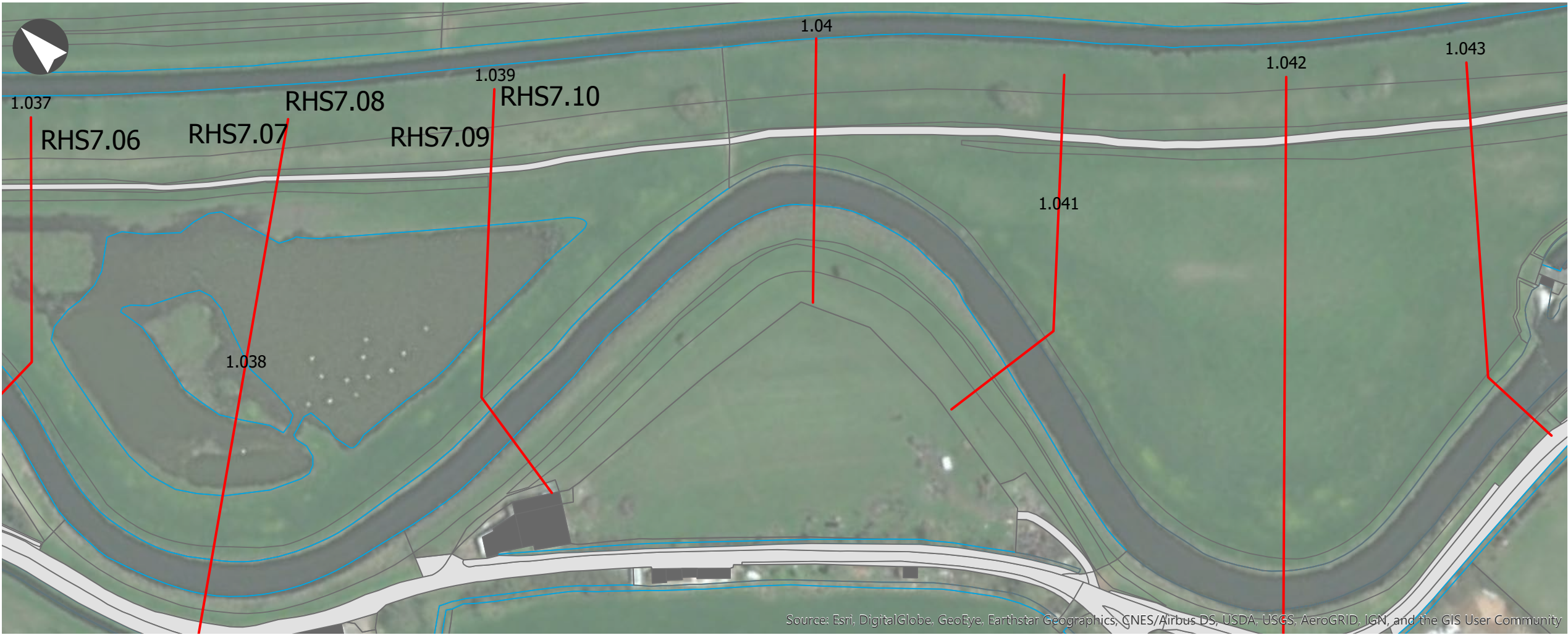
Buildings,Roads Tracks And Paths

Roads Tracks And Paths

Roads Tracks And Paths,Structures

<all other values>





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**PROJECT**  
Oath to Burrowbridge Dredging

**TITLE**  
Survey sheets 13 and 14

|                   |                   |                    |
|-------------------|-------------------|--------------------|
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| J00256.s13/s14    |                   | 23/5/2018          |

### Theme

- Water
- Buildings
- Buildings,Rail
- Rail,Structures
- Structures
- Rail
- Roads Tracks And Paths,Rail
- Land,Roads Tracks And Paths
- Buildings,Roads Tracks And Paths
- Roads Tracks And Paths
- Roads Tracks And Paths,Structures
- <all other values>

ANNEX B



**A FIELD SURVEY DETAILS**Site Number: leave blank if new site

Site Reference: 02BB

Spot-check 1 coord:

Spot-check 6 coord:

End of site coord:

Reach Reference: 02BB1

River name: RIVER PARLETT

Date 29 / 05 / 2018 Time:

Surveyor name: T CHISWALL  
M JOHNS

Accredited Surveyor code: MN33

Is the site part of a river or an artificial channel? River ☐ Artificial ☒Are adverse conditions affecting survey? No ☒ Yes ☐

If yes, state .....

Is bed of river visible? barely or not ☒ partially ☐ ± entirely ☐Is health and safety assessment form attached? Yes ☒ No ☐Number of photographs taken: ☐


Photo references:

Site surveyed from: left bank ☐ right bank ☒ channel ☐☐ When options shown with 'shadow boxes', tick one box only

LEFT banks determined by facing downstream RIGHT

**B. PREDOMINANT VALLEY FORM (within the horizon limit)** (tick one box only)

(tick one box only)

 ☐ shallow vee ☐ deep vee ☐ gorge ☐ concave/bowl ☐ asymmetrical valley ☐ U-shape valley ☒ no obvious valley sidesDistinct flat valley bottom? No ☐ Yes ☒Natural terraces? No ☒ Yes ☐**C. NUMBER OF RIFFLES, POOLS AND POINT BARS** (enter total number in boxes)Riffle(s) Unvegetated point bar(s) Pool(s) Vegetated point bar(s) **D. ARTIFICIAL FEATURES** (indicate total number of occurrences of each category within the 500m site)

| If none, tick box <input type="checkbox"/> |               | Major | Intermediate | Minor |                          | Major | Intermediate | Minor |
|--------------------------------------------|---------------|-------|--------------|-------|--------------------------|-------|--------------|-------|
|                                            | Weirs/sluices |       |              |       | Outfalls/intakes         |       | 1            |       |
|                                            | Culverts      |       |              |       | Fords                    |       |              |       |
|                                            | Bridges       |       |              |       | Deflectors/groynes/croys |       |              |       |
|                                            | Other - state |       |              |       |                          |       |              |       |

Is channel obviously realigned? No ☐ Yes, <33% of site ☐ ≥33% of site ☒Is channel obviously over-deepened? No ☐ Yes, <33% of site ☐ ≥33% of site ☒Is water impounded by weir/dam? No ☒ Yes, <33% of site ☐ ≥33% of site ☐

|                                                                                                                                     |  |                                              |    |    |    |    |       |    |    |    |    |             |
|-------------------------------------------------------------------------------------------------------------------------------------|--|----------------------------------------------|----|----|----|----|-------|----|----|----|----|-------------|
| SITE REF. <u>07881</u>                                                                                                              |  | <b>RIVER HABITAT SURVEY: TEN SPOT-CHECKS</b> |    |    |    |    |       |    |    |    |    | Page 2 of 4 |
| Spot-check 1 is at: upstream end <input checked="" type="checkbox"/> downstream end <input type="checkbox"/> of site (tick one box) |  |                                              |    |    |    |    |       |    |    |    |    |             |
| <b>E PHYSICAL ATTRIBUTES</b> (to be assessed across channel within 1m wide transect)                                                |  |                                              |    |    |    |    |       |    |    |    |    |             |
| When boxes 'bordered', only one entry allowed                                                                                       |  | 1 GPS                                        | 2  | 3  | 4  | 5  | 6 GPS | 7  | 8  | 9  | 10 | GPS         |
| <b>LEFT BANK</b>                                                                                                                    |  | Ring EC or SC if composed of sandy substrate |    |    |    |    |       |    |    |    |    |             |
| Material NV, BE, BO, CO, GS, EA, PE, CL, CC, SP, WP, GA, BR, RR, TD, FA, BI                                                         |  | EA                                           | EA | EA | EA | EA | EA    | EA | EA | EA | EA |             |
| Bank modification(s) NK, NO, RS, RI, PC(B), BM, EM                                                                                  |  | RS                                           | RS | RS | RS | RS | RS    | RS | RS | RS | RS |             |
| Marginal & bank feature(s) NV, NO, EC, SC, PB, VP, SB, VS, NB                                                                       |  | SC                                           | SC | SC | SC | SC | SC    | SC | SC | SC | SC |             |
| <b>CHANNEL</b>                                                                                                                      |  | GP-ring either G or P if predominant         |    |    |    |    |       |    |    |    |    |             |
| Channel substrate NV, BE, BO, CO, GP, SA, SI, CL, PE, EA, AR                                                                        |  | CL                                           | CL | CL | CL | CL | CL    | CL | CL | CL | CL | SI          |
| Flow-type NV, FF, CH, BW, UW, CF, RP, UP, SM, NP, DR                                                                                |  | SM                                           | SM | SM | SM | SM | SM    | SM | SM | SM | SM |             |
| Channel modification(s) NK, NO, CV, RS, RI, DA, FO                                                                                  |  | RS                                           | RS | RS | RS | RS | RS    | RS | RS | RS | RS |             |
| Channel feature(s) NV, NO, EB, RO, VR, MB, VB, MI, TR                                                                               |  | NO                                           | NO | NO | NO | NO | NO    | NO | NO | NO | NO |             |
| For braided rivers only: number of sub-channels                                                                                     |  |                                              |    |    |    |    |       |    |    |    |    |             |
| <b>RIGHT BANK</b>                                                                                                                   |  | Ring EC or SC if composed of sandy substrate |    |    |    |    |       |    |    |    |    |             |
| Material NV, BE, BO, CO, GS, EA, PE, CL, CC, SP, WP, GA, BR, RR, TD, FA, BI                                                         |  | EA                                           | EA | EA | EA | EA | EA    | EA | EA | EA | EA |             |
| Bank modification(s) NK, NO, RS, RI, PC(B), BM, EM                                                                                  |  | RS                                           | RS | RS | RS | RS | RS    | RS | RS | RS | RS |             |
| Marginal & bank feature(s) NV, NO, EC, SC, PB, VP, SB, VS, NB                                                                       |  | SC                                           | SC | SC | SC | SC | SC    | SC | SC | SC | SC |             |
| <b>F BANKTOP LAND-USE AND VEGETATION STRUCTURE</b> (to be assessed over a 10m wide transect)                                        |  |                                              |    |    |    |    |       |    |    |    |    |             |
| Land-use: choose one from BL, BP, CW, CP, SH, OR, WL, MH, AW, OW, RP, IG, TH, RD, SU, TL, IL, PG, NV                                |  |                                              |    |    |    |    |       |    |    |    |    |             |
| LAND-USE WITHIN 5m OF LEFT BANKTOP                                                                                                  |  | IG                                           | IG | IG | IG | IG | IG    | IG | IG | IG | IG |             |
| LEFT BANKTOP (structure within 1m) B/U/S/C/NV                                                                                       |  | U                                            | U  | U  | S  | S  | S     | S  | S  | S  | S  |             |
| LEFT BANK-FACE (structure) B/U/S/C/NV                                                                                               |  | S                                            | S  | S  | S  | S  | S     | S  | S  | S  | S  |             |
| RIGHT BANK-FACE (structure) B/U/S/C/NV                                                                                              |  | S                                            | S  | S  | S  | S  | S     | S  | S  | S  | S  |             |
| RIGHT BANKTOP (structure within 1m) B/U/S/C/NV                                                                                      |  | U                                            | U  | U  | U  | U  | U     | U  | U  | U  | U  |             |
| LAND-USE WITHIN 5m OF RIGHT BANKTOP                                                                                                 |  | RP                                           | RP | RP | RP | RP | RP    | RP | RP | RP | RP |             |
| <b>G CHANNEL VEGETATION TYPES</b> (to be assessed over a 10m wide transect: use E (≥ 33% area), ✓ (minor) or NV (not visible))      |  |                                              |    |    |    |    |       |    |    |    |    |             |
| None (✓) or Not Visible (NV)                                                                                                        |  |                                              |    |    |    |    |       |    |    |    |    |             |
| Liverworts/mosses/lichens                                                                                                           |  |                                              |    |    |    |    |       |    |    |    |    | ✓           |
| Emergent broad-leaved herbs                                                                                                         |  |                                              |    |    |    |    |       |    |    |    |    |             |
| Emergent reeds/sedges/rushes/grasses/horsetails                                                                                     |  | ✓                                            | ✓  |    | ✓  | ✓  | ✓     | ✓  | ✓  | ✓  | ✓  | E           |
| Floating-leaved (rooted)                                                                                                            |  |                                              |    |    |    |    |       |    |    |    |    |             |
| Free-floating                                                                                                                       |  |                                              |    |    |    |    |       |    |    |    |    |             |
| Amphibious                                                                                                                          |  | ✓                                            | ✓  |    | ✓  | ✓  | ✓     | ✓  | ✓  | ✓  | ✓  | ✓           |
| Submerged broad-leaved                                                                                                              |  |                                              |    |    |    |    |       |    |    |    |    | ✓           |
| Submerged linear-leaved                                                                                                             |  |                                              |    |    |    |    |       |    |    |    |    |             |
| Submerged fine-leaved                                                                                                               |  | ✓                                            |    | ✓  |    | ✓  | ✓     | ✓  | ✓  |    | ✓  | ✓           |
| Filamentous algae                                                                                                                   |  |                                              |    |    |    |    |       |    |    |    |    | ✓           |
| Use end column for overall assessment over 500m, including types not occurring in spot-checks (use ✓, E or NV)                      |  |                                              |    |    |    |    |       |    |    |    |    |             |

Riffles:

○

Pools:

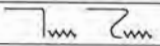


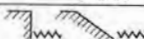
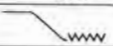

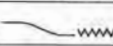


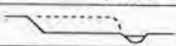

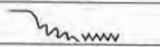

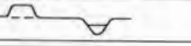
○

PB:

○

VP:

○

|                                                                                                     |                                             |                                                                                                           |
|-----------------------------------------------------------------------------------------------------|---------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| SITE REF. <b>02981</b>                                                                              | <b>RIVER HABITAT SURVEY : 500m SWEEP-UP</b> | Page 3 of 4                                                                                               |
| II LAND-USE WITHIN 50m OF BANKTOP (Use ✓ (present) or E (≥ 33% banklength))                         |                                             |                                                                                                           |
|                                                                                                     | L                                           | R                                                                                                         |
| Broadleaf/mixed woodland (semi-natural) (BL)                                                        |                                             | Natural open water (OW)                                                                                   |
| Broadleaf/mixed plantation (BP)                                                                     |                                             | Rough/unimproved grassland/pasture (RP)                                                                   |
| Coniferous woodland (semi-natural) (CW)                                                             |                                             | Improved/semi-improved grassland (IG)                                                                     |
| Coniferous plantation (CP)                                                                          |                                             | Tall herb/rank vegetation (TH)                                                                            |
| Scrub & shrubs (SH)                                                                                 | ✓                                           | Rock, scree or sand dunes (RD)                                                                            |
| Orchard (OR)                                                                                        |                                             | Suburban/urban development (SU)                                                                           |
| Wetland (e.g. bog, marsh, fen) (WL)                                                                 |                                             | Tilled land (TL)                                                                                          |
| Moorland/heath (MH)                                                                                 |                                             | Irrigated land (IL)                                                                                       |
| Artificial open water (AW)                                                                          |                                             | Parkland or gardens (PG)                                                                                  |
|                                                                                                     |                                             | Not visible (NV)                                                                                          |
| I BANK PROFILES (Use ✓ (present) or E (≥ 33% banklength))                                           |                                             |                                                                                                           |
| <b>Natural/unmodified</b>                                                                           | L                                           | R                                                                                                         |
| Vertical/undercut  |                                             | Artificial/modified    |
| Vertical with toe  |                                             | Reinforced - whole     |
| Steep (>45°)       |                                             | Reinforced - top only  |
| Gentle             |                                             | Reinforced - toe only  |
| Composite         |                                             | Artificial two-stage   |
| Natural berm     |                                             | Poached bank         |
|                                                                                                     |                                             | Embanked             |
|                                                                                                     |                                             | Set-back embankment  |
| J EXTENT OF TREES AND ASSOCIATED FEATURES (Record even if <1%)                                      |                                             |                                                                                                           |
| TREES (tick one box per bank)                                                                       |                                             |                                                                                                           |
|                                                                                                     | Left                                        | Right                                                                                                     |
| None                                                                                                | <input type="checkbox"/>                    | <input type="checkbox"/>                                                                                  |
| Isolated/scattered                                                                                  | <input checked="" type="checkbox"/>         | <input type="checkbox"/>                                                                                  |
| Regularly spaced, single                                                                            | <input type="checkbox"/>                    | <input type="checkbox"/>                                                                                  |
| Occasional clumps                                                                                   | <input type="checkbox"/>                    | <input type="checkbox"/>                                                                                  |
| Semi-continuous                                                                                     | <input type="checkbox"/>                    | <input type="checkbox"/>                                                                                  |
| Continuous                                                                                          | <input type="checkbox"/>                    | <input type="checkbox"/>                                                                                  |
| ASSOCIATED FEATURES (tick one box per feature)                                                      |                                             |                                                                                                           |
|                                                                                                     | None                                        | Present                                                                                                   |
| Shading of channel                                                                                  | <input checked="" type="checkbox"/>         | <input type="checkbox"/>                                                                                  |
| *Overhanging boughs                                                                                 | <input checked="" type="checkbox"/>         | <input type="checkbox"/>                                                                                  |
| *Exposed bankside roots                                                                             | <input checked="" type="checkbox"/>         | <input type="checkbox"/>                                                                                  |
| *Underwater tree roots                                                                              | <input checked="" type="checkbox"/>         | <input type="checkbox"/>                                                                                  |
| Fallen trees                                                                                        | <input checked="" type="checkbox"/>         | <input type="checkbox"/>                                                                                  |
| Large woody debris                                                                                  | <input checked="" type="checkbox"/>         | <input type="checkbox"/>                                                                                  |
| K EXTENT OF CHANNEL AND BANK FEATURES (tick one box for each feature) (Record even if <1%)          |                                             |                                                                                                           |
|                                                                                                     | None                                        | Present                                                                                                   |
| *Free fall flow                                                                                     | <input type="checkbox"/>                    | <input type="checkbox"/>                                                                                  |
| Chute flow                                                                                          | <input type="checkbox"/>                    | <input type="checkbox"/>                                                                                  |
| Broken standing waves                                                                               | <input type="checkbox"/>                    | <input type="checkbox"/>                                                                                  |
| Unbroken standing waves                                                                             | <input type="checkbox"/>                    | <input type="checkbox"/>                                                                                  |
| Rippled flow                                                                                        | <input type="checkbox"/>                    | <input checked="" type="checkbox"/>                                                                       |
| *Upwelling                                                                                          | <input type="checkbox"/>                    | <input checked="" type="checkbox"/>                                                                       |
| Smooth flow                                                                                         | <input type="checkbox"/>                    | <input checked="" type="checkbox"/>                                                                       |
| No perceptible flow                                                                                 | <input type="checkbox"/>                    | <input type="checkbox"/>                                                                                  |
| No flow (dry)                                                                                       | <input type="checkbox"/>                    | <input type="checkbox"/>                                                                                  |
| Marginal deadwater                                                                                  | <input type="checkbox"/>                    | <input type="checkbox"/>                                                                                  |
| Eroding cliff(s)                                                                                    | <input type="checkbox"/>                    | <input checked="" type="checkbox"/>                                                                       |
| Stable cliff(s)                                                                                     | <input type="checkbox"/>                    | <input type="checkbox"/>                                                                                  |
|                                                                                                     | None                                        | Present                                                                                                   |
| Exposed bedrock                                                                                     | <input type="checkbox"/>                    | <input type="checkbox"/>                                                                                  |
| Exposed boulders                                                                                    | <input type="checkbox"/>                    | <input type="checkbox"/>                                                                                  |
| Vegetated bedrock/boulders                                                                          | <input type="checkbox"/>                    | <input type="checkbox"/>                                                                                  |
| Unvegetated mid-channel bar(s)                                                                      | <input type="checkbox"/>                    | <input type="checkbox"/>                                                                                  |
| Vegetated mid-channel bar(s)                                                                        | <input type="checkbox"/>                    | <input type="checkbox"/>                                                                                  |
| Mature island(s)                                                                                    | <input type="checkbox"/>                    | <input type="checkbox"/>                                                                                  |
| Unvegetated side bar(s)                                                                             | <input type="checkbox"/>                    | <input type="checkbox"/>                                                                                  |
| Vegetated side bar(s)                                                                               | <input type="checkbox"/>                    | <input type="checkbox"/>                                                                                  |
| Unvegetated point bar(s)                                                                            | <input type="checkbox"/>                    | <input type="checkbox"/>                                                                                  |
| Vegetated point bar(s)                                                                              | <input type="checkbox"/>                    | <input type="checkbox"/>                                                                                  |
| *Discrete unvegetated silt deposit(s)                                                               | <input type="checkbox"/>                    | <input checked="" type="checkbox"/>                                                                       |
| *Discrete unvegetated sand deposit(s)                                                               | <input type="checkbox"/>                    | <input type="checkbox"/>                                                                                  |
| *Discrete unvegetated gravel deposit(s)                                                             | <input type="checkbox"/>                    | <input type="checkbox"/>                                                                                  |



|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                         |                                                                                                                                |                                                    |             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|-------------|
| SITE REF. 02851                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>RIVER HABITAT SURVEY : DIMENSIONS AND INFLUENCES</b> |                                                                                                                                |                                                    | Page 4 of 4 |
| <b>L CHANNEL DIMENSIONS</b> (to be measured at one location on a straight uniform section, preferably across a riffle)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                         |                                                                                                                                |                                                    |             |
| LEFT BANK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | CHANNEL                                                 | RIGHT BANK                                                                                                                     |                                                    |             |
| Banktop height (m)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Bankfull/top width (m)                                  | Banktop height (m)                                                                                                             |                                                    |             |
| Is banktop height also bankfull height? (Y or N)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Water width (m)                                         | Is banktop height also bankfull height? (Y or N)                                                                               |                                                    |             |
| Embanked height (m)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Water depth (m)                                         | Embanked height (m)                                                                                                            |                                                    |             |
| If trashline lower than banktop, indicate: height above water (m) = width from bank to bank (m) =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                         |                                                                                                                                |                                                    |             |
| Bed material at site is: consolidated <input type="checkbox"/> unconsolidated (loose) <input type="checkbox"/> unknown <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                         |                                                                                                                                |                                                    |             |
| Location of measurements is: riffle <input type="checkbox"/> other <input type="checkbox"/> (state)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                         |                                                                                                                                |                                                    |             |
| <b>M FEATURES OF SPECIAL INTEREST</b> (Use ✓ or E (≥ 33% length) *record even if < 1%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                         |                                                                                                                                |                                                    |             |
| None <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Very large boulders (>1m) <input type="checkbox"/>      | Backwater(s) <i>small</i> <input checked="" type="checkbox"/>                                                                  | Marsh(es) <input type="checkbox"/>                 |             |
| Braided channels <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | *Debris dam(s) <input type="checkbox"/>                 | Floodplain boulder deposits <input type="checkbox"/>                                                                           | Flush(es) <input type="checkbox"/>                 |             |
| Side channel(s) <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | *Leafy debris <input type="checkbox"/>                  | Water meadow(s) <input type="checkbox"/>                                                                                       | Natural open water <input type="checkbox"/>        |             |
| *Natural waterfall(s) > 5m high <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Fringing reed-bank(s) <input type="checkbox"/>          | Fen(s) <input type="checkbox"/>                                                                                                | Others (state) <input checked="" type="checkbox"/> |             |
| *Natural waterfall(s) < 5m high <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Quaking bank(s) <input type="checkbox"/>                | Bog(s) <input type="checkbox"/>                                                                                                | ADJACENT MOSES + LEVELS                            |             |
| Natural cascade(s) <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | *Sink hole(s) <input type="checkbox"/>                  | Wet woodland(s) <input type="checkbox"/>                                                                                       |                                                    |             |
| <b>N CHOKED CHANNEL</b> (tick one box)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                         |                                                                                                                                |                                                    |             |
| Is 33% or more of the channel choked with vegetation? No <input checked="" type="checkbox"/> Yes <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                         |                                                                                                                                |                                                    |             |
| <b>O NOTABLE NUISANCE PLANT SPECIES</b> (Use ✓ or E (≥ 33% length) *record even if < 1%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                         |                                                                                                                                |                                                    |             |
| <div style="display: flex; justify-content: space-between;"> <div>             bankface banktop to 50m<br/>             None <input type="checkbox"/> *Giant hogweed <input type="checkbox"/> *Japanese knotweed <input type="checkbox"/> </div> <div>             bankface banktop to 50m<br/>             *Himalayan balsam <input checked="" type="checkbox"/> *Other (state)..... <input type="checkbox"/> </div> </div>                                                                                                                                                                                                                                                                                                                                                                  |                                                         |                                                                                                                                |                                                    |             |
| <b>P OVERALL CHARACTERISTICS</b> (Circle appropriate words, add others as necessary)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                         |                                                                                                                                |                                                    |             |
| <b>Major Impacts:</b> landfill - tipping - litter - sewage - pollution - drought - abstraction - mill - dam - road - rail - industry - housing - mining - quarrying - <u>overdeepening</u> - <u>overwidening</u> (P or E) - <u>realignment</u> - afforestation - fisheries management - silting - waterlogging - hydroelectric power<br><b>Evidence of recent management:</b> dredging - <u>bank mowing</u> - weed cutting - enhancement - river rehabilitation - gravel extraction - other (please specify)<br><b>Animals:</b> otter - mink - water vole - kingfisher - dipper - grey wagtail - sand martin - heron - <u>dragonflies/damselflies</u><br><b>Other significant observations:</b> if necessary use separate sheet to describe overall characteristics and relevant observations |                                                         |                                                                                                                                |                                                    |             |
| <b>Q ALDERS</b> (tick one box in each of the two categories) *record even if < 1%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                         |                                                                                                                                |                                                    |             |
| *Alders? None <input checked="" type="checkbox"/> Present <input type="checkbox"/> Extensive <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                         | *Diseased Alders? None <input checked="" type="checkbox"/> Present <input type="checkbox"/> Extensive <input type="checkbox"/> |                                                    |             |
| <b>R FIELD SURVEY QUALITY CONTROL</b> (✓ boxes to confirm checks)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                         |                                                                                                                                |                                                    |             |
| Have you taken at least two photos that illustrate the general character of the site and additional photos of any weirs/ sluices and major/intermediate structures across the channel? <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                         |                                                                                                                                |                                                    |             |
| Have you completed all ten spot-checks and made entries in all boxes in E & F on page 2? <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                         |                                                                                                                                |                                                    |             |
| Have you completed column 11 of section G (and E if appropriate) on page 2? <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                         |                                                                                                                                |                                                    |             |
| Have you recorded in section C the number of riffles, pools and point bars (even if 0) on page 1? <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                         |                                                                                                                                |                                                    |             |
| Have you given an accurate (alphanumeric) grid reference for spot-checks 1, 6 and end of site (page 1)? <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                         |                                                                                                                                |                                                    |             |
| Have you stated whether spot-check 1 is at the upstream or downstream end of the site (top of page 2)? <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                         |                                                                                                                                |                                                    |             |
| Have you cross-checked your spot-check and sweep-up responses with the channel modification indicators given on page 2 of the spot-check key? <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                         |                                                                                                                                |                                                    |             |

SEE  
SECTIONS  
1.003  
to  
1.008

**A FIELD SURVEY DETAILS**Site Number: leave blank if new site

2

Site Reference: OTBB

Spot-check 1 coord:

Spot-check 6 coord:

End of site coord:

Reach Reference: OTBB 2

River name: RIVER PARLETT

Date 29/05/2018 Time:

Surveyor name: T. CHISWALL  
M. JOHNS

Accredited Surveyor code: MN33

Is the site part of a river or an artificial channel? River ☐ Artificial ☒Are adverse conditions affecting survey? No ☒ Yes ☐

If yes, state .....

Is bed of river visible? barely or not ☒ partially ☐ ± entirely ☐Is health and safety assessment form attached? Yes ☒ No ☐Number of photographs taken: ☐

Photo references:

Site surveyed from: left bank ☐ right bank ☒ channel ☐☐ When options shown with 'shadow boxes', tick one box only

LEFT banks determined by facing downstream RIGHT

**B PREDOMINANT VALLEY FORM (within the horizon limit)** (tick one box only)

(tick one box only)

☐ shallow vee☐ deep vee☐ gorge☐ concave/bowl☐ asymmetrical valley☐ U-shape valley☒ no obvious valley sidesDistinct flat valley bottom? No ☐ Yes ☒Natural terraces? No ☒ Yes ☐**C NUMBER OF RIFFLES, POOLS AND POINT BARS** (enter total number in boxes)

Riffle(s)

Unvegetated point bar(s)

Pool(s)

Vegetated point bar(s)

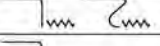
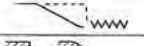

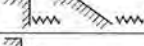
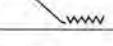

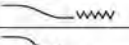

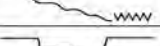


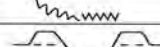


**D ARTIFICIAL FEATURES** (indicate total number of occurrences of each category within the 500m site)If none, tick box ☒

|               | Major | Intermediate | Minor |                          | Major | Intermediate | Minor |
|---------------|-------|--------------|-------|--------------------------|-------|--------------|-------|
| Weirs/sluices |       |              |       | Outfalls/intakes         |       |              |       |
| Culverts      |       |              |       | Fords                    |       |              |       |
| Bridges       |       |              |       | Deflectors/groynes/croys |       |              |       |
| Other - state |       |              |       |                          |       |              |       |

Is channel obviously realigned? No ☐ Yes, <33% of site ☐ ≥33% of site ☒Is channel obviously over-deepened? No ☐ Yes, <33% of site ☐ ≥33% of site ☒Is water impounded by weir/dam? No ☒ Yes, <33% of site ☐ ≥33% of site ☐

|                                                                                                                                         |  |                                              |       |       |       |       |       |       |       |       |       |             |
|-----------------------------------------------------------------------------------------------------------------------------------------|--|----------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------------|
| SITE REF. <b>OTB52</b>                                                                                                                  |  | <b>RIVER HABITAT SURVEY: TEN SPOT-CHECKS</b> |       |       |       |       |       |       |       |       |       | Page 2 of 4 |
| Spot-check 1 is at: upstream end <input checked="" type="checkbox"/> downstream end <input type="checkbox"/> of site (tick one box)     |  |                                              |       |       |       |       |       |       |       |       |       |             |
| <b>E PHYSICAL ATTRIBUTES</b> (to be assessed across channel within 1m wide transect)                                                    |  |                                              |       |       |       |       |       |       |       |       |       |             |
| <b>When boxes 'bordered', only one entry allowed</b>                                                                                    |  | 1 GPS                                        | 2     | 3     | 4     | 5     | 6 GPS | 7     | 8     | 9     | 10    | GPS         |
| <b>LEFT BANK</b>                                                                                                                        |  | Ring EC or SC if composed of sandy substrate |       |       |       |       |       |       |       |       |       |             |
| <b>Material</b> NV, BE, BO, CO, GS, EA, PE, CL, CC, SP, WP, GA, BR, RR, TD, FA, BI                                                      |  | EA                                           | EA    | EA    | EA    | EA    | EA    | EA    | EA    | EA    | EA    |             |
| <b>Bank modification(s)</b> NK, NO, RS, RI, PC(B), BM, EM                                                                               |  | RS/EM                                        | RS/EM | RS/EM | RS/EM | RS/EM | RS/EM | RS/EM | RS/EM | RS/EM | RS/EM |             |
| <b>Marginal &amp; bank feature(s)</b> NV, NO, EC, SC, PB, VP, SB, VS, NB                                                                |  | SC                                           | SC    | EC    | EC    | SC    | EC    | SC    | SC    | EC    | SC    |             |
| <b>CHANNEL</b>                                                                                                                          |  | GP: ring either G or P if predominant        |       |       |       |       |       |       |       |       |       |             |
| <b>Channel substrate</b> NV, BE, BO, CO, GP, SA, SI, CL, PE, EA, AR                                                                     |  | CL                                           | CL    | CL    | CL    | CL    | CL    | CL    | CL    | CL    | CL    | SI          |
| <b>Flow-type</b> NV, FF, CH, BW, UW, CF, RP, UP, SM, NP, DR                                                                             |  | SM                                           | SM    | SM    | SM    | SM    | SM    | SM    | SM    | SM    | SM    |             |
| <b>Channel modification(s)</b> NK, NO, CV, RS, RI, DA, FO                                                                               |  | RS                                           | RS    | RS    | RS    | RS    | RS    | RS    | RS    | RS    | RS    |             |
| <b>Channel feature(s)</b> NV, NO, EB, RO, VR, MB, VB, MI, TR                                                                            |  | NO                                           | NO    | NO    | NO    | NO    | NO    | NO    | NO    | NO    | NO    |             |
| <b>For braided rivers only: number of sub-channels</b>                                                                                  |  |                                              |       |       |       |       |       |       |       |       |       |             |
| <b>RIGHT BANK</b>                                                                                                                       |  | Ring EC or SC if composed of sandy substrate |       |       |       |       |       |       |       |       |       |             |
| <b>Material</b> NV, BE, BO, CO, GS, EA, PE, CL, CC, SP, WP, GA, BR, RR, TD, FA, BI                                                      |  | EA                                           | EA    | EA    | EA    | EA    | EA    | EA    | EA    | EA    | EA    |             |
| <b>Bank modification(s)</b> NK, NO, RS, RI, PC(B), BM, EM                                                                               |  | RS/EM                                        | RS/EM | RS/EM | RS/EM | RS/EM | RS/EM | RS/EM | RS/EM | RS/EM | RS/EM |             |
| <b>Marginal &amp; bank feature(s)</b> NV, NO, EC, SC, PB, VP, SB, VS, NB                                                                |  | NO                                           | SC    | NO    | NO    | EC    | NO    | NO    | SC    | SC    | SC    |             |
| <b>F BANKTOP LAND-USE AND VEGETATION STRUCTURE</b> (to be assessed over a 10m wide transect)                                            |  |                                              |       |       |       |       |       |       |       |       |       |             |
| <b>Land-use: choose one from BL, BP, CW, CP, SH, OR, WL, MH, AW, OW, RP, IG, TH, RD, SU, TL, IL, PG, NV</b>                             |  |                                              |       |       |       |       |       |       |       |       |       |             |
| <b>LAND-USE WITHIN 5m OF LEFT BANKTOP</b>                                                                                               |  | PG                                           | PG    | PG    | RP    | PG    | PG    | PG    | PG    | SU    | PG    |             |
| <b>LEFT BANKTOP (structure within 1m)</b> B/U/S/C/NV                                                                                    |  | U                                            | U     | U     | U     | U     | U     | U     | U     | U     | U     |             |
| <b>LEFT BANK-FACE (structure)</b> B/U/S/C/NV                                                                                            |  | S                                            | S     | S     | S     | S     | S     | S     | S     | S     | S     |             |
| <b>RIGHT BANK-FACE (structure)</b> B/U/S/C/NV                                                                                           |  | S                                            | S     | S     | S     | S     | S     | S     | S     | S     | S     |             |
| <b>RIGHT BANKTOP (structure within 1m)</b> B/U/S/C/NV                                                                                   |  | U                                            | U     | U     | U     | U     | U     | U     | U     | U     | U     |             |
| <b>LAND-USE WITHIN 5m OF RIGHT BANKTOP</b>                                                                                              |  | RP                                           | RP    | RP    | RP    | RP    | RP    | RP    | RP    | RP    | RP    |             |
| <b>G CHANNEL VEGETATION TYPES</b> (to be assessed over a 100m wide transect: use E if $\geq 1\%$ area), ✓ (present) or NV (not visible) |  |                                              |       |       |       |       |       |       |       |       |       |             |
| None (✓) or Not Visible (NV)                                                                                                            |  |                                              |       |       |       |       |       |       |       |       |       |             |
| Liverworts/mosses/lichens                                                                                                               |  |                                              |       |       |       |       |       |       |       |       |       |             |
| Emergent broad-leaved herbs                                                                                                             |  |                                              |       |       |       |       |       |       |       |       |       |             |
| Emergent reeds/sedges/rushes/grasses/horsetails                                                                                         |  | ✓                                            |       | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     |       | E           |
| Floating-leaved (rooted)                                                                                                                |  |                                              |       |       |       |       |       |       |       |       |       |             |
| Free-floating                                                                                                                           |  |                                              |       |       |       |       |       |       |       |       |       |             |
| Amphibious                                                                                                                              |  | ✓                                            |       |       | ✓     | ✓     | ✓     | ✓     | ✓     |       | ✓     | ✓           |
| Submerged broad-leaved                                                                                                                  |  |                                              |       |       |       |       |       |       |       |       |       |             |
| Submerged linear-leaved                                                                                                                 |  |                                              |       |       |       |       |       |       |       |       |       |             |
| Submerged fine-leaved                                                                                                                   |  |                                              | ✓     |       |       | ✓     | ✓     | ✓     | ✓     | ✓     |       | E           |
| Filamentous algae                                                                                                                       |  | ✓                                            | ✓     | ✓     |       |       | ✓     | ✓     |       | ✓     |       | ✓           |
| Use end column for overall assessment over 500m, including types not occurring in spot-checks (use ✓, E or NV)                          |  |                                              |       |       |       |       |       |       |       |       |       |             |

Riffles: ☐ Pools: ☐ PB: ☐ VP: ☐

|                                                                                                     |                                                                                       |                                                                                                              |                                                                                       |
|-----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| SITE REF. <b>OT362</b>                                                                              | <b>RIVER HABITAT SURVEY : 500m SWEEP-UP</b>                                           | Page 3 of 4                                                                                                  |                                                                                       |
| II LAND USE WITHIN 50m OF BANKTOP Use ✓ (present) or E (≥ 33% banklength)                           |                                                                                       |                                                                                                              |                                                                                       |
|                                                                                                     | L R                                                                                   | L R                                                                                                          |                                                                                       |
| Broadleaf/mixed woodland (semi-natural) (BL)                                                        |                                                                                       | Natural open water (OW)                                                                                      |                                                                                       |
| Broadleaf/mixed plantation (BP)                                                                     |                                                                                       | Rough/unimproved grassland/pasture (RP)                                                                      | E                                                                                     |
| Coniferous woodland (semi-natural) (CW)                                                             |                                                                                       | Improved/semi-improved grassland (IG)                                                                        | E                                                                                     |
| Coniferous plantation (CP)                                                                          |                                                                                       | Tall herb/rank vegetation (TH)                                                                               | ✓ ✓                                                                                   |
| Scrub & shrubs (SH)                                                                                 | E                                                                                     | Rock, scree or sand dunes (RD)                                                                               |                                                                                       |
| Orchard (OR)                                                                                        |                                                                                       | Suburban/urban development (SU)                                                                              | ✓                                                                                     |
| Wetland (e.g. bog, marsh, fen) (WL)                                                                 |                                                                                       | Tilled land (TL)                                                                                             |                                                                                       |
| Moorland/heath (MH)                                                                                 |                                                                                       | Irrigated land (IL)                                                                                          |                                                                                       |
| Artificial open water (AW)                                                                          |                                                                                       | Parkland or gardens (PG)                                                                                     | E                                                                                     |
|                                                                                                     |                                                                                       | Not visible (NV)                                                                                             |                                                                                       |
| I BANK PROFILES Use ✓ (present) or E (≥ 33% banklength)                                             |                                                                                       |                                                                                                              |                                                                                       |
| <b>Natural/unmodified</b>                                                                           | L R                                                                                   | <b>Artificial/modified</b>                                                                                   | L R                                                                                   |
| Vertical/undercut  |                                                                                       | Resectioned (reprofiled)  | E E                                                                                   |
| Vertical with toe  |                                                                                       | Reinforced - whole        |                                                                                       |
| Steep (>45°)       |                                                                                       | Reinforced - top only     |                                                                                       |
| Gentle             |                                                                                       | Reinforced - toe only     |                                                                                       |
| Composite         |                                                                                       | Artificial two-stage      |                                                                                       |
| Natural berm     |                                                                                       | Poached bank            | ✓ ✓                                                                                   |
|                                                                                                     |                                                                                       | Embanked                | E E                                                                                   |
|                                                                                                     |                                                                                       | Set-back embankment     |                                                                                       |
| III EXTENT OF TREES AND ASSOCIATED FEATURES *record even if < 15%                                   |                                                                                       |                                                                                                              |                                                                                       |
| <b>TREES</b> (tick one box per bank)                                                                |                                                                                       | <b>ASSOCIATED FEATURES</b> (tick one box per feature)                                                        |                                                                                       |
|                                                                                                     | Left Right                                                                            |                                                                                                              | None Present E (≥33%)                                                                 |
| None                                                                                                | <input type="checkbox"/> <input checked="" type="checkbox"/>                          | Shading of channel                                                                                           | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| Isolated/scattered                                                                                  | <input type="checkbox"/> <input type="checkbox"/>                                     | *Overhanging boughs                                                                                          | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| Regularly spaced, single                                                                            | <input type="checkbox"/> <input type="checkbox"/>                                     | *Exposed bankside roots                                                                                      | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| Occasional clumps                                                                                   | <input checked="" type="checkbox"/> <input type="checkbox"/>                          | *Underwater tree roots                                                                                       | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| Semi-continuous                                                                                     | <input type="checkbox"/> <input type="checkbox"/>                                     | Fallen trees                                                                                                 | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| Continuous                                                                                          | <input type="checkbox"/> <input type="checkbox"/>                                     | Large woody debris                                                                                           | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| IV EXTENT OF CHANNEL AND BANK FEATURES (tick one box for each feature) *record even if < 1%         |                                                                                       |                                                                                                              |                                                                                       |
|                                                                                                     | None Present E(≥33%)                                                                  |                                                                                                              | None Present E(≥33%)                                                                  |
| *Free fall flow                                                                                     | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Exposed bedrock                                                                                              | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| Chute flow                                                                                          | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Exposed boulders                                                                                             | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| Broken standing waves                                                                               | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Vegetated bedrock/boulders                                                                                   | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| Unbroken standing waves                                                                             | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Unvegetated mid-channel bar(s)                                                                               | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| Rippled flow                                                                                        | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Vegetated mid-channel bar(s)                                                                                 | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| *Upwelling                                                                                          | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Mature island(s)                                                                                             | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| Smooth flow                                                                                         | <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> | Unvegetated side bar(s)                                                                                      | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| No perceptible flow                                                                                 | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Vegetated side bar(s)                                                                                        | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| No flow (dry)                                                                                       | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Unvegetated point bar(s)                                                                                     | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| Marginal deadwater                                                                                  | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Vegetated point bar(s)                                                                                       | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| Eroding cliff(s)                                                                                    | <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> | *Discrete unvegetated silt deposit(s)                                                                        | <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> |
| Stable cliff(s)                                                                                     | <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> | *Discrete unvegetated sand deposit(s)                                                                        | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
|                                                                                                     |                                                                                       | *Discrete unvegetated gravel deposit(s)                                                                      | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |



|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                         |                                                                                                                                |                                             |             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|-------------|
| SITE REF. <b>OT352</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>RIVER HABITAT SURVEY : DIMENSIONS AND INFLUENCES</b> |                                                                                                                                |                                             | Page 4 of 4 |
| <b>L CHANNEL DIMENSIONS</b> (to be measured at one location on a straight uniform section, preferably across a riffle)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                         |                                                                                                                                |                                             |             |
| LEFT BANK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | CHANNEL                                                 | RIGHT BANK                                                                                                                     |                                             |             |
| Banktop height (m)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Bankfull/top width (m)                                  | Banktop height (m)                                                                                                             |                                             |             |
| Is banktop height also bankfull height? (Y or N)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Water width (m)                                         | Is banktop height also bankfull height? (Y or N)                                                                               |                                             |             |
| Embanked height (m)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Water depth (m)                                         | Embanked height (m)                                                                                                            |                                             |             |
| If trashline lower than banktop, indicate: height above water (m) =      width from bank to bank (m) =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                         |                                                                                                                                |                                             |             |
| Bed material at site is:      consolidated <input type="checkbox"/> unconsolidated (loose) <input type="checkbox"/> unknown <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                         |                                                                                                                                |                                             |             |
| Location of measurements is: riffle <input type="checkbox"/> other <input type="checkbox"/> (state)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                         |                                                                                                                                |                                             |             |
| <b>M FEATURES OF SPECIAL INTEREST</b> (Use ✓ or E (≥ 33% length) *record even if <1%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                         |                                                                                                                                |                                             |             |
| None <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Very large boulders (>1m) <input type="checkbox"/>      | Backwater(s) <input checked="" type="checkbox"/>                                                                               | Marsh(es) <input type="checkbox"/>          |             |
| Braided channels <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | *Debris dam(s) <input type="checkbox"/>                 | Floodplain boulder deposits <input type="checkbox"/>                                                                           | Flush(es) <input type="checkbox"/>          |             |
| Side channel(s) <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | *Leafy debris <input type="checkbox"/>                  | Water meadow(s) <input type="checkbox"/>                                                                                       | Natural open water <input type="checkbox"/> |             |
| *Natural waterfall(s) > 5m high <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Fringing reed-bank(s) <input type="checkbox"/>          | Fen(s) <input type="checkbox"/>                                                                                                | Others (state) <input type="checkbox"/>     |             |
| *Natural waterfall(s) < 5m high <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Quaking bank(s) <input type="checkbox"/>                | Bog(s) <input type="checkbox"/>                                                                                                | <b>ADJACENT LEVELS + MOORS</b>              |             |
| Natural cascade(s) <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | *Sink hole(s) <input type="checkbox"/>                  | Wet woodland(s) <input type="checkbox"/>                                                                                       |                                             |             |
| <b>N CHOKED CHANNEL</b> (tick one box)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                         |                                                                                                                                |                                             |             |
| Is 33% or more of the channel choked with vegetation?      No <input checked="" type="checkbox"/> Yes <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                         |                                                                                                                                |                                             |             |
| <b>O NOTABLE NUISANCE PLANT SPECIES</b> (Use ✓ or E (≥ 33% length) *record even if <1%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                         |                                                                                                                                |                                             |             |
| <div style="display: flex; justify-content: space-between;"> <div>             bankface      banktop to 50m<br/>             None <input type="checkbox"/> *Giant hogweed <input type="checkbox"/> <input type="checkbox"/> *Japanese knotweed <input type="checkbox"/> <input type="checkbox"/> </div> <div>             bankface      banktop to 50m<br/>             *Himalayan balsam <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> *Other (state)..... <input type="checkbox"/> <input type="checkbox"/> </div> </div>                                                                                                                                                                                                                                                |                                                         |                                                                                                                                |                                             |             |
| <b>P OVERALL CHARACTERISTICS</b> (Circle appropriate words, add others as necessary)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                         |                                                                                                                                |                                             |             |
| <b>Major impacts:</b> landfill - tipping - litter - sewage - pollution - drought - abstraction - mill - dam - road - rail - industry - <u>housing</u> - mining - quarrying - <u>overdeepening</u> - <u>overwidening</u> (P or E) - <u>realignment</u> - afforestation - fisheries management - silting - waterlogging - hydroelectric power<br><b>Evidence of recent management:</b> dredging - bank mowing - weed cutting - enhancement - river rehabilitation - gravel extraction - other (please specify)<br><b>Animals:</b> otter - mink - <u>water vole</u> - kingfisher - dipper - grey wagtail - sand martin - heron - <u>dragonflies/damselflies</u><br><b>Other significant observations:</b> if necessary use separate sheet to describe overall characteristics and relevant observations |                                                         |                                                                                                                                |                                             |             |
| <b>Q ALDERS</b> (tick one box in each of the two categories) *record even if <1%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                         |                                                                                                                                |                                             |             |
| *Alders? None <input checked="" type="checkbox"/> Present <input type="checkbox"/> Extensive <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                         | *Diseased Alders? None <input checked="" type="checkbox"/> Present <input type="checkbox"/> Extensive <input type="checkbox"/> |                                             |             |
| <b>R FIELD SURVEY QUALITY CONTROL</b> (✓ boxes to confirm checks)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                         |                                                                                                                                |                                             |             |
| Have you taken at least two photos that illustrate the general character of the site and additional photos of any weirs/ sluices and major/intermediate structures across the channel? <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                         |                                                                                                                                |                                             |             |
| Have you completed all ten spot-checks and made entries in all boxes in E & F on page 2? <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                         |                                                                                                                                |                                             |             |
| Have you completed column 11 of section G (and E if appropriate) on page 2? <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                         |                                                                                                                                |                                             |             |
| Have you recorded in section C the number of riffles, pools and point bars (even if 0) on page 1? <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                         |                                                                                                                                |                                             |             |
| Have you given an accurate (alphanumeric) grid reference for spot-checks 1, 6 and end of site (page 1)? <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                         |                                                                                                                                |                                             |             |
| Have you stated whether spot-check 1 is at the upstream or downstream end of the site (top of page 2)? <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                         |                                                                                                                                |                                             |             |
| Have you cross-checked your spot-check and sweep-up responses with the channel modification indicators given on page 2 of the spot-check key? <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                         |                                                                                                                                |                                             |             |

SEE  
SECTIONS  
1.008 - 9  
TO  
1.013

**A FIELD SURVEY DETAILS**

leave blank if new site

Site Number: 

Site Reference: OTBB

Spot-check 1 coord:

Spot-check 6 coord:

End of site coord:

Reach Reference: OTBB3

River name: RIVER PARRETT

Date 29/05/2018 Time:

Surveyor name: T. CHISNALL

M. JONES

Accredited Surveyor code: MN33

Is the site part of a river or an artificial channel? River ☐ Artificial ☒Are adverse conditions affecting survey? No ☒ Yes ☐

If yes, state .....

Is bed of river visible? barely or not ☐ partially ☒ ± entirely ☐Is health and safety assessment form attached? Yes ☒ No ☐Number of photographs taken: 

Photo references:

Site surveyed from: left bank ☐ right bank ☒ channel ☐☐ When options shown with 'shadow boxes', tick one box only

LEFT banks determined by facing downstream RIGHT

**B PREDOMINANT VALLEY FORM (within the horizon limit)** (tick one box only)

(tick one box only)

☐ shallow vee☐ deep vee☐ gorge☐ concave/bowl☐ asymmetrical valley☐ U-shape valley☒ no obvious valley sidesDistinct flat valley bottom? No ☐ Yes ☒ Natural terraces? No ☒ Yes ☐**C NUMBER OF RIFFLES, POOLS AND POINT BARS** (enter total number in boxes)Riffle(s)  Unvegetated point bar(s) Pool(s)  Vegetated point bar(s) **D ARTIFICIAL FEATURES** (Indicate total number of occurrences of each category within the 500m site)

| If none, tick box | Major | Intermediate | Minor | Major                    | Intermediate | Minor |
|-------------------|-------|--------------|-------|--------------------------|--------------|-------|
| Weirs/sluices     |       |              |       | Outfalls/intakes         |              |       |
| Culverts          |       |              |       | Fords                    |              |       |
| Bridges           |       |              |       | Deflectors/groynes/croys |              |       |
| Other - state     |       |              |       |                          |              |       |

Is channel obviously realigned? No ☐ Yes, <33% of site ☐ ≥33% of site ☒

Is channel obviously over-deepened? No ☐ Yes, <33% of site ☐ ≥33% of site ☒

Is water impounded by weir/dam? No ☒ Yes, <33% of site ☐ ≥33% of site ☐



|                                                                                                                                     |                                              |          |          |          |               |          |          |          |          |          |             |
|-------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|----------|----------|----------|---------------|----------|----------|----------|----------|----------|-------------|
| SITE REF. <b>OT383</b>                                                                                                              | <b>RIVER HABITAT SURVEY: TEN SPOT-CHECKS</b> |          |          |          |               |          |          |          |          |          | Page 2 of 4 |
| Spot-check 1 is at: upstream end <input checked="" type="checkbox"/> downstream end <input type="checkbox"/> of site (tick one box) |                                              |          |          |          |               |          |          |          |          |          |             |
| <b>E PHYSICAL ATTRIBUTES</b> (to be assessed across channel within 1m wide transect)                                                |                                              |          |          |          |               |          |          |          |          |          |             |
| <b>When boxes 'bordered', only one entry allowed</b>                                                                                | 1 GPS                                        | 2        | 3        | 4        | 5             | 6 GPS    | 7        | 8        | 9        | 10       | GPS         |
| <b>LEFT BANK</b>                                                                                                                    | Ring EC or SC if composed of sandy substrate |          |          |          |               |          |          |          |          |          |             |
| <b>Material</b> NV, BE, BO, CO, GS, EA, PE, CL, CC, SP, WP, GA, BR, RR, TD, FA, BI                                                  | EA                                           | EA       | EA       | EA       | EA            | EA       | EA       | EA       | EA       | EA       |             |
| <b>Bank modification(s)</b> NK, NO, RS, RI, PC(B), BM, EM                                                                           | RS<br>EM                                     | RS<br>EM | RS<br>EM | RS<br>EM | RS<br>EM      | RS<br>EM | RS<br>EM | RS<br>EM | RS<br>EM | RS<br>EM |             |
| <b>Marginal &amp; bank feature(s)</b> NV, NO, EC, SC, PB, VP, SB, VS, NB                                                            | EC                                           | SC       | SC       | SC       | SC            | SC       | SC       | SC       | SC       | SC       |             |
| <b>CHANNEL</b>                                                                                                                      | GPS: ring either G or I if predominant       |          |          |          |               |          |          |          |          |          |             |
| <b>Channel substrate</b> NV, BE, BO, CO, GP, SA, SI, CL, PE, EA, AR                                                                 | CL                                           | CL       | CL       | CL       | CL            | CL       | CL       | CL       | CL       | CL       | SI          |
| <b>Flow-type</b> NV, FF, CH, BW, UW, CF, RP, UP, SM, NP, DR                                                                         | SM                                           | SM       | SM       | SM       | SM            | SM       | SM       | SM       | SM       | SM       |             |
| <b>Channel modification(s)</b> NK, NO, CV, RS, RI, DA, FO                                                                           | RS                                           | RS       | RS       | RS       | RS            | RS       | RS       | RS       | RS       | RS       |             |
| <b>Channel feature(s)</b> NV, NO, EB, RO, VR, MB, VB, MI, TR                                                                        | NO                                           | NO       | NO       | NO       | NO            | NO       | NO       | NO       | NO       | NO       |             |
| <b>For braided rivers only: number of sub-channels</b>                                                                              |                                              |          |          |          |               |          |          |          |          |          |             |
| <b>RIGHT BANK</b>                                                                                                                   | Ring EC or SC if composed of sandy substrate |          |          |          |               |          |          |          |          |          |             |
| <b>Material</b> NV, BE, BO, CO, GS, EA, PE, CL, CC, SP, WP, GA, BR, RR, TD, FA, BI                                                  | EA                                           | EA       | EA       | EA       | EA            | EA       | EA       | EA       | EA       | EA       |             |
| <b>Bank modification(s)</b> NK, NO, RS, RI, PC(B), BM, EM                                                                           | RS<br>EM                                     | RS<br>EM | RS<br>EM | RS<br>EM | RS<br>EM      | RS<br>EM | RS<br>EM | RS<br>EM | RS<br>EM | RS<br>EM |             |
| <b>Marginal &amp; bank feature(s)</b> NV, NO, EC, SC, PB, VP, SB, VS, NB                                                            | PB                                           | PB       | PB       | NO       | NO            | NO       | EC       | SC       | SC       | SC       |             |
| <b>F BANKTOP LAND-USE AND VEGETATION STRUCTURE</b> (to be assessed over a 10m wide transect)                                        |                                              |          |          |          |               |          |          |          |          |          |             |
| <b>Land-use:</b> choose one from BL, BP, CW, CP, SH, OR, WL, MH, AW, OW, RP, IG, TH, RD, SU, TL, IL, PG, NV                         |                                              |          |          |          |               |          |          |          |          |          |             |
| <b>LAND-USE WITHIN 5m OF LEFT BANKTOP</b>                                                                                           | BL                                           | BL       | BL       | P4       | <del>BP</del> | P4       | P4       | SU       | SU       | SU       |             |
| <b>LEFT BANKTOP (structure within 1m)</b> B/U/S/C/NV                                                                                | C                                            | C        | C        | U        | U             | U        | U        | U        | U        | U        |             |
| <b>LEFT BANK-FACE (structure)</b> B/U/S/C/NV                                                                                        | S                                            | S        | S        | S        | S             | S        | S        | S        | S        | S        |             |
| <b>RIGHT BANK-FACE (structure)</b> B/U/S/C/NV                                                                                       | S                                            | S        | S        | S        | S             | S        | S        | S        | S        | S        |             |
| <b>RIGHT BANKTOP (structure within 1m)</b> B/U/S/C/NV                                                                               | U                                            | U        | U        | U        | U             | U        | U        | U        | U        | U        |             |
| <b>LAND-USE WITHIN 5m OF RIGHT BANKTOP</b>                                                                                          | RP                                           | RP       | RP       | RP       | RP            | RP       | RP       | RP       | RP       | RP       |             |
| <b>G CHANNEL VEGETATION TYPES</b> (to be assessed over a 10m wide transect: use E (≥ 33% area), ✓ (present) or NV (not visible))    |                                              |          |          |          |               |          |          |          |          |          |             |
| None (✓) or Not Visible (NV)                                                                                                        |                                              |          |          |          |               |          |          |          |          |          |             |
| Liverworts/mosses/lichens                                                                                                           |                                              |          |          |          |               |          |          |          |          |          | ✓           |
| Emergent broad-leaved herbs                                                                                                         | ✓                                            |          |          |          |               |          |          |          |          |          |             |
| Emergent reeds/sedges/rushes/grasses/horsetails                                                                                     | ✓                                            | ✓        | ✓        | ✓        |               |          | ✓        | ✓        | ✓        | ✓        | E           |
| Floating-leaved (rooted)                                                                                                            |                                              |          |          |          |               |          |          |          |          |          |             |
| Free-floating                                                                                                                       |                                              |          |          |          |               |          |          |          |          |          |             |
| Amphibious                                                                                                                          | ✓                                            | ✓        | ✓        | ✓        |               |          | ✓        | ✓        | ✓        | ✓        | ✓           |
| Submerged broad-leaved                                                                                                              |                                              |          |          |          |               |          |          |          |          |          |             |
| Submerged linear-leaved                                                                                                             |                                              |          |          |          |               |          |          |          |          |          |             |
| Submerged fine-leaved                                                                                                               |                                              | ✓        |          |          |               |          | ✓        |          |          | ✓        | ✓           |
| Filamentous algae                                                                                                                   | ✓                                            | ✓        |          |          | ✓             | ✓        | ✓        |          |          | ✓        | ✓           |
| Use end column for overall assessment over 500m, including types not occurring in spot-checks (use ✓, E or NV) —————→               |                                              |          |          |          |               |          |          |          |          |          |             |

Riffles: ☐ Pools: ☐ PB: ☐ VP: ☐



|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                        |                                                                                                                                |                                                       |                                                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|--------------------------------------------------|
| SITE REF.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>RIVER HABITAT SURVEY : DIMENSIONS AND INFLUENCES</b> <span style="float: right;">Page 4 of 4</span> |                                                                                                                                |                                                       |                                                  |
| <b>I CHANNEL DIMENSIONS</b> (to be measured at one location on a straight uniform section, preferably across a riffle)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                        |                                                                                                                                |                                                       |                                                  |
| LEFT BANK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                        | CHANNEL                                                                                                                        |                                                       | RIGHT BANK                                       |
| Banktop height (m)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                        | Bankfull/top width (m)                                                                                                         |                                                       | Banktop height (m)                               |
| Is banktop height also bankfull height? (Y or N)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                        | Water width (m)                                                                                                                |                                                       | Is banktop height also bankfull height? (Y or N) |
| Embanked height (m)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                        | Water depth (m)                                                                                                                |                                                       | Embanked height (m)                              |
| If trashline lower than banktop, indicate: height above water (m) =      width from bank to bank (m) =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                        |                                                                                                                                |                                                       |                                                  |
| Bed material at site is:      consolidated <input type="checkbox"/> unconsolidated (loose) <input type="checkbox"/> unknown <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                        |                                                                                                                                |                                                       |                                                  |
| Location of measurements is: riffle <input type="checkbox"/> other <input type="checkbox"/> (state)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                        |                                                                                                                                |                                                       |                                                  |
| <b>M FEATURES OF SPECIAL INTEREST</b> Use ✓ or E (≥ 33% length) *record even if < 1%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                        |                                                                                                                                |                                                       |                                                  |
| None <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Very large boulders (>1m) <input type="checkbox"/>                                                     | Backwater(s) <input checked="" type="checkbox"/>                                                                               | Marsh(es) <input type="checkbox"/>                    |                                                  |
| Braided channels <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | *Debris dam(s) <input type="checkbox"/>                                                                | Floodplain boulder deposits <input type="checkbox"/>                                                                           | Flush(es) <input type="checkbox"/>                    |                                                  |
| Side channel(s) <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | *Leafy debris <input type="checkbox"/>                                                                 | Water meadow(s) <input type="checkbox"/>                                                                                       | Natural open water <input type="checkbox"/>           |                                                  |
| *Natural waterfall(s) > 5m high <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Fringing reed-bank(s) <input type="checkbox"/>                                                         | Fen(s) <input type="checkbox"/>                                                                                                | Others (state) <input type="checkbox"/>               |                                                  |
| *Natural waterfall(s) < 5m high <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Quaking bank(s) <input type="checkbox"/>                                                               | Bog(s) <input type="checkbox"/>                                                                                                | <b>ADJACENT LEVELS + MOOLS</b>                        |                                                  |
| Natural cascade(s) <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | *Sink hole(s) <input type="checkbox"/>                                                                 | Wet woodland(s) <input type="checkbox"/>                                                                                       |                                                       |                                                  |
| <b>N CHOKED CHANNEL</b> (tick one box)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                        |                                                                                                                                |                                                       |                                                  |
| Is 33% or more of the channel choked with vegetation?      No <input checked="" type="checkbox"/> Yes <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                        |                                                                                                                                |                                                       |                                                  |
| <b>O NOTABLE NUISANCE PLANT SPECIES</b> Use ✓ or E (≥ 33% length) *record even if < 1%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                        |                                                                                                                                |                                                       |                                                  |
| bankface      banktop to 50m      bankface      banktop to 50m                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                        |                                                                                                                                |                                                       |                                                  |
| None <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | *Giant hogweed <input type="checkbox"/>                                                                |                                                                                                                                | *Himalayan balsam <input checked="" type="checkbox"/> |                                                  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | *Japanese knotweed <input type="checkbox"/>                                                            |                                                                                                                                | *Other (state)..... <input type="checkbox"/>          |                                                  |
| <b>P OVERALL CHARACTERISTICS</b> (Circle appropriate words, add others as necessary)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                        |                                                                                                                                |                                                       |                                                  |
| <b>Major impacts:</b> landfill - tipping - litter - sewage - pollution - drought - abstraction - mill - dam - road - rail - industry - housing - mining - quarrying - <u>overdeepening</u> - overwidening (P or E) - <u>realignment</u> - afforestation - fisheries management - silting - waterlogging - hydroelectric power<br><b>Evidence of recent management:</b> dredging - <u>bank mowing</u> - weed cutting - enhancement - river rehabilitation - gravel extraction - other (please specify)<br><b>Animals:</b> otter - mink - <u>water vole</u> - <u>kingfisher</u> - dipper - grey wagtail - sand martin - heron - <u>dragonflies/damselflies</u><br><b>Other significant observations:</b> if necessary use separate sheet to describe overall characteristics and relevant observations |                                                                                                        |                                                                                                                                |                                                       |                                                  |
| <b>Q ALDERS</b> (tick one box in each of the two categories) *record even if < 1%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                        |                                                                                                                                |                                                       |                                                  |
| *Alders? None <input checked="" type="checkbox"/> Present <input type="checkbox"/> Extensive <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                        | *Diseased Alders? None <input checked="" type="checkbox"/> Present <input type="checkbox"/> Extensive <input type="checkbox"/> |                                                       |                                                  |
| <b>R FIELD SURVEY QUALITY CONTROL</b> (✓ boxes to confirm checks)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                        |                                                                                                                                |                                                       |                                                  |
| Have you taken at least two photos that illustrate the general character of the site and additional photos of any weirs/ sluices and major/intermediate structures across the channel? <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                        |                                                                                                                                |                                                       |                                                  |
| Have you completed all ten spot-checks and made entries in all boxes in E & F on page 2? <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                        |                                                                                                                                |                                                       |                                                  |
| Have you completed column 11 of section G (and E if appropriate) on page 2? <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                        |                                                                                                                                |                                                       |                                                  |
| Have you recorded in section C the number of riffles, pools and point bars (even if 0) on page 1? <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                        |                                                                                                                                |                                                       |                                                  |
| Have you given an accurate (alphanumeric) grid reference for spot-checks 1, 6 and end of site (page 1)? <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                        |                                                                                                                                |                                                       |                                                  |
| Have you stated whether spot-check 1 is at the upstream or downstream end of the site (top of page 2)? <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                        |                                                                                                                                |                                                       |                                                  |
| Have you cross-checked your spot-check and sweep-up responses with the channel modification indicators given on page 2 of the spot-check key? <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                        |                                                                                                                                |                                                       |                                                  |

SEE  
SECTIONS  
1.013-14  
TO  
1.018

**A FIELD SURVEY DETAILS**Site Number: leave blank if new site 

Site Reference: OTBS

Spot-check 1 coord:

Spot-check 6 coord:

End of site coord:

Reach Reference: OTBS 4

River name: RIVER PARRETT

Date 24/05/2018 Time:

Surveyor name: T. CHISNALL  
M. JOHNS

Accredited Surveyor code: MNBS

Is the site part of a river or an artificial channel? River ☐ Artificial ☒Are adverse conditions affecting survey? No ☒ Yes ☐

If yes, state .....

Is bed of river visible? barely or not ☐ partially ☒ ± entirely ☐Is health and safety assessment form attached? Yes ☒ No ☐Number of photographs taken: 

Photo references:

Site surveyed from: left bank ☐ right bank ☒ channel ☐☐ When options shown with 'shadow boxes', tick one box only

LEFT banks determined by facing downstream RIGHT

**B. PREDOMINANT VALLEY FORM (within the horizon limit)** (tick one box only)

(tick one box only)

☐ shallow vee☐ deep vee☐ gorge☐ concave/bowl☐ asymmetrical valley☐ U-shape valley☒ no obvious valley sides

Distinct flat valley bottom?

No ☐Yes ☒

Natural terraces?

No ☐Yes ☐**C NUMBER OF RIFFLES, POOLS AND POINT BARS** (enter total number in boxes)

Riffle(s)

Unvegetated point bar(s)

Pool(s)

Vegetated point bar(s)

**D ARTIFICIAL FEATURES** (indicate total number of occurrences of each category within the 500m site)If none, tick box ☒

|                | Major | Intermediate | Minor |                          | Major | Intermediate | Minor |
|----------------|-------|--------------|-------|--------------------------|-------|--------------|-------|
| Weirs/sluiques |       |              |       | Outfalls/intakes         |       |              |       |
| Culverts       |       |              |       | Fords                    |       |              |       |
| Bridges        |       |              |       | Deflectors/groynes/croys |       |              |       |
| Other - state  |       |              |       |                          |       |              |       |

Is channel obviously realigned? No ☐Yes, <33% of site ☐≥33% of site ☒Is channel obviously over-deepened? No ☐Yes, <33% of site ☐≥33% of site ☒Is water impounded by weir/dam? No ☒Yes, <33% of site ☐≥33% of site ☐



|                                                                                                                                     |                                              |    |    |    |    |       |    |    |    |    |             |
|-------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|----|----|----|----|-------|----|----|----|----|-------------|
| SITE REF: <b>OTBS4</b>                                                                                                              | <b>RIVER HABITAT SURVEY: TEN SPOT-CHECKS</b> |    |    |    |    |       |    |    |    |    | Page 2 of 4 |
| Spot-check 1 is at: upstream end <input checked="" type="checkbox"/> downstream end <input type="checkbox"/> of site (tick one box) |                                              |    |    |    |    |       |    |    |    |    |             |
| <b>E PHYSICAL ATTRIBUTES</b> (to be assessed across channel within 1m wide transect)                                                |                                              |    |    |    |    |       |    |    |    |    |             |
| <b>When boxes 'bordered', only one entry allowed</b>                                                                                | 1 GPS                                        | 2  | 3  | 4  | 5  | 6 GPS | 7  | 8  | 9  | 10 | GPS         |
| <b>LEFT BANK</b>                                                                                                                    | Ring EC or SC if composed of sandy substrate |    |    |    |    |       |    |    |    |    |             |
| <b>Material</b> NV, BE, BO, CO, GS, EA, PE, CL, CC, SP, WP, GA, BR, RR, TD, FA, BI                                                  | EA                                           | EA | EA | EA | EA | EA    | EA | EA | EA | EA |             |
| <b>Bank modification(s)</b> NK, NO, RS, RI, PC(B), BM, EM                                                                           | RS                                           | RS | RS | RS | RS | RS    | RS | RS | RS | RS |             |
| <b>Marginal &amp; bank feature(s)</b> NV, NO, EC, SC, PB, VP, SB, VS, NB                                                            | SC                                           | SC | SC | SC | SC | SC    | SC | SC | SC | SC |             |
| <b>CHANNEL</b>                                                                                                                      | CP ring either G or P if predominant         |    |    |    |    |       |    |    |    |    |             |
| <b>Channel substrate</b> NV, BE, BO, CO, GP, SA, SI, CL, PE, EA, AR                                                                 | CL                                           | CL | CL | CL | CL | CL    | CL | CL | CL | CL | SE          |
| <b>Flow-type</b> NV, FF, CH, BW, UW, CF, RP, UP, SM, NP, DR                                                                         | SM                                           | SM | SM | SM | SM | SM    | SM | SM | SM | SM |             |
| <b>Channel modification(s)</b> NK, NO, CV, RS, RI, DA, FO                                                                           | RS                                           | RS | RS | RS | RS | RS    | RS | RS | RS | RS |             |
| <b>Channel feature(s)</b> NV, NO, EB, RO, VR, MB, VB, MI, TR                                                                        | NO                                           | NO | NO | NO | NO | NO    | NO | NO | NO | NO |             |
| <b>For braided rivers only: number of sub-channels</b>                                                                              |                                              |    |    |    |    |       |    |    |    |    |             |
| <b>RIGHT BANK</b>                                                                                                                   | Ring EC or SC if composed of sandy substrate |    |    |    |    |       |    |    |    |    |             |
| <b>Material</b> NV, BE, BO, CO, GS, EA, PE, CL, CC, SP, WP, GA, BR, RR, TD, FA, BI                                                  | EA                                           | EA | EA | EA | EA | EA    | EA | EA | EA | EA |             |
| <b>Bank modification(s)</b> NK, NO, RS, RI, PC(B), BM, EM                                                                           | RS                                           | RS | RS | RS | RS | RS    | RS | RS | RS | RS |             |
| <b>Marginal &amp; bank feature(s)</b> NV, NO, EC, SC, PB, VP, SB, VS, NB                                                            | SC                                           | SC | SC | SC | SC | SC    | SC | SC | SC | SC |             |
| <b>F BANKTOP LAND-USE AND VEGETATION STRUCTURE</b> (to be assessed over a 10m wide transect)                                        |                                              |    |    |    |    |       |    |    |    |    |             |
| <b>Land-use:</b> choose one from BL, BP, CW, CP, SH, OR, WL, MH, AW, OW, RP, IG, TH, RD, SU, TL, IL, PG, NV                         |                                              |    |    |    |    |       |    |    |    |    |             |
| <b>LAND-USE WITHIN 5m OF LEFT BANKTOP</b>                                                                                           | IG                                           | IG | IG | IG | IG | IG    | PG | IG | BL | BL |             |
| <b>LEFT BANKTOP (structure within 1m)</b> B/U/S/C/NV                                                                                | S                                            | S  | S  | S  | S  | S     | S  | S  | S  | S  |             |
| <b>LEFT BANK-FACE (structure)</b> B/U/S/C/NV                                                                                        | S                                            | S  | S  | S  | S  | S     | S  | S  | S  | S  |             |
| <b>RIGHT BANK-FACE (structure)</b> B/U/S/C/NV                                                                                       | S                                            | S  | S  | S  | S  | S     | S  | S  | S  | S  |             |
| <b>RIGHT BANKTOP (structure within 1m)</b> B/U/S/C/NV                                                                               | U                                            | U  | U  | U  | U  | U     | U  | U  | U  | U  |             |
| <b>LAND-USE WITHIN 5m OF RIGHT BANKTOP</b>                                                                                          | RP                                           | BP | RP | RP | RP | RP    | RP | RP | RP | RP |             |
| <b>G CHANNEL VEGETATION TYPES</b> (to be assessed over a 10m wide transect; use ET = 35% area, ✓ (present) or NV (not visible))     |                                              |    |    |    |    |       |    |    |    |    |             |
| None (✓) or Not Visible (NV)                                                                                                        |                                              |    |    |    |    |       |    |    |    |    |             |
| Liverworts/mosses/lichens                                                                                                           |                                              |    |    |    |    |       |    |    |    |    |             |
| Emergent broad-leaved herbs                                                                                                         |                                              |    |    |    |    |       |    |    |    |    |             |
| Emergent reeds/sedges/rushes/grasses/horsetails                                                                                     | ✓                                            | ✓  |    | ✓  | ✓  | ✓     | ✓  | ✓  | ✓  | ✓  | E           |
| Floating-leaved (rooted)                                                                                                            |                                              |    |    |    |    |       |    |    |    |    |             |
| Free-floating                                                                                                                       |                                              |    |    |    |    |       |    |    |    |    |             |
| Amphibious                                                                                                                          | ✓                                            | ✓  |    | ✓  | ✓  | ✓     | ✓  |    |    |    | E           |
| Submerged broad-leaved                                                                                                              |                                              |    |    |    |    |       |    |    |    |    |             |
| Submerged linear-leaved                                                                                                             |                                              |    |    |    |    |       |    |    |    |    |             |
| Submerged fine-leaved                                                                                                               |                                              | ✓  |    | ✓  | ✓  | ✓     |    | ✓  | ✓  |    | E           |
| Filamentous algae                                                                                                                   |                                              |    | ✓  | ✓  | ✓  |       | ✓  | ✓  |    | ✓  |             |
| Use end column for overall assessment over 500m, including types not occurring in spot-checks (use ✓, E or NV) —————→               |                                              |    |    |    |    |       |    |    |    |    |             |

Riffles:

O

Pools:

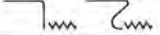



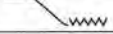

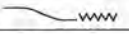

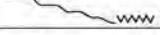
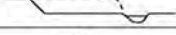

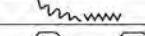


O

PB:

O

VP:

O

|                                                                                                     |                                             |                                     |                                                                                                              |                                         |                                     |
|-----------------------------------------------------------------------------------------------------|---------------------------------------------|-------------------------------------|--------------------------------------------------------------------------------------------------------------|-----------------------------------------|-------------------------------------|
| SITE REF. <b>02884</b>                                                                              | <b>RIVER HABITAT SURVEY : 500m SWEEP-UP</b> | Page 3 of 4                         |                                                                                                              |                                         |                                     |
| H LAND-USE WITHIN 50m OF BANKTOP Use ✓ (present) or E (> 33% bank/length)                           |                                             |                                     |                                                                                                              |                                         |                                     |
|                                                                                                     | L R                                         | L R                                 |                                                                                                              |                                         |                                     |
| Broadleaf/mixed woodland (semi-natural) (BL)                                                        | ✓                                           |                                     | Natural open water (OW)                                                                                      |                                         |                                     |
| Broadleaf/mixed plantation (BP)                                                                     |                                             |                                     | Rough/unimproved grassland/pasture (RP)                                                                      |                                         | E                                   |
| Coniferous woodland (semi-natural) (CW)                                                             |                                             |                                     | Improved/semi-improved grassland (IG)                                                                        | E                                       | ✓                                   |
| Coniferous plantation (CP)                                                                          |                                             |                                     | Tall herb/rank vegetation (TH)                                                                               | ✓                                       |                                     |
| Scrub & shrubs (SH)                                                                                 | ✓                                           |                                     | Rock, scree or sand dunes (RD)                                                                               |                                         |                                     |
| Orchard (OR)                                                                                        |                                             |                                     | Suburban/urban development (SU)                                                                              | ✓                                       |                                     |
| Wetland (e.g. bog, marsh, fen) (WL)                                                                 |                                             |                                     | Tilled land (TL)                                                                                             |                                         |                                     |
| Moorland/heath (MH)                                                                                 |                                             |                                     | Irrigated land (IL)                                                                                          |                                         |                                     |
| Artificial open water (AW)                                                                          |                                             |                                     | Parkland or gardens (PG)                                                                                     | ✓                                       |                                     |
|                                                                                                     |                                             |                                     | Not visible (NV)                                                                                             |                                         |                                     |
| I BANK PROFILES Use ✓ (present) or E (> 33% bank/length)                                            |                                             |                                     |                                                                                                              |                                         |                                     |
| <b>Natural/unmodified</b>                                                                           | L                                           | R                                   | <b>Artificial/modified</b>                                                                                   | L                                       | R                                   |
| Vertical/undercut  |                                             |                                     | Resectioned (reprofiled)  | E                                       | E                                   |
| Vertical with toe  |                                             |                                     | Reinforced - whole        |                                         |                                     |
| Steep (>45°)       |                                             |                                     | Reinforced - top only     |                                         |                                     |
| Gentle             |                                             |                                     | Reinforced - toe only     |                                         |                                     |
| Composite         |                                             |                                     | Artificial two-stage      |                                         |                                     |
| Natural berm     |                                             |                                     | Poached bank            | ✓                                       | ✓                                   |
|                                                                                                     |                                             |                                     | Embanked                | E                                       | E                                   |
|                                                                                                     |                                             |                                     | Set-back embankment     |                                         |                                     |
| J EXTENT OF TREES AND ASSOCIATED FEATURES Record even if <1%                                        |                                             |                                     |                                                                                                              |                                         |                                     |
| <b>TREES</b> (tick one box per bank)                                                                |                                             |                                     | <b>ASSOCIATED FEATURES</b> (tick one box per feature)                                                        |                                         |                                     |
|                                                                                                     | Left                                        | Right                               |                                                                                                              | None                                    | Present                             |
| None                                                                                                | <input type="checkbox"/>                    | <input checked="" type="checkbox"/> | Shading of channel                                                                                           | <input checked="" type="checkbox"/>     | <input type="checkbox"/>            |
| Isolated/scattered                                                                                  | <input checked="" type="checkbox"/>         | <input type="checkbox"/>            | *Overhanging boughs                                                                                          | <input type="checkbox"/>                | <input type="checkbox"/>            |
| Regularly spaced, single                                                                            | <input type="checkbox"/>                    | <input type="checkbox"/>            | *Exposed bankside roots                                                                                      | <input type="checkbox"/>                | <input type="checkbox"/>            |
| Occasional clumps                                                                                   | <input type="checkbox"/>                    | <input type="checkbox"/>            | *Underwater tree roots                                                                                       | <input type="checkbox"/>                | <input type="checkbox"/>            |
| Semi-continuous                                                                                     | <input type="checkbox"/>                    | <input type="checkbox"/>            | Fallen trees                                                                                                 | <input type="checkbox"/>                | <input type="checkbox"/>            |
| Continuous                                                                                          | <input type="checkbox"/>                    | <input type="checkbox"/>            | Large woody debris                                                                                           | <input type="checkbox"/>                | <input type="checkbox"/>            |
| K EXTENT OF CHANNEL AND BANK FEATURES (tick one box for each feature) *record even if <1%           |                                             |                                     |                                                                                                              |                                         |                                     |
|                                                                                                     | None                                        | Present                             | E(>33%)                                                                                                      |                                         | None                                |
| *Free fall flow                                                                                     | <input checked="" type="checkbox"/>         | <input type="checkbox"/>            | <input type="checkbox"/>                                                                                     | Exposed bedrock                         | <input checked="" type="checkbox"/> |
| Chute flow                                                                                          | <input checked="" type="checkbox"/>         | <input type="checkbox"/>            | <input type="checkbox"/>                                                                                     | Exposed boulders                        | <input checked="" type="checkbox"/> |
| Broken standing waves                                                                               | <input checked="" type="checkbox"/>         | <input type="checkbox"/>            | <input type="checkbox"/>                                                                                     | Vegetated bedrock/boulders              | <input checked="" type="checkbox"/> |
| Unbroken standing waves                                                                             | <input checked="" type="checkbox"/>         | <input type="checkbox"/>            | <input type="checkbox"/>                                                                                     | Unvegetated mid-channel bar(s)          | <input checked="" type="checkbox"/> |
| Rippled flow                                                                                        | <input checked="" type="checkbox"/>         | <input type="checkbox"/>            | <input type="checkbox"/>                                                                                     | Vegetated mid-channel bar(s)            | <input checked="" type="checkbox"/> |
| *Upwelling                                                                                          | <input type="checkbox"/>                    | <input checked="" type="checkbox"/> | <input type="checkbox"/>                                                                                     | Mature island(s)                        | <input checked="" type="checkbox"/> |
| Smooth flow                                                                                         | <input type="checkbox"/>                    | <input type="checkbox"/>            | <input checked="" type="checkbox"/>                                                                          | Unvegetated side bar(s)                 | <input checked="" type="checkbox"/> |
| No perceptible flow                                                                                 | <input checked="" type="checkbox"/>         | <input type="checkbox"/>            | <input type="checkbox"/>                                                                                     | Vegetated side bar(s)                   | <input checked="" type="checkbox"/> |
| No flow (dry)                                                                                       | <input checked="" type="checkbox"/>         | <input type="checkbox"/>            | <input type="checkbox"/>                                                                                     | Unvegetated point bar(s)                | <input checked="" type="checkbox"/> |
| Marginal deadwater                                                                                  | <input checked="" type="checkbox"/>         | <input type="checkbox"/>            | <input type="checkbox"/>                                                                                     | Vegetated point bar(s)                  | <input checked="" type="checkbox"/> |
| Eroding cliff(s)                                                                                    | <input type="checkbox"/>                    | <input checked="" type="checkbox"/> | <input type="checkbox"/>                                                                                     | *Discrete unvegetated silt deposit(s)   | <input checked="" type="checkbox"/> |
| Stable cliff(s)                                                                                     | <input type="checkbox"/>                    | <input type="checkbox"/>            | <input checked="" type="checkbox"/>                                                                          | *Discrete unvegetated sand deposit(s)   | <input checked="" type="checkbox"/> |
|                                                                                                     |                                             |                                     |                                                                                                              | *Discrete unvegetated gravel deposit(s) | <input checked="" type="checkbox"/> |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                         |                                                                                                                                |                                             |             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|-------------|
| SITE REF. <b>02884</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>RIVER HABITAT SURVEY : DIMENSIONS AND INFLUENCES</b> |                                                                                                                                |                                             | Page 4 of 4 |
| <b>I CHANNEL DIMENSIONS</b> (to be measured at one location on a straight uniform section, preferably across a riffle)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                         |                                                                                                                                |                                             |             |
| LEFT BANK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | CHANNEL                                                 | RIGHT BANK                                                                                                                     |                                             |             |
| Banktop height (m)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Bankfull/top width (m)                                  | Banktop height (m)                                                                                                             |                                             |             |
| Is banktop height also bankfull height? (Y or N)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Water width (m)                                         | Is banktop height also bankfull height? (Y or N)                                                                               |                                             |             |
| Embanked height (m)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Water depth (m)                                         | Embanked height (m)                                                                                                            |                                             |             |
| If trashline lower than banktop, indicate: height above water (m) = width from bank to bank (m) =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                         |                                                                                                                                |                                             |             |
| Bed material at site is: consolidated <input type="checkbox"/> unconsolidated (loose) <input type="checkbox"/> unknown <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                         |                                                                                                                                |                                             |             |
| Location of measurements is: riffle <input type="checkbox"/> other <input type="checkbox"/> (state)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                         |                                                                                                                                |                                             |             |
| <b>M FEATURES OF SPECIAL INTEREST</b> Use ✓ or E (≥ 33% length) *record even if < 1%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                         |                                                                                                                                |                                             |             |
| None <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Very large boulders (>1m) <input type="checkbox"/>      | Backwater(s) <input checked="" type="checkbox"/>                                                                               | Marsh(es) <input type="checkbox"/>          |             |
| Braided channels <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | *Debris dam(s) <input type="checkbox"/>                 | Floodplain boulder deposits <input type="checkbox"/>                                                                           | Flush(es) <input type="checkbox"/>          |             |
| Side channel(s) <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | *Leafy debris <input type="checkbox"/>                  | Water meadow(s) <input checked="" type="checkbox"/>                                                                            | Natural open water <input type="checkbox"/> |             |
| *Natural waterfall(s) > 5m high <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Fringing reed-bank(s) <input type="checkbox"/>          | Fen(s) <input type="checkbox"/>                                                                                                | Others (state) <input type="checkbox"/>     |             |
| *Natural waterfall(s) < 5m high <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Quaking bank(s) <input type="checkbox"/>                | Bog(s) <input type="checkbox"/>                                                                                                | <b>ADJACENT MOSES + LEVELS</b>              |             |
| Natural cascade(s) <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | *Sink hole(s) <input type="checkbox"/>                  | Wet woodland(s) <input type="checkbox"/>                                                                                       |                                             |             |
| <b>N CHOKED CHANNEL</b> (tick one box)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                         |                                                                                                                                |                                             |             |
| Is 33% or more of the channel choked with vegetation? No <input checked="" type="checkbox"/> Yes <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                         |                                                                                                                                |                                             |             |
| <b>O NOTABLE NUISANCE PLANT SPECIES</b> Use ✓ or E (≥ 33% length) *record even if < 1%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                         |                                                                                                                                |                                             |             |
| <div style="display: flex; justify-content: space-between;"> <div>             bankface banktop to 50m<br/>             None <input type="checkbox"/> *Giant hogweed <input type="checkbox"/> *Japanese knotweed <input type="checkbox"/> </div> <div>             bankface banktop to 50m<br/>             *Himalayan balsam <input checked="" type="checkbox"/> *Other (state)..... <input type="checkbox"/> </div> </div>                                                                                                                                                                                                                                                                                                                                                                       |                                                         |                                                                                                                                |                                             |             |
| <b>P OVERALL CHARACTERISTICS</b> (Circle appropriate words, add others as necessary)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                         |                                                                                                                                |                                             |             |
| <b>Major impacts:</b> landfill - tipping - litter - sewage - pollution - drought - abstraction - mill - dam - road - rail - industry <u>housing</u> - mining - quarrying - <u>overdeepening</u> - overwidening (P or E) - <u>realignment</u> - afforestation - fisheries management - silting - waterlogging - hydroelectric power<br><b>Evidence of recent management:</b> dredging - <u>bank moving</u> - weed cutting - enhancement - river rehabilitation - gravel extraction - other (please specify)<br><b>Animals:</b> otter - mink - <u>water vole</u> - kingfisher - dipper - grey wagtail - sand martin - heron - <u>dragonflies/damselflies</u><br><b>Other significant observations:</b> if necessary use separate sheet to describe overall characteristics and relevant observations |                                                         |                                                                                                                                |                                             |             |
| <b>Q ALDERS</b> (tick one box in each of the two categories) *record even if < 1%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                         |                                                                                                                                |                                             |             |
| *Alders? None <input checked="" type="checkbox"/> Present <input type="checkbox"/> Extensive <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                         | *Diseased Alders? None <input checked="" type="checkbox"/> Present <input type="checkbox"/> Extensive <input type="checkbox"/> |                                             |             |
| <b>R FIELD SURVEY QUALITY CONTROL</b> (✓ boxes to confirm checks)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                         |                                                                                                                                |                                             |             |
| Have you taken at least two photos that illustrate the general character of the site and additional photos of any weirs/ sluices and major/intermediate structures across the channel? <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                         |                                                                                                                                |                                             |             |
| Have you completed all ten spot-checks and made entries in all boxes in E & F on page 2? <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                         |                                                                                                                                |                                             |             |
| Have you completed column 11 of section G (and E if appropriate) on page 2? <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                         |                                                                                                                                |                                             |             |
| Have you recorded in section C the number of riffles, pools and point bars (even if 0) on page 1? <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                         |                                                                                                                                |                                             |             |
| Have you given an accurate (alphanumeric) grid reference for spot-checks 1, 6 and end of site (page 1)? <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                         |                                                                                                                                |                                             |             |
| Have you stated whether spot-check 1 is at the upstream or downstream end of the site (top of page 2)? <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                         |                                                                                                                                |                                             |             |
| Have you cross-checked your spot-check and sweep-up responses with the channel modification indicators given on page 2 of the spot-check key? <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                         |                                                                                                                                |                                             |             |

SEE  
SECTIONS  
1.018-19  
TO  
1.023

**A FIELD SURVEY DETAILS**Site Number: leave blank if new siteSite Reference: **0288**

Spot-check 1 coord:

Spot-check 6 coord:

End of site coord:

Reach Reference: **02885**River name: **LIVER PARLETT**Date **29/05/2018** Time:Surveyor name: **T CHISWALL**Accredited Surveyor code: **MN33**Is the site part of a river or an artificial channel? River ☐ Artificial ☒Are adverse conditions affecting survey? No ☒ Yes ☐



If yes, state .....

Is bed of river visible? barely or not ☐ partially ☒ ± entirely ☐Is health and safety assessment form attached? Yes ☒ No ☐Number of photographs taken: ☐

Photo references:

Site surveyed from: left bank ☐ right bank ☒ channel ☐☐ When options shown with 'shadow boxes', tick one box only**LEFT** banks determined by facing downstream **RIGHT****B PREDOMINANT VALLEY FORM (within the horizon limit)** (tick one box only)

(tick one box only)

 ☐ shallow vee ☐ deep vee ☐ gorge ☐ concave/bowl ☐ asymmetrical valley ☐ U-shape valley ☒ no obvious valley sidesDistinct flat valley bottom? No ☐ Yes ☒Natural terraces? No ☒ Yes ☐**C NUMBER OF RIFFLES, POOLS AND POINT BARS** (enter total number in boxes)

Riffle(s)

Unvegetated point bar(s)

Pool(s)

Vegetated point bar(s)

**D ARTIFICIAL FEATURES** (indicate total number of occurrences of each category within the 500m site)

| If none, tick box <input type="checkbox"/> |               | Major | Intermediate | Minor |                          | Major | Intermediate | Minor |
|--------------------------------------------|---------------|-------|--------------|-------|--------------------------|-------|--------------|-------|
|                                            | Weirs/sluices |       |              |       | Outfalls/intakes         |       |              |       |
|                                            | Culverts      |       |              |       | Fords                    |       |              |       |
|                                            | Bridges       |       | 1            |       | Deflectors/groynes/croys |       |              |       |
|                                            | Other - state |       |              |       |                          |       |              |       |

Is channel obviously realigned? No ☐ Yes, <33% of site ☐ ≥33% of site ☒Is channel obviously over-deepened? No ☐ Yes, <33% of site ☐ ≥33% of site ☒Is water impounded by weir/dam? No ☒ Yes, <33% of site ☐ ≥33% of site ☐



|                                                                                                                                     |                                              |          |          |          |          |          |          |          |          |          |             |
|-------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-------------|
| SITE REF. <b>02B55</b>                                                                                                              | <b>RIVER HABITAT SURVEY: TEN SPOT-CHECKS</b> |          |          |          |          |          |          |          |          |          | Page 2 of 4 |
| Spot-check 1 is at: upstream end <input checked="" type="checkbox"/> downstream end <input type="checkbox"/> of site (tick one box) |                                              |          |          |          |          |          |          |          |          |          |             |
| <b>E PHYSICAL ATTRIBUTES</b> (to be assessed across channel within 1m wide transect)                                                |                                              |          |          |          |          |          |          |          |          |          |             |
| <b>When boxes 'bordered', only one entry allowed</b>                                                                                | 1 GPS                                        | 2        | 3        | 4        | 5        | 6 GPS    | 7        | 8        | 9        | 10       | GPS         |
| <b>LEFT BANK</b>                                                                                                                    | Ring EC or SC if composed of sandy substrate |          |          |          |          |          |          |          |          |          |             |
| <b>Material</b> NV, BE, BO, CO, GS, EA, PE, CL, CC, SP, WP, GA, BR, RR, TD, FA, BI                                                  | EA                                           | EA       | EA       | EA       | EA       | EA       | EA       | EA       | EA       | EA       | EA          |
| <b>Bank modification(s)</b> NK, NO, RS, RI, PC(B), BM, EM                                                                           | RS<br>EM                                     | RS<br>EM | RS<br>EM | RS<br>EM | RS<br>EM | RS<br>EM | RS<br>EM | RS<br>EM | RS<br>EM | RS<br>EM | RS<br>EM    |
| <b>Marginal &amp; bank feature(s)</b> NV, NO, EC, SC, PB, VP, SB, VS, NB                                                            | SC                                           | SC       | SC       | SC       | SC       | SC       | SC       | SC       | SC       | SC       | SC          |
| <b>CHANNEL</b>                                                                                                                      | GP: ring either G or P if predominant        |          |          |          |          |          |          |          |          |          |             |
| <b>Channel substrate</b> NV, BE, BO, CO, GP, SA, SI, CL, PE, EA, AR                                                                 | CL                                           | CL       | CL       | CL       | CL       | CL       | CL       | CL       | CL       | CL       | SE          |
| <b>Flow-type</b> NV, FF, CH, BW, UW, CF, RP, UP, SM, NP, DR                                                                         | SM                                           | SM       | SM       | SM       | SM       | SM       | SM       | SM       | SM       | SM       | SM          |
| <b>Channel modification(s)</b> NK, NO, CV, RS, RI, DA, FO                                                                           | RS                                           | RS       | RS       | RS       | RS       | RS       | RS       | RS       | RS       | RS       | RS          |
| <b>Channel feature(s)</b> NV, NO, EB, RO, VR, MB, VB, MI, TR                                                                        | NO                                           | NO       | NO       | NO       | NO       | NO       | NO       | NO       | NO       | NO       | NO          |
| <b>For braided rivers only: number of sub-channels</b>                                                                              |                                              |          |          |          |          |          |          |          |          |          |             |
| <b>RIGHT BANK</b>                                                                                                                   | Ring EC or SC if composed of sandy substrate |          |          |          |          |          |          |          |          |          |             |
| <b>Material</b> NV, BE, BO, CO, GS, EA, PE, CL, CC, SP, WP, GA, BR, RR, TD, FA, BI                                                  | EA                                           | EA       | EA       | EA       | EA       | EA       | EA       | EA       | EA       | EA       | EA          |
| <b>Bank modification(s)</b> NK, NO, RS, RI, PC(B), BM, EM                                                                           | RS<br>EM                                     | RS<br>EM | RS<br>EM | RS<br>EM | RS<br>EM | RS<br>EM | RS<br>EM | RS<br>EM | RS<br>EM | RS<br>EM | RS<br>EM    |
| <b>Marginal &amp; bank feature(s)</b> NV, NO, EC, SC, PB, VP, SB, VS, NB                                                            | SC                                           | SC       | NJ       | NJ       | SC       | SC       | SC       | SC       | PB       | PB       | PB          |
| <b>F BANKTOP LAND-USE AND VEGETATION STRUCTURE</b> (to be assessed over a 10m wide transect)                                        |                                              |          |          |          |          |          |          |          |          |          |             |
| <b>Land-use:</b> choose one from BL, BP, CW, CP, SH, OR, WL, MH, AW, OW, RP, IG, TH, RD, SU, TL, IL, PG, NV                         |                                              |          |          |          |          |          |          |          |          |          |             |
| <b>LAND-USE WITHIN 5m OF LEFT BANKTOP</b>                                                                                           | SJ                                           | SJ       | SJ       | SH       | SH       | SH       | SH       | SH       | SH       | SH       | SH          |
| <b>LEFT BANKTOP (structure within 1m)</b> B/U/S/C/NV                                                                                | S                                            | S        | S        | S        | S        | S        | S        | S        | S        | S        | S           |
| <b>LEFT BANK-FACE (structure)</b> B/U/S/C/NV                                                                                        | S                                            | S        | S        | S        | S        | S        | U        | U        | U        | U        | U           |
| <b>RIGHT BANK-FACE (structure)</b> B/U/S/C/NV                                                                                       | S                                            | S        | S        | S        | S        | S        | S        | S        | U        | U        | U           |
| <b>RIGHT BANKTOP (structure within 1m)</b> B/U/S/C/NV                                                                               | U                                            | U        | U        | U        | U        | U        | S        | U        | U        | U        | U           |
| <b>LAND-USE WITHIN 5m OF RIGHT BANKTOP</b>                                                                                          | RP                                           | RP       | 14       | 14       | 14       | 14       | 14       | 14       | 14       | 14       | 14          |
| <b>G CHANNEL VEGETATION TYPES</b> (to be assessed over a 10m wide transect: use E (≥ 35% area), ✓ (present) or NV (not visible))    |                                              |          |          |          |          |          |          |          |          |          |             |
| None (✓) or Not Visible (NV)                                                                                                        |                                              |          |          |          |          |          |          |          |          |          | NV          |
| Liverworts/mosses/lichens                                                                                                           |                                              |          |          |          |          |          |          |          |          |          | ✓           |
| Emergent broad-leaved herbs                                                                                                         |                                              |          |          |          |          |          |          |          |          |          |             |
| Emergent reeds/sedges/rushes/grasses/horsetails                                                                                     |                                              | /        | /        | /        | /        | /        | /        | /        | /        | /        | E           |
| Floating-leaved (rooted)                                                                                                            |                                              |          |          |          |          |          |          |          |          |          |             |
| Free-floating                                                                                                                       |                                              |          |          |          |          |          |          |          |          |          |             |
| Amphibious                                                                                                                          | /                                            |          |          | /        | /        | /        | /        | /        | /        | /        | /           |
| Submerged broad-leaved                                                                                                              |                                              |          |          |          |          |          |          |          |          |          |             |
| Submerged linear-leaved                                                                                                             |                                              |          |          |          |          |          |          |          |          |          |             |
| Submerged fine-leaved                                                                                                               |                                              | /        | /        | /        | /        | /        | /        | /        | /        | /        | E           |
| Filamentous algae                                                                                                                   | /                                            | /        | /        | /        | /        | /        | /        | /        | /        | /        | E           |
| Use end column for overall assessment over 500m, including types not occurring in spot-checks (use ✓, E or NV)                      |                                              |          |          |          |          |          |          |          |          |          |             |

Riffles:

○

Pools:

○

PB:

○

VP:

○

|                                                                                           |                                                                                       |                                                       |
|-------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-------------------------------------------------------|
| SITE REF. <b>02BBS</b>                                                                    | <b>RIVER HABITAT SURVEY : 500m SWEEP-UP</b>                                           | Page 3 of 4                                           |
| II LAND-USE WITHIN 50m OF BANKTOP Use ✓ (present) or E (≥ 33% banklength)                 |                                                                                       |                                                       |
|                                                                                           | L                                                                                     | R                                                     |
| Broadleaf/mixed woodland (semi-natural) (BL)                                              |                                                                                       | Natural open water (OW)                               |
| Broadleaf/mixed plantation (BP)                                                           |                                                                                       | Rough/unimproved grassland/pasture (RP)               |
| Coniferous woodland (semi-natural) (CW)                                                   |                                                                                       | Improved/semi-improved grassland (IG)                 |
| Coniferous plantation (CP)                                                                |                                                                                       | Tall herb/rank vegetation (TH)                        |
| Scrub & shrubs (SH)                                                                       | ✓                                                                                     | Rock, scree or sand dunes (RD)                        |
| Orchard (OR)                                                                              |                                                                                       | Suburban/urban development (SU)                       |
| Wetland (e.g. bog, marsh, fen) (WL)                                                       |                                                                                       | Tilled land (TL)                                      |
| Moorland/heath (MH)                                                                       |                                                                                       | Irrigated land (IL)                                   |
| Artificial open water (AW)                                                                |                                                                                       | Parkland or gardens (PG)                              |
|                                                                                           |                                                                                       | Not visible (NV)                                      |
| I BANK PROFILES Use ✓ (present) or E (≥ 33% banklength)                                   |                                                                                       |                                                       |
| <b>Natural/unmodified</b>                                                                 | L                                                                                     | R                                                     |
| Vertical/undercut                                                                         |                                                                                       | Artificial/modified                                   |
| Vertical with toe                                                                         |                                                                                       | Reinforced - whole                                    |
| Steep (>45°)                                                                              |                                                                                       | Reinforced - top only                                 |
| Gentle                                                                                    |                                                                                       | Reinforced - toe only                                 |
| Composite                                                                                 |                                                                                       | Artificial two-stage                                  |
| Natural berm                                                                              |                                                                                       | Poached bank                                          |
|                                                                                           |                                                                                       | Embanked                                              |
|                                                                                           |                                                                                       | Set-back embankment                                   |
| J EXTENT OF TREES AND ASSOCIATED FEATURES *record even if <1%                             |                                                                                       |                                                       |
| <b>TREES</b> (tick one box per bank)                                                      |                                                                                       | <b>ASSOCIATED FEATURES</b> (tick one box per feature) |
|                                                                                           | Left      Right                                                                       | None      Present      E (≥33%)                       |
| None                                                                                      | <input type="checkbox"/> <input type="checkbox"/>                                     | Shading of channel                                    |
| Isolated/scattered                                                                        | <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>               | *Overhanging boughs                                   |
| Regularly spaced, single                                                                  | <input type="checkbox"/> <input type="checkbox"/>                                     | *Exposed bankside roots                               |
| Occasional clumps                                                                         | <input type="checkbox"/> <input type="checkbox"/>                                     | *Underwater tree roots                                |
| Semi-continuous                                                                           | <input type="checkbox"/> <input type="checkbox"/>                                     | Fallen trees                                          |
| Continuous                                                                                | <input type="checkbox"/> <input type="checkbox"/>                                     | Large woody debris                                    |
| K EXTENT OF CHANNEL AND BANK FEATURES (tick one box for each feature) *record even if <1% |                                                                                       |                                                       |
|                                                                                           | None      Present      E (≥33%)                                                       | None      Present      E (≥33%)                       |
| *Free fall flow                                                                           | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Exposed bedrock                                       |
| Chute flow                                                                                | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Exposed boulders                                      |
| Broken standing waves                                                                     | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Vegetated bedrock/boulders                            |
| Unbroken standing waves                                                                   | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Unvegetated mid-channel bar(s)                        |
| Rippled flow                                                                              | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Vegetated mid-channel bar(s)                          |
| *Upwelling                                                                                | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Mature island(s)                                      |
| Smooth flow                                                                               | <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> | Unvegetated side bar(s)                               |
| No perceptible flow                                                                       | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Vegetated side bar(s)                                 |
| No flow (dry)                                                                             | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Unvegetated point bar(s)                              |
| Marginal deadwater                                                                        | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Vegetated point bar(s)                                |
| Eroding cliff(s)                                                                          | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | *Discrete unvegetated silt deposit(s)                 |
| Stable cliff(s)                                                                           | <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> | *Discrete unvegetated sand deposit(s)                 |
|                                                                                           |                                                                                       | *Discrete unvegetated gravel deposit(s)               |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                         |                                                                                                                                |                                             |             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|-------------|
| SITE REF. <b>02835</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>RIVER HABITAT SURVEY : DIMENSIONS AND INFLUENCES</b> |                                                                                                                                |                                             | Page 4 of 4 |
| <b>L CHANNEL DIMENSIONS</b> (to be measured at one location on a straight uniform section, preferably across a riffle)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                         |                                                                                                                                |                                             |             |
| LEFT BANK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | CHANNEL                                                 | RIGHT BANK                                                                                                                     |                                             |             |
| Banktop height (m)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Bankfull/top width (m)                                  | Banktop height (m)                                                                                                             |                                             |             |
| Is banktop height also bankfull height? (Y or N)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Water width (m)                                         | Is banktop height also bankfull height? (Y or N)                                                                               |                                             |             |
| Embanked height (m)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Water depth (m)                                         | Embanked height (m)                                                                                                            |                                             |             |
| If trashline lower than banktop, indicate: height above water (m) =      width from bank to bank (m) =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                         |                                                                                                                                |                                             |             |
| Bed material at site is:      consolidated <input type="checkbox"/> unconsolidated (loose) <input type="checkbox"/> unknown <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                         |                                                                                                                                |                                             |             |
| Location of measurements is: riffle <input type="checkbox"/> other <input type="checkbox"/> (state)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                         |                                                                                                                                |                                             |             |
| <b>M FEATURES OF SPECIAL INTEREST</b> Use / or E (≥ 33% length) *record even if < 1%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                         |                                                                                                                                |                                             |             |
| None <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Very large boulders (>1m) <input type="checkbox"/>      | Backwater(s) <input type="checkbox"/>                                                                                          | Marsh(es) <input type="checkbox"/>          |             |
| Braided channels <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | *Debris dam(s) <input type="checkbox"/>                 | Floodplain boulder deposits <input type="checkbox"/>                                                                           | Flush(es) <input type="checkbox"/>          |             |
| Side channel(s) <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | *Leafy debris <input type="checkbox"/>                  | Water meadow(s) <input type="checkbox"/>                                                                                       | Natural open water <input type="checkbox"/> |             |
| *Natural waterfall(s) > 5m high <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Fringing reed-bank(s) <input type="checkbox"/>          | Fen(s) <input type="checkbox"/>                                                                                                | Others (state) <input type="checkbox"/>     |             |
| *Natural waterfall(s) < 5m high <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Quaking bank(s) <input type="checkbox"/>                | Bog(s) <input type="checkbox"/>                                                                                                |                                             |             |
| Natural cascade(s) <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | *Sink hole(s) <input type="checkbox"/>                  | Wet woodland(s) <input type="checkbox"/>                                                                                       |                                             |             |
| <b>N CHOKED CHANNEL</b> (tick one box)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                         |                                                                                                                                |                                             |             |
| Is 33% or more of the channel choked with vegetation?      No <input checked="" type="checkbox"/> Yes <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                         |                                                                                                                                |                                             |             |
| <b>O NOTABLE NUISANCE PLANT SPECIES</b> Use ✓ or E (≥ 33% length) *record even if < 1%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                         |                                                                                                                                |                                             |             |
| <div style="display: flex; justify-content: space-between;"> <div>             bankface      banktop to 50m<br/>             None <input type="checkbox"/> *Giant hogweed <input type="checkbox"/> <input type="checkbox"/> *Japanese knotweed <input type="checkbox"/> <input type="checkbox"/> </div> <div>             bankface      banktop to 50m<br/>             *Himalayan balsam <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> *Other (state)..... <input type="checkbox"/> <input type="checkbox"/> </div> </div>                                                                                                                                                                                                                                                                   |                                                         |                                                                                                                                |                                             |             |
| <b>P OVERALL CHARACTERISTICS</b> (Circle appropriate words, add others as necessary)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                         |                                                                                                                                |                                             |             |
| <b>Major impacts:</b> landfill - tipping - litter - sewage - pollution - drought - abstraction - mill - dam <u>road</u> - rail - industry - <u>housing</u> - mining - quarrying - <u>overdeepening</u> - <u>overwidening</u> (P or E) - <u>realignment</u> - afforestation - fisheries management - silting - waterlogging - hydroelectric power<br><b>Evidence of recent management:</b> dredging - <u>bank mowing</u> - weed cutting - enhancement - river rehabilitation - gravel extraction - other (please specify)<br><b>Animals:</b> <u>otter</u> - mink - <u>water vole</u> - kingfisher - dipper - grey wagtail - sand martin - heron - <u>dragonflies/damselflies</u><br><b>Other significant observations:</b> if necessary use separate sheet to describe overall characteristics and relevant observations |                                                         |                                                                                                                                |                                             |             |
| <b>Q ALDERS</b> (tick one box in each of the two categories) *record even if < 1%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                         |                                                                                                                                |                                             |             |
| *Alders? None <input checked="" type="checkbox"/> Present <input type="checkbox"/> Extensive <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                         | *Diseased Alders? None <input checked="" type="checkbox"/> Present <input type="checkbox"/> Extensive <input type="checkbox"/> |                                             |             |
| <b>R FIELD SURVEY QUALITY CONTROL</b> (✓ boxes to confirm checks)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                         |                                                                                                                                |                                             |             |
| Have you taken at least two photos that illustrate the general character of the site and additional photos of any weirs/ sluices and major/intermediate structures across the channel? <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                         |                                                                                                                                |                                             |             |
| Have you completed all ten spot-checks and made entries in all boxes in E & F on page 2? <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                         |                                                                                                                                |                                             |             |
| Have you completed column 11 of section G (and E if appropriate) on page 2? <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                         |                                                                                                                                |                                             |             |
| Have you recorded in section C the number of riffles, pools and point bars (even if 0) on page 1? <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                         |                                                                                                                                |                                             |             |
| Have you given an accurate (alphanumeric) grid reference for spot-checks 1, 6 and end of site (page 1)? <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                         |                                                                                                                                |                                             |             |
| Have you stated whether spot-check 1 is at the upstream or downstream end of the site (top of page 2)? <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                         |                                                                                                                                |                                             |             |
| Have you cross-checked your spot-check and sweep-up responses with the channel modification indicators given on page 2 of the spot-check key? <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                         |                                                                                                                                |                                             |             |

SEE  
SECTIONS  
1.023-24  
TO  
1.029

**A FIELD SURVEY DETAILS**Site Number: leave blank if new siteSite Number: **6**Site Reference: **02BB**

Spot-check 1 coord:

Spot-check 6 coord:

End of site coord:

Reach Reference: **02BB6**River name: **RIVER PARLETT**Date **29/05/2018** Time:Surveyor name: **TCHISWALL  
M. JOHNS**Accredited Surveyor code: **MD33**Is the site part of a river or an artificial channel? River ☐ Artificial ☒Are adverse conditions affecting survey? No ☒ Yes ☐

If yes, state .....

Is bed of river visible? barely or not ☐ partially ☒ ± entirely ☐Is health and safety assessment form attached? Yes ☒ No ☐Number of photographs taken: ☐

Photo references:

Site surveyed from: left bank ☐ right bank ☒ channel ☐☐ When options shown with 'shadow boxes', tick one box only**LEFT** banks determined by facing downstream **RIGHT****B. PREDOMINANT VALLEY FORM (within the horizon limit)** (tick one box only)

(tick one box only)

☐ shallow vee☐ deep vee☐ gorge☐ concave/bowl☐ asymmetrical valley☐ U-shape valley☒ no obvious valley sidesDistinct flat valley bottom? No ☐ Yes ☒Natural terraces? No ☒ Yes ☐**C NUMBER OF RIFFLES, POOLS AND POINT BARS** (enter total number in boxes)

Riffle(s)

Unvegetated point bar(s)

Pool(s)

Vegetated point bar(s)

**D ARTIFICIAL FEATURES** (Indicate total number of occurrences of each category within the 500m site)

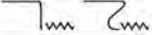



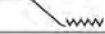




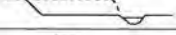

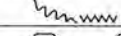


| If none, tick box <input type="checkbox"/> | Major | Intermediate | Minor |                          | Major | Intermediate | Minor |
|--------------------------------------------|-------|--------------|-------|--------------------------|-------|--------------|-------|
| Weirs/sluices                              |       |              |       | Outfalls/intakes         |       |              | 1     |
| Culverts                                   |       |              |       | Fords                    |       |              |       |
| Bridges                                    |       |              |       | Deflectors/groynes/croys |       |              |       |
| Other - state                              |       |              |       |                          |       |              |       |

Is channel obviously realigned? No ☐Yes, <33% of site ☐≥33% of site ☒Is channel obviously over-deepened? No ☐Yes, <33% of site ☐≥33% of site ☒Is water impounded by weir/dam? No ☒Yes, <33% of site ☐≥33% of site ☐



|                                                                                                                                         |                                              |       |       |       |       |       |       |       |       |       |             |
|-----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------------|
| SITE REF. <b>02886</b>                                                                                                                  | <b>RIVER HABITAT SURVEY: TEN SPOT-CHECKS</b> |       |       |       |       |       |       |       |       |       | Page 2 of 4 |
| Spot-check 1 is at: upstream end <input type="checkbox"/> downstream end <input checked="" type="checkbox"/> of site (tick one box)     |                                              |       |       |       |       |       |       |       |       |       |             |
| <b>E PHYSICAL ATTRIBUTES</b> (to be assessed across channel within 1m wide transect)                                                    |                                              |       |       |       |       |       |       |       |       |       |             |
| <b>When boxes 'bordered', only one entry allowed</b>                                                                                    | 1 GPS                                        | 2     | 3     | 4     | 5     | 6 GPS | 7     | 8     | 9     | 10    | GPS         |
| <b>LEFT BANK</b>                                                                                                                        | Ring EC or SC if composed of sandy substrate |       |       |       |       |       |       |       |       |       |             |
| <b>Material</b> NV, BE, BO, CO, GS, EA, PE, CL, CC, SP, WP, GA, BR, RR, TD, FA, BI                                                      | EA                                           | EA    | EA    | EA    | EA    | EA    | EA    | EA    | EA    | EA    |             |
| <b>Bank modification(s)</b> NK, NO, RS, RI, PC(B), BM, EM                                                                               | RS/EM                                        | RS/EM | RS/EM | RS/EM | RS/EM | RS/EM | RS/EM | RS/EM | RS/EM | RS/EM |             |
| <b>Marginal &amp; bank feature(s)</b> NV, NO, EC, SC, PB, VP, SB, VS, NB                                                                | SC                                           | SC    | SC    | SC    | SC    | NV    | NV    | SC    | SC    | SC    |             |
| <b>CHANNEL</b>                                                                                                                          | GP: ring either C or P if predominant        |       |       |       |       |       |       |       |       |       |             |
| <b>Channel substrate</b> NV, BE, BO, CO, GP, SA, SI, CL, PE, EA, AR                                                                     | CL                                           | CL    | CL    | CL    | CL    | CL    | CL    | CL    | CL    | CL    | SC          |
| <b>Flow-type</b> NV, FF, CH, BW, UW, CF, RP, UP, SM, NP, DR                                                                             | SM                                           | SM    | SM    | SM    | SM    | SM    | SM    | SM    | SM    | SM    |             |
| <b>Channel modification(s)</b> NK, NO, CV, RS, RI, DA, FO                                                                               | RS                                           | RS    | RS    | RS    | RS    | RS    | RS    | RS    | RS    | RS    |             |
| <b>Channel feature(s)</b> NV, NO, EB, RO, VR, MB, VB, MI, TR                                                                            | NO                                           | NO    | NO    | NO    | NO    | NO    | NO    | NO    | NO    | NO    |             |
| <b>For braided rivers only: number of sub-channels</b>                                                                                  |                                              |       |       |       |       |       |       |       |       |       |             |
| <b>RIGHT BANK</b>                                                                                                                       | Ring EC or SC if composed of sandy substrate |       |       |       |       |       |       |       |       |       |             |
| <b>Material</b> NV, BE, BO, CO, GS, EA, PE, CL, CC, SP, WP, GA, BR, RR, TD, FA, BI                                                      | EA                                           | EA    | EA    | EA    | EA    | EA    | EA    | EA    | EA    | EA    |             |
| <b>Bank modification(s)</b> NK, NO, RS, RI, PC(B), BM, EM                                                                               | RS/EM                                        | RS/EM | RS/EM | RS/EM | RS/EM | RS/EM | RS/EM | RS/EM | RS/EM | RS/EM |             |
| <b>Marginal &amp; bank feature(s)</b> NV, NO, EC, SC, PB, VP, SB, VS, NB                                                                | NO                                           | NO    | NO    | NO    | NO    | NO    | NO    | NO    | NO    | NO    |             |
| <b>F BANKTOP LAND-USE AND VEGETATION STRUCTURE</b> (to be assessed over a 10m wide transect)                                            |                                              |       |       |       |       |       |       |       |       |       |             |
| <b>Land-use:</b> choose one from BL, BP, CW, CP, SH, OR, WL, MH, AW, OW, RP, IG, TH, RD, SU, TL, IL, PG, NV                             |                                              |       |       |       |       |       |       |       |       |       |             |
| <b>LAND-USE WITHIN 5m OF LEFT BANKTOP</b>                                                                                               | PG                                           | PG    | PG    | PG    | PG    | PG    | PG    | PG    | PG    | PG    |             |
| <b>LEFT BANKTOP (structure within 1m)</b> B/U/S/C/NV                                                                                    | S                                            | S     | S     | S     | C     | C     | C     | C     | C     | C     |             |
| <b>LEFT BANK-FACE (structure)</b> B/U/S/C/NV                                                                                            | S                                            | S     | S     | C     | C     | S     | S     | S     | S     | S     |             |
| <b>RIGHT BANK-FACE (structure)</b> B/U/S/C/NV                                                                                           | S                                            | S     | S     | S     | C     | S     | S     | S     | S     | S     |             |
| <b>RIGHT BANKTOP (structure within 1m)</b> B/U/S/C/NV                                                                                   | S                                            | S     | S     | S     | C     | S     | C     | C     | C     | S     |             |
| <b>LAND-USE WITHIN 5m OF RIGHT BANKTOP</b>                                                                                              | RP                                           | RP    | RP    | RP    | RP    | RP    | RP    | RP    | RP    | RP    |             |
| <b>G CHANNEL VEGETATION TYPES</b> (to be assessed over a 10m wide transect: use E if $\geq 33\%$ area), ✓ (present) or NV (not visible) |                                              |       |       |       |       |       |       |       |       |       |             |
| None (✓) or Not Visible (NV)                                                                                                            |                                              |       |       |       |       |       |       |       |       |       |             |
| Liverworts/mosses/lichens                                                                                                               |                                              |       |       |       |       |       |       |       |       |       |             |
| Emergent broad-leaved herbs                                                                                                             |                                              |       |       |       |       |       |       |       |       |       |             |
| Emergent reeds/sedges/rushes/grasses/horsetails                                                                                         | /                                            | /     | /     | /     | /     | /     | /     | /     | /     | /     | E           |
| Floating-leaved (rooted)                                                                                                                |                                              |       |       |       |       |       |       |       |       |       |             |
| Free-floating                                                                                                                           |                                              |       |       |       |       |       |       |       |       |       |             |
| Amphibious                                                                                                                              | /                                            | /     | /     | /     | /     | /     | /     | /     | /     | /     | E           |
| Submerged broad-leaved                                                                                                                  |                                              |       |       |       |       |       |       |       |       |       |             |
| Submerged linear-leaved                                                                                                                 |                                              |       |       |       |       |       |       |       |       |       |             |
| Submerged fine-leaved                                                                                                                   | /                                            | /     | /     | /     | /     | /     | /     | /     | /     | /     | E           |
| Filamentous algae                                                                                                                       |                                              |       |       |       | /     | /     | /     |       |       |       | /           |
| Use end column for overall assessment over 500m, including types not occurring in spot-checks (use ✓, E or NV)                          |                                              |       |       |       |       |       |       |       |       |       |             |

Riffles: 0 Pools: 0 PB: 0 VP: 0

|                                                                                                     |                                                                                       |                                                                                                              |                                                                                       |
|-----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| SITE REF. <b>02586</b>                                                                              | <b>RIVER HABITAT SURVEY : 500m SWEEP-UP</b>                                           | Page 3 of 4                                                                                                  |                                                                                       |
| H LAND-USE WITHIN 50m OF BANK (Q1) Use ✓ (present) or E (≥ 33% banklength)                          |                                                                                       |                                                                                                              |                                                                                       |
|                                                                                                     | L R                                                                                   | L R                                                                                                          |                                                                                       |
| Broadleaf/mixed woodland (semi-natural) (BL)                                                        |                                                                                       | Natural open water (OW)                                                                                      |                                                                                       |
| Broadleaf/mixed plantation (BP)                                                                     | /                                                                                     | Rough/unimproved grassland/pasture (RP)                                                                      | E                                                                                     |
| Coniferous woodland (semi-natural) (CW)                                                             |                                                                                       | Improved/semi-improved grassland (IG)                                                                        |                                                                                       |
| Coniferous plantation (CP)                                                                          |                                                                                       | Tall herb/rank vegetation (TH)                                                                               | /                                                                                     |
| Scrub & shrubs (SH)                                                                                 | /                                                                                     | Rock, scree or sand dunes (RD)                                                                               |                                                                                       |
| Orchard (OR)                                                                                        |                                                                                       | Suburban/urban development (SU)                                                                              | E                                                                                     |
| Wetland (e.g. bog, marsh, fen) (WL)                                                                 |                                                                                       | Tilled land (TL)                                                                                             |                                                                                       |
| Moorland/heath (MH)                                                                                 |                                                                                       | Irrigated land (IL)                                                                                          |                                                                                       |
| Artificial open water (AW)                                                                          |                                                                                       | Parkland or gardens (PG)                                                                                     | E                                                                                     |
|                                                                                                     |                                                                                       | Not visible (NV)                                                                                             |                                                                                       |
| I BANK PROFILES Use ✓ (present) or E (≥ 33% banklength)                                             |                                                                                       |                                                                                                              |                                                                                       |
| <b>Natural/unmodified</b>                                                                           | L R                                                                                   | <b>Artificial/modified</b>                                                                                   | L R                                                                                   |
| Vertical/undercut  |                                                                                       | Resectioned (reprofiled)  | E E                                                                                   |
| Vertical with toe  |                                                                                       | Reinforced - whole        |                                                                                       |
| Steep (>45°)       |                                                                                       | Reinforced - top only     |                                                                                       |
| Gentle             |                                                                                       | Reinforced - toe only     |                                                                                       |
| Composite         |                                                                                       | Artificial two-stage      |                                                                                       |
| Natural berm     |                                                                                       | Poached bank            |                                                                                       |
|                                                                                                     |                                                                                       | Embanked                | E E                                                                                   |
|                                                                                                     |                                                                                       | Set-back embankment     | ✓                                                                                     |
| J EXTENT OF TREES AND ASSOCIATED FEATURES *record even if <1%                                       |                                                                                       |                                                                                                              |                                                                                       |
| TREES (tick one box per bank)                                                                       |                                                                                       | ASSOCIATED FEATURES (tick one box per feature)                                                               |                                                                                       |
|                                                                                                     | Left Right                                                                            | None Present E (≥33%)                                                                                        |                                                                                       |
| None                                                                                                | <input type="checkbox"/> <input type="checkbox"/>                                     | Shading of channel                                                                                           | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| Isolated/scattered                                                                                  | <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>               | *Overhanging boughs                                                                                          | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| Regularly spaced, single                                                                            | <input type="checkbox"/> <input type="checkbox"/>                                     | *Exposed bankside roots                                                                                      | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| Occasional clumps                                                                                   | <input type="checkbox"/> <input type="checkbox"/>                                     | *Underwater tree roots                                                                                       | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| Semi-continuous                                                                                     | <input type="checkbox"/> <input type="checkbox"/>                                     | Fallen trees                                                                                                 | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| Continuous                                                                                          | <input type="checkbox"/> <input type="checkbox"/>                                     | Large woody debris                                                                                           | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| K EXTENT OF CHANNEL AND BANK FEATURES (tick one box for each feature) *record even if <1%           |                                                                                       |                                                                                                              |                                                                                       |
|                                                                                                     | None Present E (≥33%)                                                                 | None Present E (≥33%)                                                                                        |                                                                                       |
| *Free fall flow                                                                                     | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Exposed bedrock                                                                                              | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| Chute flow                                                                                          | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Exposed boulders                                                                                             | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| Broken standing waves                                                                               | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Vegetated bedrock/boulders                                                                                   | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| Unbroken standing waves                                                                             | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Unvegetated mid-channel bar(s)                                                                               | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| Rippled flow                                                                                        | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Vegetated mid-channel bar(s)                                                                                 | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| *Upwelling                                                                                          | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Mature island(s)                                                                                             | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| Smooth flow                                                                                         | <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> | Unvegetated side bar(s)                                                                                      | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| No perceptible flow                                                                                 | <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> | Vegetated side bar(s)                                                                                        | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| No flow (dry)                                                                                       | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Unvegetated point bar(s)                                                                                     | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| Marginal deadwater                                                                                  | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Vegetated point bar(s)                                                                                       | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| Eroding cliff(s)                                                                                    | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | *Discrete unvegetated silt deposit(s)                                                                        | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| Stable cliff(s)                                                                                     | <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> | *Discrete unvegetated sand deposit(s)                                                                        | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
|                                                                                                     |                                                                                       | *Discrete unvegetated gravel deposit(s)                                                                      | <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                         |                                                                                                                                |                                                        |                                                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------|
| SITE REF. <b>02336</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>RIVER HABITAT SURVEY : DIMENSIONS AND INFLUENCES</b> |                                                                                                                                |                                                        | Page 4 of 4                                      |
| <b>L CHANNEL DIMENSIONS</b> (to be measured at one location on a straight uniform section, preferably across a riffle)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                         |                                                                                                                                |                                                        |                                                  |
| LEFT BANK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                         | CHANNEL                                                                                                                        |                                                        | RIGHT BANK                                       |
| Banktop height (m)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                         | Bankfull/top width (m)                                                                                                         |                                                        | Banktop height (m)                               |
| Is banktop height also bankfull height? (Y or N)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                         | Water width (m)                                                                                                                |                                                        | Is banktop height also bankfull height? (Y or N) |
| Embanked height (m)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                         | Water depth (m)                                                                                                                |                                                        | Embanked height (m)                              |
| If trashline lower than banktop, indicate: height above water (m) =      width from bank to bank (m) =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                         |                                                                                                                                |                                                        |                                                  |
| Bed material at site is:      consolidated <input type="checkbox"/> unconsolidated (loose) <input type="checkbox"/> unknown <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                         |                                                                                                                                |                                                        |                                                  |
| Location of measurements is: riffle <input type="checkbox"/> other <input type="checkbox"/> (state)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                         |                                                                                                                                |                                                        |                                                  |
| <b>M FEATURES OF SPECIAL INTEREST</b> Use ✓ or E (≥ 33% length) *record even if <1%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                         |                                                                                                                                |                                                        |                                                  |
| None <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Very large boulders (>1m) <input type="checkbox"/>      | Backwater(s) <input type="checkbox"/>                                                                                          | Marsh(es) <input type="checkbox"/>                     |                                                  |
| Braided channels <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | *Debris dam(s) <input type="checkbox"/>                 | Floodplain boulder deposits <input type="checkbox"/>                                                                           | Flush(es) <input type="checkbox"/>                     |                                                  |
| Side channel(s) <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | *Leafy debris <input type="checkbox"/>                  | Water meadow(s) <input type="checkbox"/>                                                                                       | Natural open water <input checked="" type="checkbox"/> |                                                  |
| *Natural waterfall(s) > 5m high <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Fringing reed-bank(s) <input type="checkbox"/>          | Fen(s) <input type="checkbox"/>                                                                                                | Others (state) <input type="checkbox"/>                |                                                  |
| *Natural waterfall(s) < 5m high <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Quaking bank(s) <input type="checkbox"/>                | Bog(s) <input type="checkbox"/>                                                                                                | <b>ADJACENT MOBS + LEVELS</b>                          |                                                  |
| Natural cascade(s) <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | *Sink hole(s) <input type="checkbox"/>                  | Wet woodland(s) <input type="checkbox"/>                                                                                       |                                                        |                                                  |
| <b>N CHOKED CHANNEL</b> (tick one box)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                         |                                                                                                                                |                                                        |                                                  |
| Is 33% or more of the channel choked with vegetation?      No <input checked="" type="checkbox"/> Yes <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                         |                                                                                                                                |                                                        |                                                  |
| <b>O NOTABLE NUISANCE PLANT SPECIES</b> Use ✓ or E (≥ 33% length) *record even if <1%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                         |                                                                                                                                |                                                        |                                                  |
| bankface      banktop to 50m      bankface      banktop to 50m                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                         |                                                                                                                                |                                                        |                                                  |
| None <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | *Giant hogweed <input type="checkbox"/>                 | *Himalayan balsam <input checked="" type="checkbox"/>                                                                          |                                                        |                                                  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | *Japanese knotweed <input type="checkbox"/>             | *Other (state)..... <input type="checkbox"/>                                                                                   |                                                        |                                                  |
| <b>P OVERALL CHARACTERISTICS</b> (Circle appropriate words, add others as necessary)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                         |                                                                                                                                |                                                        |                                                  |
| <b>Major impacts:</b> landfill - tipping - litter - sewage - pollution - drought - <u>abstraction</u> - mill - dam - road - rail - industry - <u>housing</u> - mining - quarrying - <u>overdeepening</u> - overwidening (P or E) - <u>realignment</u> - afforestation - fisheries management - silting - waterlogging - hydroelectric power<br><b>Evidence of recent management:</b> dredging - bank mowing - weed cutting - enhancement - river rehabilitation - gravel extraction - other (please specify)<br><b>Animals:</b> otter - mink - water vole - kingfisher - dipper - grey wagtail - sand martin - heron - <u>dragonflies/damselflies</u><br><b>Other significant observations:</b> if necessary use separate sheet to describe overall characteristics and relevant observations |                                                         |                                                                                                                                |                                                        |                                                  |
| <b>Q ALDERS</b> (tick one box in each of the two categories) *record even if <1%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                         |                                                                                                                                |                                                        |                                                  |
| *Alders? None <input checked="" type="checkbox"/> Present <input type="checkbox"/> Extensive <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                         | *Diseased Alders? None <input checked="" type="checkbox"/> Present <input type="checkbox"/> Extensive <input type="checkbox"/> |                                                        |                                                  |
| <b>R FIELD SURVEY QUALITY CONTROL</b> (✓ boxes to confirm checks)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                         |                                                                                                                                |                                                        |                                                  |
| Have you taken at least two photos that illustrate the general character of the site and additional photos of any weirs/ sluices and major/intermediate structures across the channel? <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                         |                                                                                                                                |                                                        |                                                  |
| Have you completed all ten spot-checks and made entries in all boxes in E & F on page 2? <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                         |                                                                                                                                |                                                        |                                                  |
| Have you completed column 11 of section G (and E if appropriate) on page 2? <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                         |                                                                                                                                |                                                        |                                                  |
| Have you recorded in section C the number of riffles, pools and point bars (even if 0) on page 1? <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                         |                                                                                                                                |                                                        |                                                  |
| Have you given an accurate (alphanumeric) grid reference for spot-checks 1, 6 and end of site (page 1)? <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                         |                                                                                                                                |                                                        |                                                  |
| Have you stated whether spot-check 1 is at the upstream or downstream end of the site (top of page 2)? <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                         |                                                                                                                                |                                                        |                                                  |
| Have you cross-checked your spot-check and sweep-up responses with the channel modification indicators given on page 2 of the spot-check key? <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                         |                                                                                                                                |                                                        |                                                  |

SEE  
SECTION 3  
1.024-31  
TO  
1.034

**A FIELD SURVEY DETAILS**Site Number: leave blank if new site 

Site Reference: 02BB

Spot-check 1 coord:

Spot-check 6 coord:

End of site coord:

Reach Reference: 02BB7

River name: RIVER PARLETT

Date 30/05/2018 Time:

Surveyor name: T CHISNALL  
M JONES

Accredited Surveyor code: M233

Is the site part of a river or an artificial channel? River ☐ Artificial ☒Are adverse conditions affecting survey? No ☒ Yes ☐

If yes, state .....

Is bed of river visible? barely or not ☐ partially ☒ ± entirely ☐Is health and safety assessment form attached? Yes ☒ No ☐Number of photographs taken: 

Photo references:

Site surveyed from: left bank ☐ right bank ☒ channel ☐☐ When options shown with 'shadow boxes', tick one box only

LEFT banks determined by facing downstream RIGHT

**B PREDOMINANT VALLEY FORM (within the horizon limit)** (tick one box only)

(tick one box only)

☐ shallow vee☐ deep vee☐ gorge☐ concave/bowl☐ asymmetrical valley☐ U-shape valley☒ no obvious valley sidesDistinct flat valley bottom? No ☐ Yes ☒ Natural terraces? No ☒ Yes ☐**C NUMBER OF RIFFLES, POOLS AND POINT BARS** (enter total number in boxes)Riffle(s)  Unvegetated point bar(s)   
Pool(s)  Vegetated point bar(s) **D ARTIFICIAL FEATURES** (indicate total number of occurrences of each category within the 500m site)

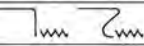







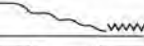


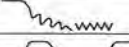


| If none, tick box | Major | Intermediate | Minor | Major                    | Intermediate | Minor |
|-------------------|-------|--------------|-------|--------------------------|--------------|-------|
| Weirs/sluices     |       |              |       | Outfalls/intakes         |              |       |
| Culverts          |       |              |       | Fords                    |              |       |
| Bridges           |       |              |       | Deflectors/groynes/croys |              |       |
| Other - state     |       |              |       |                          |              |       |

Is channel obviously realigned? No ☐ Yes, <33% of site ☐ ≥33% of site ☒  
 Is channel obviously over-deepened? No ☐ Yes, <33% of site ☐ ≥33% of site ☒  
 Is water impounded by weir/dam? No ☒ Yes, <33% of site ☐ ≥33% of site ☐



|                                                                                                                                     |                                              |       |       |       |       |       |       |       |       |       |                                                                                                                |
|-------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------------------------------------------------------------------------------------------------------------|
| SITE REF. <u>02557</u>                                                                                                              | <b>RIVER HABITAT SURVEY: TEN SPOT-CHECKS</b> |       |       |       |       |       |       |       |       |       | Page 2 of 4                                                                                                    |
| Spot-check 1 is at: upstream end <input type="checkbox"/> downstream end <input checked="" type="checkbox"/> of site (tick one box) |                                              |       |       |       |       |       |       |       |       |       |                                                                                                                |
| <b>E PHYSICAL ATTRIBUTES</b> (to be assessed across channel within 1m wide transect)                                                |                                              |       |       |       |       |       |       |       |       |       |                                                                                                                |
| <b>When boxes 'bordered', only one entry allowed</b>                                                                                | 1 GPS                                        | 2     | 3     | 4     | 5     | 6 GPS | 7     | 8     | 9     | 10    | GPS                                                                                                            |
| <b>LEFT BANK</b>                                                                                                                    | Ring EC or SC if composed of sandy substrate |       |       |       |       |       |       |       |       |       | ↑<br>Enter channel substrate(s) not occurring as predominant in spot-checks but present in > 1% of whole site. |
| <b>Material</b> NV, BE, BO, CO, GS, EA, PE, CL, CC, SP, WP, GA, BR, RR, TD, FA, BI                                                  | EA                                           | EA    | EA    | EA    | EA    | EA    | EA    | EA    | EA    | EA    |                                                                                                                |
| <b>Bank modification(s)</b> NK, NO, RS, RI, PC(B), BM, EM                                                                           | RS/EM                                        | RS/EM | RS/EM | RS/EM | RS/EM | RS/EM | RS/EM | RS/EM | RS/EM | RS/EM |                                                                                                                |
| <b>Marginal &amp; bank feature(s)</b> NV, NO, EC, SC, PB, VP, SB, VS, NB                                                            | SC                                           | SC    | SC    | SC    | NO    | NO    | NO    | NO    | NO    | NO    |                                                                                                                |
| <b>CHANNEL</b>                                                                                                                      | GP- ring either G or P if predominant        |       |       |       |       |       |       |       |       |       |                                                                                                                |
| <b>Channel substrate</b> NV, BE, BO, CO, GP, SA, SI, CL, PE, EA, AR                                                                 | CL                                           | CL    | CL    | CL    | CL    | CL    | CL    | CL    | CL    | CL    |                                                                                                                |
| <b>Flow-type</b> NV, FF, CH, BW, UW, CF, RP, UP, SM, NP, DR                                                                         | SM                                           | SM    | SM    | SM    | SM    | SM    | SM    | SM    | SM    | SM    |                                                                                                                |
| <b>Channel modification(s)</b> NK, NO, CV, RS, RI, DA, FO                                                                           | RS                                           | RS    | RS    | RS    | RS    | RS    | RS    | RS    | RS    | RS    |                                                                                                                |
| <b>Channel feature(s)</b> NV, NO, EB, RO, VR, MB, VB, MI, TR                                                                        | NO                                           | NO    | NO    | NO    | NO    | NO    | NO    | NO    | NO    | NO    |                                                                                                                |
| <b>For braided rivers only: number of sub-channels</b>                                                                              |                                              |       |       |       |       |       |       |       |       |       |                                                                                                                |
| <b>RIGHT BANK</b>                                                                                                                   | Ring EC or SC if composed of sandy substrate |       |       |       |       |       |       |       |       |       |                                                                                                                |
| <b>Material</b> NV, BE, BO, CO, GS, EA, PE, CL, CC, SP, WP, GA, BR, RR, TD, FA, BI                                                  | EA                                           | EA    | EA    | EA    | EA    | EA    | EA    | EA    | EA    | EA    |                                                                                                                |
| <b>Bank modification(s)</b> NK, NO, RS, RI, PC(B), BM, EM                                                                           | RS/EM                                        | RS/EM | RS/EM | RS/EM | RS/EM | RS/EM | RS/EM | RS/EM | RS/EM | RS/EM |                                                                                                                |
| <b>Marginal &amp; bank feature(s)</b> NV, NO, EC, SC, PB, VP, SB, VS, NB                                                            | NO                                           | NO    | NO    | NO    | NO    | NO    | SB    | NO    | NO    | NO    |                                                                                                                |
| <b>F BANKTOP LAND-USE AND VEGETATION STRUCTURE</b> (to be assessed over a 10m wide transect)                                        |                                              |       |       |       |       |       |       |       |       |       |                                                                                                                |
| <b>Land-use:</b> choose one from BL, BP, CW, CP, SH, OR, WL, MH, AW, OW, RP, IG, TH, RD, SU, TL, IL, PG, NV                         |                                              |       |       |       |       |       |       |       |       |       |                                                                                                                |
| <b>LAND-USE WITHIN 5m OF LEFT BANKTOP</b>                                                                                           | BP                                           | BP    | BP    | BP    | BP    | BP    | BP    | BP    | BP    | BP    |                                                                                                                |
| <b>LEFT BANKTOP (structure within 1m)</b> B/U/S/C/NV                                                                                | C                                            | C     | C     | C     | C     | C     | C     | C     | C     | C     |                                                                                                                |
| <b>LEFT BANK-FACE (structure)</b> B/U/S/C/NV                                                                                        | U                                            | U     | S     | S     | S     | S     | S     | C     | C     | S     |                                                                                                                |
| <b>RIGHT BANK-FACE (structure)</b> B/U/S/C/NV                                                                                       | S                                            | S     | S     | S     | S     | S     | S     | C     | S     | S     |                                                                                                                |
| <b>RIGHT BANKTOP (structure within 1m)</b> B/U/S/C/NV                                                                               | U                                            | U     | S     | S     | S     | S     | S     | S     | S     | S     |                                                                                                                |
| <b>LAND-USE WITHIN 5m OF RIGHT BANKTOP</b>                                                                                          | RP                                           | RP    | RP    | RP    | RP    | RP    | RP    | RP    | RP    | RP    |                                                                                                                |
| <b>G CHANNEL VEGETATION TYPES</b> (to be assessed over a 10m wide transect (use LI ≥ 33% area), ✓ (present) or NV (not visible))    |                                              |       |       |       |       |       |       |       |       |       |                                                                                                                |
| None (✓) or Not Visible (NV)                                                                                                        |                                              |       |       |       |       |       |       |       |       |       |                                                                                                                |
| Liverworts/mosses/lichens                                                                                                           |                                              |       |       |       |       |       |       |       |       |       |                                                                                                                |
| Emergent broad-leaved herbs                                                                                                         | ✓                                            | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     |                                                                                                                |
| Emergent reeds/sedges/rushes/grasses/horsetails                                                                                     |                                              |       |       |       |       |       |       |       |       |       |                                                                                                                |
| Floating-leaved (rooted)                                                                                                            |                                              |       |       |       |       |       |       |       |       |       |                                                                                                                |
| Free-floating                                                                                                                       |                                              |       |       |       |       |       |       |       |       |       |                                                                                                                |
| Amphibious                                                                                                                          | ✓                                            |       |       | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     |                                                                                                                |
| Submerged broad-leaved                                                                                                              |                                              |       |       |       |       |       |       |       |       |       |                                                                                                                |
| Submerged linear-leaved                                                                                                             | ✓                                            | ✓     | ✓     |       | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     |                                                                                                                |
| Submerged fine-leaved                                                                                                               |                                              |       |       |       |       |       |       |       |       |       |                                                                                                                |
| Filamentous algae                                                                                                                   |                                              | ✓     |       |       |       |       |       |       |       |       |                                                                                                                |
| Use end column for overall assessment over 500m, including types not occurring in spot-checks (use ✓, E or NV)                      |                                              |       |       |       |       |       |       |       |       |       |                                                                                                                |

Riffles: 0 Pools: 0 PB: 0 VP: 0

|                                                                                                     |                                             |                                     |                                                                                                              |                                         |                                     |                                     |                          |
|-----------------------------------------------------------------------------------------------------|---------------------------------------------|-------------------------------------|--------------------------------------------------------------------------------------------------------------|-----------------------------------------|-------------------------------------|-------------------------------------|--------------------------|
| SITE REF. <b>02337</b>                                                                              | <b>RIVER HABITAT SURVEY : 500m SWEEP-UP</b> |                                     | Page 3 of 4                                                                                                  |                                         |                                     |                                     |                          |
| H LAND-USE WITHIN 50m OF BANKTOP Use ✓ (present) or E (≥ 33% banklength)                            |                                             |                                     |                                                                                                              |                                         |                                     |                                     |                          |
|                                                                                                     | L                                           | R                                   |                                                                                                              | L                                       | R                                   |                                     |                          |
| Broadleaf/mixed woodland (semi-natural) (BL)                                                        | ✓                                           |                                     | Natural open water (OW)                                                                                      |                                         | ✓                                   |                                     |                          |
| Broadleaf/mixed plantation (BP)                                                                     | ✓                                           |                                     | Rough/unimproved grassland/pasture (RP)                                                                      |                                         | E                                   |                                     |                          |
| Coniferous woodland (semi-natural) (CW)                                                             |                                             |                                     | Improved/semi-improved grassland (IG)                                                                        | ✓                                       |                                     |                                     |                          |
| Coniferous plantation (CP)                                                                          |                                             |                                     | Tall herb/rank vegetation (TH)                                                                               |                                         | ✓                                   |                                     |                          |
| Scrub & shrubs (SH)                                                                                 | ✓                                           |                                     | Rock, scree or sand dunes (RD)                                                                               |                                         |                                     |                                     |                          |
| Orchard (OR)                                                                                        |                                             |                                     | Suburban/urban development (SU)                                                                              |                                         |                                     |                                     |                          |
| Wetland (e.g. bog, marsh, fen) (WL)                                                                 |                                             |                                     | Tilled land (TL)                                                                                             |                                         |                                     |                                     |                          |
| Moorland/heath (MH)                                                                                 |                                             |                                     | Irrigated land (IL)                                                                                          |                                         |                                     |                                     |                          |
| Artificial open water (AW)                                                                          |                                             |                                     | Parkland or gardens (PG)                                                                                     | ✓                                       |                                     |                                     |                          |
|                                                                                                     |                                             |                                     | Not visible (NV)                                                                                             |                                         |                                     |                                     |                          |
| I BANK PROFILES Use ✓ (present) or E (≥ 33% banklength)                                             |                                             |                                     |                                                                                                              |                                         |                                     |                                     |                          |
| <b>Natural/unmodified</b>                                                                           | L                                           | R                                   | <b>Artificial/modified</b>                                                                                   | L                                       | R                                   |                                     |                          |
| Vertical/undercut  |                                             |                                     | Resectioned (reprofiled)  | E                                       | E                                   |                                     |                          |
| Vertical with toe  |                                             |                                     | Reinforced - whole        |                                         |                                     |                                     |                          |
| Steep (>45°)       |                                             |                                     | Reinforced - top only     |                                         |                                     |                                     |                          |
| Gentle             |                                             |                                     | Reinforced - toe only     |                                         |                                     |                                     |                          |
| Composite         |                                             |                                     | Artificial two-stage     |                                         |                                     |                                     |                          |
| Natural berm     |                                             |                                     | Poached bank            |                                         |                                     |                                     |                          |
|                                                                                                     |                                             |                                     | Embanked                | E                                       | E                                   |                                     |                          |
|                                                                                                     |                                             |                                     | Set-back embankment     |                                         | ✓                                   |                                     |                          |
| J EXTENT OF TREES AND ASSOCIATED FEATURES *record even if < 1%                                      |                                             |                                     |                                                                                                              |                                         |                                     |                                     |                          |
| <b>TREES</b> (tick one box per bank)                                                                |                                             |                                     | <b>ASSOCIATED FEATURES</b> (tick one box per feature)                                                        |                                         |                                     |                                     |                          |
|                                                                                                     | Left                                        | Right                               |                                                                                                              | None                                    | Present                             | E (≥33%)                            |                          |
| None                                                                                                | <input type="checkbox"/>                    | <input type="checkbox"/>            | Shading of channel                                                                                           | <input checked="" type="checkbox"/>     | <input type="checkbox"/>            | <input type="checkbox"/>            |                          |
| Isolated/scattered                                                                                  | <input checked="" type="checkbox"/>         | <input checked="" type="checkbox"/> | *Overhanging boughs                                                                                          | <input checked="" type="checkbox"/>     | <input type="checkbox"/>            | <input type="checkbox"/>            |                          |
| Regularly spaced, single                                                                            | <input type="checkbox"/>                    | <input type="checkbox"/>            | *Exposed bankside roots                                                                                      | <input checked="" type="checkbox"/>     | <input type="checkbox"/>            | <input type="checkbox"/>            |                          |
| Occasional clumps                                                                                   | <input type="checkbox"/>                    | <input type="checkbox"/>            | *Underwater tree roots                                                                                       | <input checked="" type="checkbox"/>     | <input type="checkbox"/>            | <input type="checkbox"/>            |                          |
| Semi-continuous                                                                                     | <input type="checkbox"/>                    | <input type="checkbox"/>            | Fallen trees                                                                                                 | <input checked="" type="checkbox"/>     | <input type="checkbox"/>            | <input type="checkbox"/>            |                          |
| Continuous                                                                                          | <input type="checkbox"/>                    | <input type="checkbox"/>            | Large woody debris                                                                                           | <input checked="" type="checkbox"/>     | <input type="checkbox"/>            | <input type="checkbox"/>            |                          |
| K EXTENT OF CHANNEL AND BANK FEATURES (tick one box for each feature) *record even if < 1%          |                                             |                                     |                                                                                                              |                                         |                                     |                                     |                          |
|                                                                                                     | None                                        | Present                             | E (≥33%)                                                                                                     |                                         | None                                | Present                             | E (≥33%)                 |
| *Free fall flow                                                                                     | <input checked="" type="checkbox"/>         | <input type="checkbox"/>            | <input type="checkbox"/>                                                                                     | Exposed bedrock                         | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> |
| Chute flow                                                                                          | <input checked="" type="checkbox"/>         | <input type="checkbox"/>            | <input type="checkbox"/>                                                                                     | Exposed boulders                        | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> |
| Broken standing waves                                                                               | <input checked="" type="checkbox"/>         | <input type="checkbox"/>            | <input type="checkbox"/>                                                                                     | Vegetated bedrock/boulders              | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> |
| Unbroken standing waves                                                                             | <input checked="" type="checkbox"/>         | <input type="checkbox"/>            | <input type="checkbox"/>                                                                                     | Unvegetated mid-channel bar(s)          | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> |
| Rippled flow                                                                                        | <input checked="" type="checkbox"/>         | <input type="checkbox"/>            | <input type="checkbox"/>                                                                                     | Vegetated mid-channel bar(s)            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> |
| *Upwelling                                                                                          | <input checked="" type="checkbox"/>         | <input type="checkbox"/>            | <input type="checkbox"/>                                                                                     | Mature island(s)                        | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> |
| Smooth flow                                                                                         | <input type="checkbox"/>                    | <input type="checkbox"/>            | <input checked="" type="checkbox"/>                                                                          | Unvegetated side bar(s)                 | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> |
| No perceptible flow                                                                                 | <input type="checkbox"/>                    | <input checked="" type="checkbox"/> | <input type="checkbox"/>                                                                                     | Vegetated side bar(s)                   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> |
| No flow (dry)                                                                                       | <input checked="" type="checkbox"/>         | <input type="checkbox"/>            | <input type="checkbox"/>                                                                                     | Unvegetated point bar(s)                | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> |
| Marginal deadwater                                                                                  | <input checked="" type="checkbox"/>         | <input type="checkbox"/>            | <input type="checkbox"/>                                                                                     | Vegetated point bar(s)                  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> |
| Eroding cliff(s)                                                                                    | <input type="checkbox"/>                    | <input checked="" type="checkbox"/> | <input type="checkbox"/>                                                                                     | *Discrete unvegetated silt deposit(s)   | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Stable cliff(s)                                                                                     | <input type="checkbox"/>                    | <input checked="" type="checkbox"/> | <input type="checkbox"/>                                                                                     | *Discrete unvegetated sand deposit(s)   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> |
|                                                                                                     |                                             |                                     |                                                                                                              | *Discrete unvegetated gravel deposit(s) | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                         |                                                                                                                                |                                                        |             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|-------------|
| SITE REF. <b>02637</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>RIVER HABITAT SURVEY : DIMENSIONS AND INFLUENCES</b> |                                                                                                                                |                                                        | Page 4 of 4 |
| <b>L CHANNEL DIMENSIONS</b> (to be measured at one location on a straight uniform section, preferably across a riffle)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                         |                                                                                                                                |                                                        |             |
| LEFT BANK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | CHANNEL                                                 | RIGHT BANK                                                                                                                     |                                                        |             |
| Banktop height (m)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Bankfull/top width (m)                                  | Banktop height (m)                                                                                                             |                                                        |             |
| Is banktop height also bankfull height? (Y or N)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Water width (m)                                         | Is banktop height also bankfull height? (Y or N)                                                                               |                                                        |             |
| Embanked height (m)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Water depth (m)                                         | Embanked height (m)                                                                                                            |                                                        |             |
| If trashline lower than banktop, indicate: height above water (m) =      width from bank to bank (m) =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                         |                                                                                                                                |                                                        |             |
| Bed material at site is:      consolidated <input type="checkbox"/> unconsolidated (loose) <input type="checkbox"/> unknown <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                         |                                                                                                                                |                                                        |             |
| Location of measurements is: riffle <input type="checkbox"/> other <input type="checkbox"/> (state)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                         |                                                                                                                                |                                                        |             |
| <b>M FEATURES OF SPECIAL INTEREST</b> Use ✓ or E (≥ 33% length) *record even if < 1%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                         |                                                                                                                                |                                                        |             |
| None <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Very large boulders (>1m) <input type="checkbox"/>      | Backwater(s) <input type="checkbox"/>                                                                                          | Marsh(es) <input type="checkbox"/>                     |             |
| Braided channels <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | *Debris dam(s) <input type="checkbox"/>                 | Floodplain boulder deposits <input type="checkbox"/>                                                                           | Flush(es) <input type="checkbox"/>                     |             |
| Side channel(s) <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | *Leafy debris <input type="checkbox"/>                  | Water meadow(s) <input type="checkbox"/>                                                                                       | Natural open water <input checked="" type="checkbox"/> |             |
| *Natural waterfall(s) > 5m high <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Fringing reed-bank(s) <input type="checkbox"/>          | Fen(s) <input type="checkbox"/>                                                                                                | Others (state) <input type="checkbox"/>                |             |
| *Natural waterfall(s) < 5m high <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Quaking bank(s) <input type="checkbox"/>                | Bog(s) <input type="checkbox"/>                                                                                                | <b>ADJACENT MOORS &amp; LEVELS</b>                     |             |
| Natural cascade(s) <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | *Sink hole(s) <input type="checkbox"/>                  | Wet woodland(s) <input type="checkbox"/>                                                                                       |                                                        |             |
| <b>N CHOKED CHANNEL</b> (tick one box)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                         |                                                                                                                                |                                                        |             |
| Is 33% or more of the channel choked with vegetation?      No <input checked="" type="checkbox"/> Yes <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                         |                                                                                                                                |                                                        |             |
| <b>O NOTABLE NUISANCE PLANT SPECIES</b> Use ✓ or E (≥ 33% length) *record even if < 1%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                         |                                                                                                                                |                                                        |             |
| bankface      banktop to 50m      bankface      banktop to 50m                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                         |                                                                                                                                |                                                        |             |
| None <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | *Giant hogweed <input type="checkbox"/>                 | *Himalayan balsam <input checked="" type="checkbox"/>                                                                          | <input checked="" type="checkbox"/>                    |             |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | *Japanese knotweed <input type="checkbox"/>             | *Other (state)..... <input type="checkbox"/>                                                                                   | <input type="checkbox"/>                               |             |
| <b>P OVERALL CHARACTERISTICS</b> (Circle appropriate words, add others as necessary)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                         |                                                                                                                                |                                                        |             |
| <b>Major impacts:</b> landfill - tipping - litter - sewage - pollution - drought - abstraction - mill - dam - road - rail - industry - <u>housing</u> - mining - quarrying - <u>overdeepening</u> - overwidening (P or E) - <u>realignment</u> - afforestation - fisheries management - silting - waterlogging - hydroelectric power<br><b>Evidence of recent management:</b> dredging - bank mowing - weed cutting - enhancement - river rehabilitation - gravel extraction - other (please specify)<br><b>Animals:</b> otter - mink - water vole - kingfisher - dipper - grey wagtail - sand martin - <u>heron</u> - <u>dragonflies/damselflies</u><br><b>Other significant observations:</b> if necessary use separate sheet to describe overall characteristics and relevant observations |                                                         |                                                                                                                                |                                                        |             |
| <b>Q ALDERS</b> (tick one box in each of the two categories) *record even if < 1%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                         |                                                                                                                                |                                                        |             |
| *Alders? None <input checked="" type="checkbox"/> Present <input type="checkbox"/> Extensive <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                         | *Diseased Alders? None <input checked="" type="checkbox"/> Present <input type="checkbox"/> Extensive <input type="checkbox"/> |                                                        |             |
| <b>R FIELD SURVEY QUALITY CONTROL</b> (✓ boxes to confirm checks)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                         |                                                                                                                                |                                                        |             |
| Have you taken at least two photos that illustrate the general character of the site and additional photos of any weirs/ sluices and major/intermediate structures across the channel? <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                         |                                                                                                                                |                                                        |             |
| Have you completed all ten spot-checks and made entries in all boxes in E & F on page 2? <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                         |                                                                                                                                |                                                        |             |
| Have you completed column 11 of section G (and E if appropriate) on page 2? <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                         |                                                                                                                                |                                                        |             |
| Have you recorded in section C the number of riffles, pools and point bars (even if 0) on page 1? <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                         |                                                                                                                                |                                                        |             |
| Have you given an accurate (alphanumeric) grid reference for spot-checks 1, 6 and end of site (page 1)? <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                         |                                                                                                                                |                                                        |             |
| Have you stated whether spot-check 1 is at the upstream or downstream end of the site (top of page 2)? <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                         |                                                                                                                                |                                                        |             |
| Have you cross-checked your spot-check and sweep-up responses with the channel modification indicators given on page 2 of the spot-check key? <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                         |                                                                                                                                |                                                        |             |

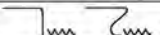




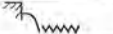

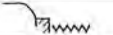



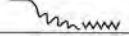

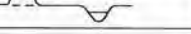
SEE  
SECTIONS  
1.034-35  
TO  
1.039

| RIVER HABITAT SURVEY 2003 Version                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |               |              |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |              | Page 1 of 4 |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-------------|--|
| <b>A FIELD SURVEY DETAILS</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |               |              |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |              |             |  |
| <p>Site Number: <small>leave blank if new site</small> <span style="border: 1px solid black; padding: 2px 10px;">8</span></p> <p>Site Reference: <span style="border: 1px solid black; padding: 2px 10px;">0288</span></p> <p>Spot-check 1 coord:</p> <p>Spot-check 6 coord:</p> <p>End of site coord:</p> <p>Reach Reference: <span style="border: 1px solid black; padding: 2px 10px;">02888</span></p> <p>River name: <span style="border: 1px solid black; padding: 2px 10px;">River Parret</span></p> <p>Date <span style="border: 1px solid black; padding: 2px 10px;">30/05/2018</span> Time:</p> <p>Surveyor name: <span style="border: 1px solid black; padding: 2px 10px;">T CHISNALL</span></p> <p>Accredited Surveyor code: <span style="border: 1px solid black; padding: 2px 10px;">MN3</span></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |               |              |       | <p>Is the site part of a river or an artificial channel? River <input type="checkbox"/> Artificial <input checked="" type="checkbox"/></p> <p>Are adverse conditions affecting survey? No <input checked="" type="checkbox"/> Yes <input type="checkbox"/></p> <p>If yes, state .....</p> <p>Is bed of river visible? barely or not <input type="checkbox"/> partially <input checked="" type="checkbox"/> ± entirely <input type="checkbox"/></p> <p>Is health and safety assessment form attached? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>Number of photographs taken: <span style="border: 1px solid black; padding: 2px 10px;"> </span></p> <p>Photo references:</p> <p>Site surveyed from: left bank <input type="checkbox"/> right bank <input checked="" type="checkbox"/> channel <input type="checkbox"/></p> |              |             |  |
| <input type="checkbox"/> When options shown with 'shadow boxes', tick one box only                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |               |              |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |              |             |  |
| LEFT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |               |              |       | RIGHT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |              |             |  |
| <b>B PREDOMINANT VALLEY FORM (within the horizon limit) (tick one box only)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |               |              |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |              |             |  |
| <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>(tick one box only)</p> <div style="display: flex; align-items: center; margin-bottom: 10px;"> <input type="checkbox"/> shallow vee         </div> <div style="display: flex; align-items: center; margin-bottom: 10px;"> <input type="checkbox"/> deep vee         </div> <div style="display: flex; align-items: center;"> <input type="checkbox"/> gorge         </div> </div> <div style="width: 45%;"> <div style="display: flex; align-items: center; margin-bottom: 10px;"> <input type="checkbox"/> concave/bowl         </div> <div style="display: flex; align-items: center; margin-bottom: 10px;"> <input type="checkbox"/> asymmetrical valley         </div> <div style="display: flex; align-items: center; margin-bottom: 10px;"> <input type="checkbox"/> U-shape valley         </div> <div style="display: flex; align-items: center;"> <input checked="" type="checkbox"/> no obvious valley sides         </div> </div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div>Distinct flat valley bottom? No <input type="checkbox"/> Yes <input checked="" type="checkbox"/></div> <div>Natural terraces? No <input type="checkbox"/> Yes <input type="checkbox"/></div> </div> |               |              |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |              |             |  |
| <b>C NUMBER OF RIFFLES, POOLS AND POINT BARS (enter total number in boxes)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |               |              |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |              |             |  |
| Riffle(s) <span style="border: 1px solid black; padding: 2px 10px;">0</span>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |               |              |       | Unvegetated point bar(s) <span style="border: 1px solid black; padding: 2px 10px;">0</span>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |             |  |
| Pool(s) <span style="border: 1px solid black; padding: 2px 10px;">0</span>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |               |              |       | Vegetated point bar(s) <span style="border: 1px solid black; padding: 2px 10px;">0</span>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |              |             |  |
| <b>D ARTIFICIAL FEATURES (indicate total number of occurrences of each category within the 500m site)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |               |              |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |              |             |  |
| If none, tick box <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Major         | Intermediate | Minor | Major                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Intermediate | Minor       |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Weirs/slues   | 1            |       | Outfalls/intakes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |              |             |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Culverts      |              |       | Fords                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |              |             |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Bridges       |              |       | Deflectors/groynes/croys                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |              |             |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Other - state |              |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |              |             |  |
| <div style="display: flex; justify-content: space-between;"> <div> <p>Is channel obviously realigned? No <input type="checkbox"/> Yes, &lt;33% of site <input type="checkbox"/> ≥33% of site <input checked="" type="checkbox"/></p> <p>Is channel obviously over-deepened? No <input type="checkbox"/> Yes, &lt;33% of site <input type="checkbox"/> ≥33% of site <input checked="" type="checkbox"/></p> <p>Is water impounded by weir/dam? No <input type="checkbox"/> Yes, &lt;33% of site <input checked="" type="checkbox"/> ≥33% of site <input type="checkbox"/></p> </div> </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |               |              |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |              |             |  |



|                                                                                                                                     |                                              |    |    |    |    |       |    |    |    |    |             |
|-------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|----|----|----|----|-------|----|----|----|----|-------------|
| SITE REF. <b>02088</b>                                                                                                              | <b>RIVER HABITAT SURVEY: TEN SPOT-CHECKS</b> |    |    |    |    |       |    |    |    |    | Page 2 of 4 |
| Spot-check 1 is at: upstream end <input type="checkbox"/> downstream end <input checked="" type="checkbox"/> of site (tick one box) |                                              |    |    |    |    |       |    |    |    |    |             |
| <b>E PHYSICAL ATTRIBUTES</b> (to be assessed across channel within 1m wide transect)                                                |                                              |    |    |    |    |       |    |    |    |    |             |
| <b>When boxes 'bordered', only one entry allowed</b>                                                                                |                                              |    |    |    |    |       |    |    |    |    |             |
|                                                                                                                                     | 1 GPS                                        | 2  | 3  | 4  | 5  | 6 GPS | 7  | 8  | 9  | 10 | GPS         |
| <b>LEFT BANK</b>                                                                                                                    | Ring EC or SC if composed of sandy substrate |    |    |    |    |       |    |    |    |    |             |
| <b>Material</b> NV, BE, BO, CO, GS, EA, PE, CL, CC, SP, WP, GA, BR, RR, TD, FA, BI                                                  | EA                                           | EA | EA | EA | EA | EA    | EA | EA | EA | EA | EA          |
| <b>Bank modification(s)</b> NK, NO, RS, RI, PC(B), BM, EM                                                                           | RS                                           | RS | RS | RS | RS | RS    | RS | RS | RS | RS | RS          |
| <b>Marginal &amp; bank feature(s)</b> NV, NO, EC, SC, PB, VP, SB, VS, NB                                                            | NV                                           | NV | EC | EC | EC | EC    | EC | SC | SC | SC | SC          |
| <b>CHANNEL</b>                                                                                                                      | GP- ring either G or P if predominant        |    |    |    |    |       |    |    |    |    |             |
| <b>Channel substrate</b> NV, BE, BO, CO, GP, SA, SI, CL, PE, EA, AR                                                                 | CL                                           | CL | CL | CL | CL | CL    | CL | CL | CL | CL | SI          |
| <b>Flow-type</b> NV, FF, CH, BW, UW, CF, RP, UP, SM, NP, DR                                                                         | SM                                           | SM | SM | SM | SM | SM    | SM | SM | SM | SM | SM          |
| <b>Channel modification(s)</b> NK, NO, CV, RS, RI, DA, FO                                                                           | RS                                           | RS | RS | RS | RS | RS    | RS | RS | RS | RS | RS          |
| <b>Channel feature(s)</b> NV, NO, EB, RO, VR, MB, VB, MI, TR                                                                        | NV                                           | NV | NO | NO | NO | NO    | NO | NO | NO | NO | NO          |
| <b>For braided rivers only: number of sub-channels</b>                                                                              |                                              |    |    |    |    |       |    |    |    |    |             |
| <b>RIGHT BANK</b>                                                                                                                   | Ring EC or SC if composed of sandy substrate |    |    |    |    |       |    |    |    |    |             |
| <b>Material</b> NV, BE, BO, CO, GS, EA, PE, CL, CC, SP, WP, GA, BR, RR, TD, FA, BI                                                  | EA                                           | EA | EA | EA | EA | EA    | EA | EA | EA | EA | EA          |
| <b>Bank modification(s)</b> NK, NO, RS, RI, PC(B), BM, EM                                                                           | RS                                           | RS | RS | RS | RS | RS    | RS | RS | RS | RS | RS          |
| <b>Marginal &amp; bank feature(s)</b> NV, NO, EC, SC, PB, VP, SB, VS, NB                                                            | NO                                           | NO | NO | NV | NV | NO    | NO | NO | NO | NO | NO          |
| <b>F BANKTOP LAND-USE AND VEGETATION STRUCTURE</b> (to be assessed over a 10m wide transect)                                        |                                              |    |    |    |    |       |    |    |    |    |             |
| <b>Land-use:</b> choose one from BL, BP, CW, CP, SH, OR, WL, MH, AW, OW, RP, IG, TH, RD, SU, TL, IL, PG, NV                         |                                              |    |    |    |    |       |    |    |    |    |             |
| <b>LAND-USE WITHIN 5m OF LEFT BANKTOP</b>                                                                                           | IG                                           | IG | IG | IG | SU | SU    | SU | SU | SU | SU | SU          |
| <b>LEFT BANKTOP (structure within 1m)</b> B/U/S/C/NV                                                                                | S                                            | U  | U  | U  | U  | U     | U  | S  | S  | S  | S           |
| <b>LEFT BANK-FACE (structure)</b> B/U/S/C/NV                                                                                        | NV                                           | U  | S  | S  | S  | S     | S  | S  | S  | S  | S           |
| <b>RIGHT BANK-FACE (structure)</b> B/U/S/C/NV                                                                                       | C                                            | NV | S  | S  | S  | S     | S  | C  | S  | S  | S           |
| <b>RIGHT BANKTOP (structure within 1m)</b> B/U/S/C/NV                                                                               | S                                            | S  | U  | U  | U  | U     | U  | S  | S  | S  | S           |
| <b>LAND-USE WITHIN 5m OF RIGHT BANKTOP</b>                                                                                          | RP                                           | RP | RP | RP | RP | RP    | RP | RP | RP | RP | RP          |
| <b>G CHANNEL VEGETATION TYPES</b> (to be assessed over a 10m wide transect; use E = 33% area, ✓ (present) or NV (not visible))      |                                              |    |    |    |    |       |    |    |    |    |             |
| None (✓) or Not Visible (NV)                                                                                                        |                                              |    |    |    |    |       |    |    |    |    |             |
| Liverworts/mosses/lichens                                                                                                           |                                              |    |    |    |    |       |    |    |    |    | ✓           |
| Emergent broad-leaved herbs                                                                                                         | ✓                                            |    | ✓  |    | ✓  | ✓     | ✓  | ✓  | ✓  | ✓  | E           |
| Emergent reeds/sedges/rushes/grasses/horsetails                                                                                     |                                              |    |    |    |    |       |    |    |    |    |             |
| Floating-leaved (rooted)                                                                                                            |                                              |    |    |    |    |       |    |    |    |    |             |
| Free-floating                                                                                                                       |                                              |    |    |    |    |       |    |    |    |    |             |
| Amphibious                                                                                                                          | ✓                                            |    | ✓  | ✓  | ✓  | ✓     | ✓  | ✓  | ✓  | ✓  | E           |
| Submerged broad-leaved                                                                                                              |                                              |    |    |    |    |       |    |    |    |    |             |
| Submerged linear-leaved                                                                                                             |                                              |    |    |    |    |       |    |    |    |    |             |
| Submerged fine-leaved                                                                                                               | ✓                                            |    | ✓  |    | ✓  |       | ✓  |    | ✓  |    | ✓           |
| Filamentous algae                                                                                                                   | ✓                                            |    |    |    | ✓  | ✓     |    | ✓  |    |    | ✓           |
| Use end column for overall assessment over 500m, including types not occurring in spot-checks (use ✓, E or NV)                      |                                              |    |    |    |    |       |    |    |    |    |             |

Riffles: 0 Pools: 0 PB: 0 VP: 0

|                                                                                                     |                                             |                                     |                                                                                                              |                                         |                                     |                                     |                          |
|-----------------------------------------------------------------------------------------------------|---------------------------------------------|-------------------------------------|--------------------------------------------------------------------------------------------------------------|-----------------------------------------|-------------------------------------|-------------------------------------|--------------------------|
| SITE REF. <b>07358</b>                                                                              | <b>RIVER HABITAT SURVEY : 500m SWEEP-UP</b> |                                     |                                                                                                              |                                         | Page 3 of 4                         |                                     |                          |
| H LAND-USE WITHIN 50m OF BANKTOP Use ✓ (present) or E (≥ 33% banklength)                            |                                             |                                     |                                                                                                              |                                         |                                     |                                     |                          |
|                                                                                                     | L                                           | R                                   |                                                                                                              | L                                       | R                                   |                                     |                          |
| Broadleaf/mixed woodland (semi-natural) (BL)                                                        |                                             |                                     | Natural open water (OW)                                                                                      |                                         |                                     | ✓                                   |                          |
| Broadleaf/mixed plantation (BP)                                                                     |                                             |                                     | Rough/unimproved grassland/pasture (RP)                                                                      |                                         |                                     | E                                   |                          |
| Coniferous woodland (semi-natural) (CW)                                                             |                                             |                                     | Improved/semi-improved grassland (IG)                                                                        | E                                       |                                     |                                     |                          |
| Coniferous plantation (CP)                                                                          |                                             |                                     | Tall herb/rank vegetation (TH)                                                                               |                                         |                                     |                                     |                          |
| Scrub & shrubs (SH)                                                                                 | ✓                                           |                                     | Rock, scree or sand dunes (RD)                                                                               |                                         |                                     |                                     |                          |
| Orchard (OR)                                                                                        |                                             |                                     | Suburban/urban development (SU)                                                                              | E                                       |                                     |                                     |                          |
| Wetland (e.g. bog, marsh, fen) (WL)                                                                 |                                             |                                     | Tilled land (TL)                                                                                             |                                         |                                     |                                     |                          |
| Moorland/heath (MH)                                                                                 |                                             |                                     | Irrigated land (IL)                                                                                          |                                         |                                     |                                     |                          |
| Artificial open water (AW)                                                                          |                                             |                                     | Parkland or gardens (PG)                                                                                     |                                         |                                     | ✓                                   |                          |
|                                                                                                     |                                             |                                     | Not visible (NV)                                                                                             |                                         |                                     |                                     |                          |
| I BANK PROFILES Use ✓ (present) or E (≥ 33% banklength)                                             |                                             |                                     |                                                                                                              |                                         |                                     |                                     |                          |
| <b>Natural/unmodified</b>                                                                           | L                                           | R                                   | <b>Artificial/modified</b>                                                                                   | L                                       | R                                   |                                     |                          |
| Vertical/undercut  |                                             |                                     | Resectioned (reprofiled)  | E                                       | E                                   |                                     |                          |
| Vertical with toe  |                                             |                                     | Reinforced - whole        | ✓                                       | ✓                                   |                                     |                          |
| Steep (>45°)       |                                             |                                     | Reinforced - top only     |                                         |                                     |                                     |                          |
| Gentle             |                                             |                                     | Reinforced - toe only     |                                         |                                     |                                     |                          |
| Composite         |                                             |                                     | Artificial two-stage      |                                         |                                     |                                     |                          |
| Natural berm     |                                             |                                     | Poached bank            |                                         |                                     |                                     |                          |
|                                                                                                     |                                             |                                     | Embanked                | E                                       | E                                   |                                     |                          |
|                                                                                                     |                                             |                                     | Set-back embankment     |                                         |                                     | ✓                                   |                          |
| J EXTENT OF TREES AND ASSOCIATED FEATURES *record even if <1%                                       |                                             |                                     |                                                                                                              |                                         |                                     |                                     |                          |
| <b>TREES</b> (tick one box per bank)                                                                |                                             |                                     | <b>ASSOCIATED FEATURES</b> (tick one box per feature)                                                        |                                         |                                     |                                     |                          |
|                                                                                                     | Left                                        | Right                               |                                                                                                              | None                                    | Present                             | E (≥33%)                            |                          |
| None                                                                                                | <input type="checkbox"/>                    | <input type="checkbox"/>            | Shading of channel                                                                                           | <input checked="" type="checkbox"/>     | <input type="checkbox"/>            | <input type="checkbox"/>            |                          |
| Isolated/scattered                                                                                  | <input checked="" type="checkbox"/>         | <input checked="" type="checkbox"/> | *Overhanging boughs                                                                                          | <input checked="" type="checkbox"/>     | <input type="checkbox"/>            | <input type="checkbox"/>            |                          |
| Regularly spaced, single                                                                            | <input type="checkbox"/>                    | <input type="checkbox"/>            | *Exposed bankside roots                                                                                      | <input checked="" type="checkbox"/>     | <input type="checkbox"/>            | <input type="checkbox"/>            |                          |
| Occasional clumps                                                                                   | <input type="checkbox"/>                    | <input type="checkbox"/>            | *Underwater tree roots                                                                                       | <input checked="" type="checkbox"/>     | <input type="checkbox"/>            | <input type="checkbox"/>            |                          |
| Semi-continuous                                                                                     | <input type="checkbox"/>                    | <input type="checkbox"/>            | Fallen trees                                                                                                 | <input checked="" type="checkbox"/>     | <input type="checkbox"/>            | <input type="checkbox"/>            |                          |
| Continuous                                                                                          | <input type="checkbox"/>                    | <input type="checkbox"/>            | Large woody debris                                                                                           | <input checked="" type="checkbox"/>     | <input type="checkbox"/>            | <input type="checkbox"/>            |                          |
| K EXTENT OF CHANNEL AND BANK FEATURES (tick one box for each feature) *record even if <1%           |                                             |                                     |                                                                                                              |                                         |                                     |                                     |                          |
|                                                                                                     | None                                        | Present                             | E (≥33%)                                                                                                     |                                         | None                                | Present                             | E (≥33%)                 |
| *Free fall flow                                                                                     | <input type="checkbox"/>                    | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/>                                                                          | Exposed bedrock                         | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> |
| Chute flow                                                                                          | <input type="checkbox"/>                    | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/>                                                                          | Exposed boulders                        | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> |
| Broken standing waves                                                                               | <input type="checkbox"/>                    | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/>                                                                          | Vegetated bedrock/boulders              | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> |
| Unbroken standing waves                                                                             | <input type="checkbox"/>                    | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/>                                                                          | Unvegetated mid-channel bar(s)          | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> |
| Rippled flow                                                                                        | <input type="checkbox"/>                    | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/>                                                                          | Vegetated mid-channel bar(s)            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> |
| *Upwelling                                                                                          | <input type="checkbox"/>                    | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/>                                                                          | Mature island(s)                        | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> |
| Smooth flow                                                                                         | <input type="checkbox"/>                    | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/>                                                                          | Unvegetated side bar(s)                 | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> |
| No perceptible flow                                                                                 | <input checked="" type="checkbox"/>         | <input type="checkbox"/>            | <input type="checkbox"/>                                                                                     | Vegetated side bar(s)                   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> |
| No flow (dry)                                                                                       | <input checked="" type="checkbox"/>         | <input type="checkbox"/>            | <input type="checkbox"/>                                                                                     | Unvegetated point bar(s)                | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> |
| Marginal deadwater                                                                                  | <input checked="" type="checkbox"/>         | <input type="checkbox"/>            | <input type="checkbox"/>                                                                                     | Vegetated point bar(s)                  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> |
| Eroding cliff(s)                                                                                    | <input checked="" type="checkbox"/>         | <input checked="" type="checkbox"/> | <input type="checkbox"/>                                                                                     | *Discrete unvegetated silt deposit(s)   | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Stable cliff(s)                                                                                     | <input type="checkbox"/>                    | <input checked="" type="checkbox"/> | <input type="checkbox"/>                                                                                     | *Discrete unvegetated sand deposit(s)   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> |
|                                                                                                     |                                             |                                     |                                                                                                              | *Discrete unvegetated gravel deposit(s) | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                         |                                                                                                                                |                                                                      |                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|--------------------------------------------------|
| SITE REF. <b>0288</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>RIVER HABITAT SURVEY : DIMENSIONS AND INFLUENCES</b> |                                                                                                                                |                                                                      | Page 4 of 4                                      |
| <b>L CHANNEL DIMENSIONS</b> (to be measured at one location on a straight uniform section, preferably across a riffle)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                         |                                                                                                                                |                                                                      |                                                  |
| <b>LEFT BANK</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                         | <b>CHANNEL</b>                                                                                                                 |                                                                      | <b>RIGHT BANK</b>                                |
| Banktop height (m)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                         | Bankfull/top width (m)                                                                                                         |                                                                      | Banktop height (m)                               |
| Is banktop height also bankfull height? (Y or N)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                         | Water width (m)                                                                                                                |                                                                      | Is banktop height also bankfull height? (Y or N) |
| Embanked height (m)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                         | Water depth (m)                                                                                                                |                                                                      | Embanked height (m)                              |
| If trashline lower than banktop, indicate: height above water (m) = _____ width from bank to bank (m) = _____                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                         |                                                                                                                                |                                                                      |                                                  |
| Bed material at site is: consolidated <input type="checkbox"/> unconsolidated (loose) <input type="checkbox"/> unknown <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                         |                                                                                                                                |                                                                      |                                                  |
| Location of measurements is: riffle <input type="checkbox"/> other <input type="checkbox"/> (state) _____                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                         |                                                                                                                                |                                                                      |                                                  |
| <b>M FEATURES OF SPECIAL INTEREST</b> (Use ✓ or E (≥ 33% length) *record even if < 1%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                         |                                                                                                                                |                                                                      |                                                  |
| None <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Very large boulders (>1m) <input type="checkbox"/>      | Backwater(s) <input type="checkbox"/>                                                                                          | Marsh(es) <input type="checkbox"/>                                   |                                                  |
| Braided channels <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | *Debris dam(s) <input type="checkbox"/>                 | Floodplain boulder deposits <input type="checkbox"/>                                                                           | Flush(es) <input type="checkbox"/>                                   |                                                  |
| Side channel(s) <input checked="" type="checkbox"/> <b>ARTIFICIAL</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | *Leafy debris <input type="checkbox"/>                  | Water meadow(s) <input type="checkbox"/>                                                                                       | Natural open water <input type="checkbox"/>                          |                                                  |
| *Natural waterfall(s) > 5m high <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Fringing reed-bank(s) <input type="checkbox"/>          | Fen(s) <input type="checkbox"/>                                                                                                | Others (state) <input checked="" type="checkbox"/> <b>slow RIVER</b> |                                                  |
| *Natural waterfall(s) < 5m high <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Quaking bank(s) <input type="checkbox"/>                | Bog(s) <input type="checkbox"/>                                                                                                |                                                                      |                                                  |
| Natural cascade(s) <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | *Sink hole(s) <input type="checkbox"/>                  | Wet woodland(s) <input type="checkbox"/>                                                                                       |                                                                      |                                                  |
| <b>N CHOKED CHANNEL</b> (tick one box)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                         |                                                                                                                                |                                                                      |                                                  |
| Is 33% or more of the channel choked with vegetation? No <input checked="" type="checkbox"/> Yes <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                         |                                                                                                                                |                                                                      |                                                  |
| <b>O NOTABLE NUISANCE PLANT SPECIES</b> (Use ✓ or E (≥ 33% length) *record even if < 1%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                         |                                                                                                                                |                                                                      |                                                  |
| None <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | bankface                                                | banktop to 50m                                                                                                                 | bankface                                                             | banktop to 50m                                   |
| *Giant hogweed <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <input type="checkbox"/>                                | <input type="checkbox"/>                                                                                                       | *Himalayan balsam <input checked="" type="checkbox"/>                | <input checked="" type="checkbox"/>              |
| *Japanese knotweed <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <input type="checkbox"/>                                | <input type="checkbox"/>                                                                                                       | *Other (state)..... <input type="checkbox"/>                         | <input type="checkbox"/>                         |
| <b>P OVERALL CHARACTERISTICS</b> (Circle appropriate words, add others as necessary)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                         |                                                                                                                                |                                                                      |                                                  |
| <b>Major impacts:</b> landfill - tipping - litter - sewage - pollution - drought - abstraction - mill - <u>dam</u> - <u>road</u> - rail - industry - <u>housing</u> - mining - quarrying - <u>overdeepening</u> - <u>overwidening</u> (P or E) - <u>realignment</u> - afforestation - fisheries management - silting - waterlogging - hydroelectric power<br><b>Evidence of recent management:</b> dredging - bank mowing - weed cutting - enhancement - river rehabilitation - gravel extraction - other (please specify) _____<br><b>Animals:</b> otter - mink - water vole - kingfisher - dipper - grey wagtail - sand martin - heron - <u>dragonflies/damselflies</u><br><b>Other significant observations:</b> if necessary use separate sheet to describe overall characteristics and relevant observations |                                                         |                                                                                                                                |                                                                      |                                                  |
| <b>Q ALDERS</b> (tick one box in each of the two categories) *record even if < 1%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                         |                                                                                                                                |                                                                      |                                                  |
| *Alders? None <input checked="" type="checkbox"/> Present <input type="checkbox"/> Extensive <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                         | *Diseased Alders? None <input checked="" type="checkbox"/> Present <input type="checkbox"/> Extensive <input type="checkbox"/> |                                                                      |                                                  |
| <b>R FIELD SURVEY QUALITY CONTROL</b> (✓ boxes to confirm checks)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                         |                                                                                                                                |                                                                      |                                                  |
| Have you taken at least two photos that illustrate the general character of the site and additional photos of any weirs/ sluices and major/intermediate structures across the channel? <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                         |                                                                                                                                |                                                                      |                                                  |
| Have you completed all ten spot-checks and made entries in all boxes in E & F on page 2? <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                         |                                                                                                                                |                                                                      |                                                  |
| Have you completed column 11 of section G (and E if appropriate) on page 2? <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                         |                                                                                                                                |                                                                      |                                                  |
| Have you recorded in section C the number of riffles, pools and point bars (even if 0) on page 1? <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                         |                                                                                                                                |                                                                      |                                                  |
| Have you given an accurate (alphanumeric) grid reference for spot-checks 1, 6 and end of site (page 1)? <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                         |                                                                                                                                |                                                                      |                                                  |
| Have you stated whether spot-check 1 is at the upstream or downstream end of the site (top of page 2)? <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                         |                                                                                                                                |                                                                      |                                                  |
| Have you cross-checked your spot-check and sweep-up responses with the channel modification indicators given on page 2 of the spot-check key? <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                         |                                                                                                                                |                                                                      |                                                  |

SEE  
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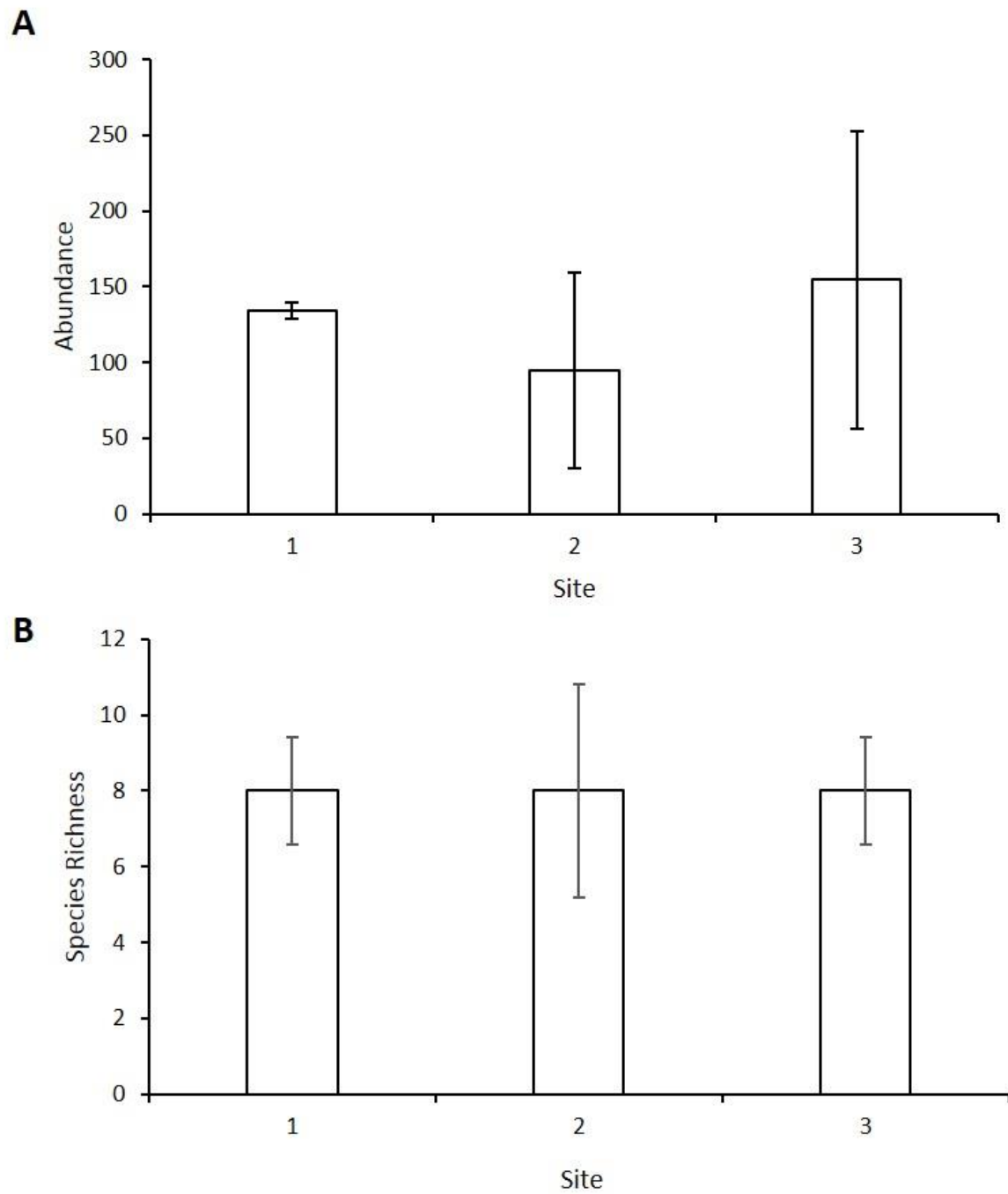
## Technical note: 2018 pre-dredge River Parrett fish surveys

Dr Andrew Pledger

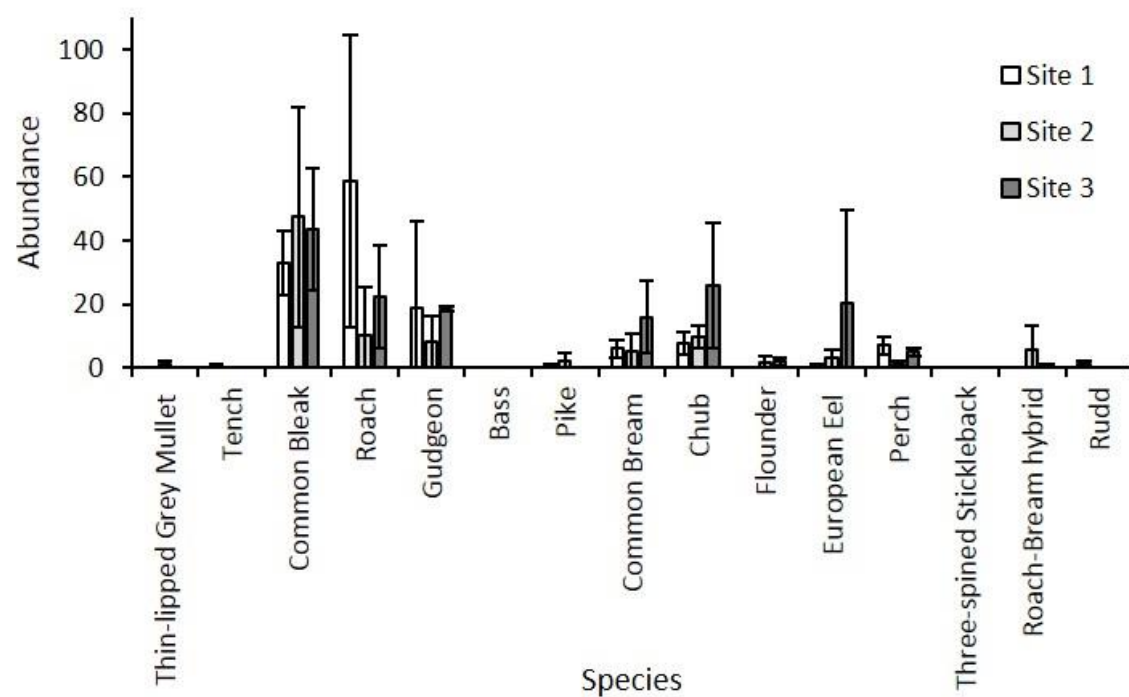
Quantitative fish surveys were conducted under baseflow conditions July-September 2018 on the River Parrett. Sites were located 1) immediately upstream of the Tone/Parrett confluence (ST 35845 30178), 2) approximately halfway between the Tone/Parrett confluence and West Sedgemoor pumping station (ST 37544 29426) and 3) adjacent to West Sedgemoor pumping station (ST 37599 28647). Two three-pass electric fishing surveys were completed per site and prior to surveying on each occasion, a 100-m reach was isolated with stop nets. Three-pass removal sampling was carried out using a pulsed FC3000GP252 electric fishing machine in conjunction with an EC4000 frame electric fishing generator, 2 anodes (10m cable) and a cathode with 6m cable and 4m heavy duty tinned copper braid. Additional pertinent survey equipment included a Rigidflex Aquapeche 370 boat, 13 x 2 m stop nets, aerators/ oxygen cylinders with regulators, fish holding tanks and 17.5" D standard steel dip nets. Captured fish were speciated, weighed and measured after each pass and fish were returned up/downstream of the survey reach after processing.

A total of 766 fish, representing 13 species (Thin-lipped Grey Mullet *Chelon ramada*: total abundance = 2, mean total length =  $7.6 \pm 0.8$  cm; Tench *Tinca tinca*: total abundance = 1, mean total length =  $13.50 \pm 0$  cm; Common bleak *Alburnus alburnus*: total abundance = 248, mean total length =  $9.0 \pm 2.6$  cm; Roach *Rutilus rutilus*: total abundance = 183, mean total length =  $12.6 \pm 3.6$  cm; Gudgeon *Gobio gobio*: total abundance = 91, mean total length =  $9.8 \pm 1.9$  cm; Pike *Esox lucius*: total abundance = 6, mean total length =  $49 \pm 20.4$  cm; Common Bream *Abramis brama*: total abundance = 54, mean total length =  $14.9 \pm 6.1$  cm; Chub *Squalius cephalus*: total abundance = 86, mean total length =  $15.3 \pm 8.6$  cm; Flounder *Paralichthys dentatus*: total abundance = 7, mean total length =  $7.1 \pm 2.5$  cm; European Eel *Anguilla Anguilla*: total abundance = 48, mean total length =  $22.9 \pm 5.8$  cm; Perch *Perca fluviatilis*: total abundance = 26, mean total length =  $15.2 \pm 2.7$  cm; Roach *Rutilus rutilus* - Common Bream *Abramis brama* hybrid: total abundance = 12, mean total length =  $20.2 \pm 6.2$  cm; Rudd *Scardinius erythrophthalmus*: total abundance = 2, mean total length =  $15.1 \pm 1.3$  cm;  $\pm$  STDEV) were recorded during the multi-pass electric fishing surveys. As expected, the majority of captured individuals (757, representing 99% of the total catch) were freshwater rather than marine fish. Fish communities were similar between sites with mean abundance and species richness values calculated as 134 and 8, 94.5 and 8 and 154.5 and 8 for sites 1, 2 and 3, respectively (Figure 1). On average, common Bleak *Alburnus alburnus*, Roach *Rutilus rutilus*, Gudgeon *Gobio gobio*, Common Bream *Abramis brama*, Chub *Squalius cephalus* and European Eel *Anguilla Anguilla* were most prevalent, in terms of abundance, across sites (Figure 2). Piscivores, including Pike *Esox Lucius*, Chub *Squalis cephalus* and Perch *Perca fluviatilis* were present at each of the surveyed sites. The European Eel *Anguilla anguilla* was observed at each of the sites with the greatest mean abundance (21; Figure 2) recorded near the confluence, at site 3.





**Figure 1: A** total abundance and **B** species richness data derived from fish sampling at sites 1, 2 and 3. Presented are site means ( $n = 2$ )  $\pm$  STDEV.



**Figure 2:** Abundance per species data derived from fish sampling at sites 1, 2 and 3. Presented are site means ( $n = 2$ )  $\pm$  STDEV.

## APPENDIX 6H: CONFIDENTIAL BADGER REPORT