

## EASTLEIGH BOROUGH COUNCIL

---

# APPENDIX 10.3 ONE HORTON HEATH ECOLOGICAL BASELINE: RIVER HABITATS AND FISH HABITATS

## 1 INTRODUCTION

Johns Associates was commissioned Eastleigh Borough Council to undertake an assessment of the variety and character of river habitat associated with the watercourses that drain and form boundaries with the One Horton Heath site, together with likely fish habitat in these watercourse reaches (hereafter referred to as the survey area).

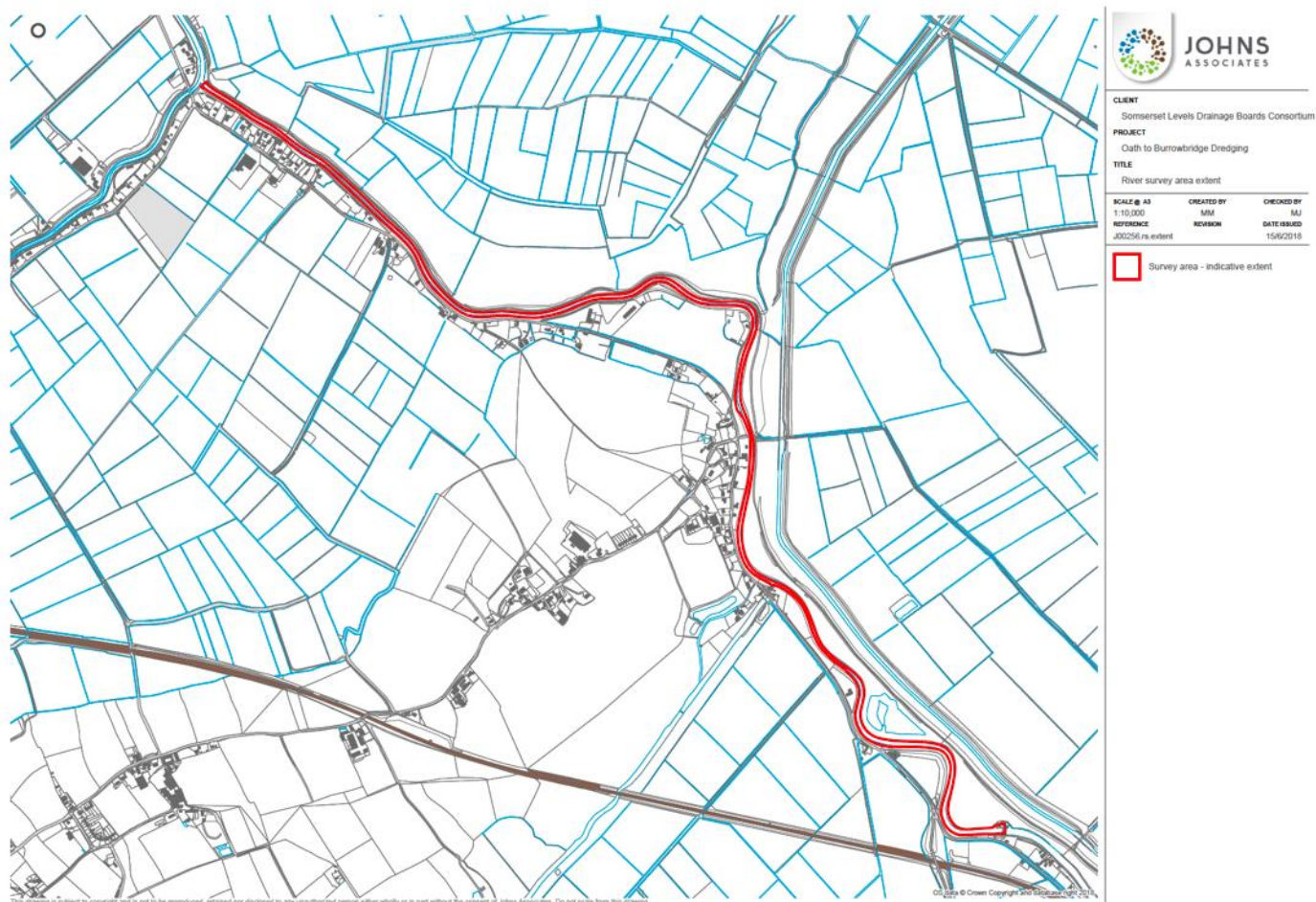
## 2 SITE LOCATION & CONTEXT

The survey area is located west of the existing settlement of Horton Heath, Eastleigh Borough, Hampshire. It is centred approximately on National Grid Reference SU 48815 17105. It comprises a western boundary watercourse (a main river) and four east-west flowing ordinary watercourses/ditches.

This can be seen in Figure 1.

The survey area comprises 10 survey reaches, with a combined length of approximately 4.5km in length.

The surrounding landscape is predominantly agricultural characterized by cattle grazing and arable lands, with woodlands and hedgerows breaking up field parcels, also characterising nearly all of the watercourses. (Figure 1).



**Figure 1: Survey Area location**

## 3 METHODOLOGY

### 3.1 DESK STUDY

A review of publicly available data was completed. This comprised Ordnance Survey 1:25,000 mapping, aerial imagery from Google Earth and information provided by the Environment Agency on its website and mapping services. A review of information provided by PFA Consulting Ltd in Chapter 11: Hydrology of this ES was also completed to inform the desk based assessment of the watercourses associated with the site.

A review of habitat requirements of certain fish species identified as potentially being present in these watercourses (based on records within 2km of the main western watercourse as listed on the NBN Atlas<sup>1</sup> 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.

### 3.2 FIELD SURVEY

A walkover assessment of the survey area was completed by Matt Johns BSc MSc CEnv MIFM MCIEEM FGS (Director, Johns Associates) on the 7<sup>th</sup> July 2020 across the 10 survey reaches, characterising the various watercourses within the One Horton Heath

<sup>1</sup> [www.nbatlas.org](http://www.nbatlas.org) accessed on 25/11/20.

site was completed. A structured approach to recording channel and bank physical habitat features, that would be used to characterise the watercourses and would also influence the type of fish habitat present, was completed using the standard River Habitat Survey<sup>2</sup> method. Aerial imagery from Google Earth was also used to identify riparian and channel features of interest.

Table 3.1 provides a summary of survey reaches, associated watercourses and total length surveyed per reach (max available on site)

**Table 3.1 Survey Reach Summary**

| Reach Reference | Associated Watercourse                                                                                                                                                                                                                                                     | Total Length Surveyed m |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| 1               | Fairoak Stream (northern east-west flowing Main River associated with Quobleigh Pond and Woods Site of Importance for Nature Conservation – tributary of the western boundary stream but not assessed by the Environment Agency against Water Framework Directive Targets) | 500m                    |
| 2               | Fairoak Stream (northern east-west flowing Main River associated with Quobleigh Pond and Woods Site of Importance for Nature Conservation – tributary of the western boundary stream but not assessed by the Environment Agency against Water Framework Directive Targets) | 500m                    |
| 3               | Western boundary stream (Main River, flowing north and associated with Field West of Treeline Break SINC and Treeline Break SINC and assessed by the Environment Agency against Water Framework Directive Targets)                                                         | 500m                    |
| 4               | Western boundary stream (Main River, flowing north and associated with Field West of Treeline Break SINC and Treeline Break SINC and assessed by the Environment Agency against Water Framework Directive Targets)                                                         | 500m                    |
| 5               | Western boundary stream (Main River, flowing north and associated with Field West of Treeline Break SINC and Treeline Break SINC and assessed by the Environment Agency against Water Framework Directive Targets)                                                         | 350m                    |
| 6               | Southern boundary stream (Ordinary Watercourse not the main channel but has the main flow and is generally flowing north but not assessed by the Environment Agency against Water Framework Directive Targets)                                                             | 350m                    |
| 7               | Solar Farm channel (Ordinary Watercourse improved as a farm ditch, located south of the solar farm as an east-west flowing channel – tributary of the western boundary stream but not assessed by the Environment Agency against Water Framework Directive Targets)        | 500m                    |
| 8               | Solar Farm channel (originally a farm ditch, located south of the solar farm as an east-west flowing channel – tributary of the western boundary stream but not assessed by the Environment Agency against Water Framework Directive Targets)                              | 500m                    |

<sup>2</sup> Environment Agency, 2013.

| Reach Reference | Associated Watercourse                                                                                                                                                                                                     | Total Length Surveyed m |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| 9               | Central woodland channel (located north of the solar farm as an east-west flowing channel – tributary of the western boundary stream but not assessed by the Environment Agency against Water Framework Directive Targets) | 500m                    |
| 10              | Central woodland channel (located north of the solar farm as an east-west flowing channel – tributary of the western boundary stream but not assessed by the Environment Agency against Water Framework Directive Targets) | 400m                    |

Please refer to **Annex A to B** of this document for further details.

### 3.3 LIMITATIONS

The presence of very dense and impenetrable vegetation in certain locations and transparency and varying depth of water influenced the visibility of certain features. It is not considered, however, to undermine the overall character of the watercourses or fish habitat highlighted. The results of this baseline are valid at the time of writing (November 2020). 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.

## 4 RESULTS

### 4.1 DESK STUDY

#### 4.1.1 Watercourses

##### Onsite Watercourses

Chapter 11: Hydrology of this ES provides a good overview of the watercourses associated with the One Horton Heath Site and is reproduced below.

A number of drainage features and watercourses are present within the Wider OPA Site. The watercourses within the Wider OPA Site are tributaries of the River Itchen which is located approximately 1.5km to the west of the Wider OPA Site's boundary.

The watercourse on the western boundary of the Site (survey reaches 3, 4 and 5) is classified as a 'Main River' and flows from south to north under Allington Lane and into the River Itchen to the south of Chickenhall Lane Wastewater Treatment Works (WwTW). All other onsite watercourses discharge into this unnamed 'Main River'. This is referred to as the western boundary stream in this Appendix.

An ordinary watercourse (survey reach 6) is present on the Wider OPA Site's southern boundary to the north of Chalcroft Business Park and drains from southeast to north. A second ordinary watercourse (survey reaches 7 and 8) bisects the southern area of the Site and flows from southeast (adjacent to Burnetts Lane) to west (running north of Chalcroft Farm, and south of the Solar Farm). A third ordinary watercourse (survey reaches 9 and 10) bisects the central area of the Wider OPA Site and flows from east (in the vicinity of Horton Heath) to west (to the north of the Solar Farm). A number of smaller ditches drain into the onsite watercourses and are adjacent to existing highways which cross the Wider OPA Site located within hedgerows.

A second 'Main River' bisects the northwestern area of the Wider OPA Site (survey reaches 1 and 2) and flows from northeast to the west to the north of Firtree Farm. This watercourse is known locally as the Fair Oak Stream.

The natural catchments of the onsite watercourses are defined by the Wider OPA Site's topography.

The unnamed Main River on the Wider OPA Site's western boundary is assessed by the Environment Agency against WFD quality targets. The area where the data is applicable is across the length of the Lower Itchen and its tributaries from Winchester in the north to Swaythling in the south. The overall status in 2019 was assessed as Moderate. The latest monitoring data is summarised in Table 4.1 below.

Table 4.1: River Quality (based on Environment Agency data)<sup>3</sup>

| Classification Item                                                                                                                         | 2019                  |
|---------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| Overall Water Body                                                                                                                          | Moderate              |
| Ecological                                                                                                                                  | Good                  |
| <ul style="list-style-type: none"> <li>Biological quality elements</li> </ul>                                                               | Good                  |
| <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Macrophytes and Phytobenthos Combined</li> </ul> </li> </ul> | Good                  |
| <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Fish</li> </ul> </li> </ul>                                  | High                  |
| <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Invertebrates</li> </ul> </li> </ul>                         | High                  |
| <ul style="list-style-type: none"> <li>Hydromorphological Supporting Elements</li> </ul>                                                    | Supports Good         |
| <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Hydrological Regime</li> </ul> </li> </ul>                   | Does Not Support Good |
| <ul style="list-style-type: none"> <li>Physico-chemical quality elements</li> </ul>                                                         | High                  |
| <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Acid Neutralising Capacity</li> </ul> </li> </ul>            | High                  |
| <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Ammonia (Phys-Chem)</li> </ul> </li> </ul>                   | High                  |
| <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Biochemical Oxygen Demand (BOD)</li> </ul> </li> </ul>       | High                  |
| <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Dissolved oxygen</li> </ul> </li> </ul>                      | High                  |
| <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>pH</li> </ul> </li> </ul>                                    | High                  |
| <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Phosphate</li> </ul> </li> </ul>                             | High                  |
| <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Temperature</li> </ul> </li> </ul>                           | High                  |

<sup>3</sup> Environment Agency (2020) Catchment Data Explorer

| Classification Item                                                                                                                         | 2019 |
|---------------------------------------------------------------------------------------------------------------------------------------------|------|
| <ul style="list-style-type: none"> <li>Specific pollutants</li> </ul>                                                                       | High |
| Chemical                                                                                                                                    | Fail |
| <ul style="list-style-type: none"> <li>Priority substances</li> </ul>                                                                       | Good |
| <ul style="list-style-type: none"> <li>Other Pollutants</li> </ul>                                                                          | Good |
| <ul style="list-style-type: none"> <li>Priority hazardous substances</li> </ul>                                                             | Fail |
| <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Polybrominated diphenyl ethers (PBDE)</li> </ul> </li> </ul> | Fail |
| <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Benzo(g-h-i)perylene</li> </ul> </li> </ul>                  | Fail |
| <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Mercury and Its Compounds</li> </ul> </li> </ul>             | Fail |
| <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Other Priority hazardous substances</li> </ul> </li> </ul>   | Good |

The reasons for not achieving 'Good' status and the reasons for deterioration in the River Itchen are listed as 'Physical modification' and 'Suspect data' affecting the Hydrological Regime Element.

#### Offsite Watercourses, Waterbodies and Wetland Areas

The Wider OPA Site is located within the catchment of the River Itchen. The River Itchen corridor is designated as a Special Area of Conservation (SAC) and as a Site of Special Scientific Interest (SSSI). The boundary of the designated site is approximately 0.9km downstream of the Wider OPA Site.

The River Itchen SAC covers 304 Ha of river from New and Old Alresford at the head of the catchment to the tidal reaches in Swaythling (Southampton). The designated features include '*Rivers with floating vegetation often dominated by water-crowfoot*' (*Ranunculon* and *Batrachion* vegetation) and populations of Southern Damselfly, Freshwater Crayfish, Brook Lamprey, Atlantic Salmon, Bullhead, and Otter. The habitat notification (Code H3260) comprises the watercourse channel, its banks and part of the riparian zone in addition to parts of the floodplain.

Regarding the baseline quality of the River Itchen SAC and the pressures it faces the Natural England document<sup>4</sup> states 'The Itchen faces numerous pressures from water abstraction and flow diversions, discharges, agricultural runoff, channel modifications, fisheries management and human impacts associated with the urbanisation alongside much of the river's valley.'

Natural England's document<sup>5</sup> recognises that the "Rivers with floating vegetation often dominated by water-crowfoot' qualifying habitat 'has been adversely affected by nutrient enrichment, mainly from sewage inputs and agriculture, and where agriculture has caused serious siltation. It is also vulnerable to artificial reductions in river flows and to unsympathetic channel engineering works.'

<sup>4</sup> Natural England (2014) Site Improvement Plan – River Itchen

<sup>5</sup> Natural England (2019) European Site Conservation Objectives: Supplementary advice on conserving and restoring site features River Itchen Special Area of Conservation (SAC) Site Code: UK0012599

The River Itchen SSSI covers approximately 42km length of river from New and Old Alresford at the head of the catchment to the tidal reaches in Swaythling (Southampton). This SSSI is notified for classic chalk stream and river, fen meadow, flood pasture and swamp habitats, particularly formations of in-channel vegetation dominated by Water Crowfoot, riparian vegetation communities (including wet woodlands) and side channels, runnels and ditches associated with the main river and former water meadows. This SSSI is also notified for significant populations of the nationally-rare Southern Damselfly and assemblages of nationally-rare and scarce freshwater and riparian invertebrates, including the White-clawed Crayfish. This SSSI is notified for Otter, Water Vole, freshwater fishes including Bullhead, Brook Lamprey and Atlantic Salmon, and the assemblage of breeding birds.

Chalk rivers are predominately groundwater fed ecosystems which typically have high water quality, relatively constant temperatures and high dissolved oxygen levels. The river and its surrounding waterways maintain high groundwater levels creating a diverse fen, swamp and meadow habitat in the low lying floodplain adjacent to the river.

Pressures facing the lowland reaches of the River Itchen include nutrient enrichment which can cause a shift in plant communities away from traditional chalk stream species. The River Itchen is a recreational game fishery with fishing for Atlantic Salmon occurring along its lower reaches. Atlantic salmon stock levels are identified as under pressure due to poor in-gravel egg survival caused by high levels of silt input to the river. The River Itchen SSSI Notification document states '*The majority of extra silt originates from cultivated land and point sources such as fish farms, sewage treatment works and cress farm discharges. In recent years substantial effort has been made to restore the river channel for Atlantic salmon by gravel reinstatement, cleaning and channel modifications.*'

The length of the River Itchen designated as an SSSI downstream of the Wider OPA Site is approximately 5km. The SSSI is divided into different management units. The management units downstream of the Site which are directly reliant on the quality of the water environment are Unit 100 'Main Habitat - Fen, Marsh and Swamp – Lowland' and Unit 108 'Main Habitat – Rivers and Steams'. Unit 100 condition is assessed as 'Unfavourable – Recovering' in 2013 and Unit 108 condition is assessed as 'Unfavourable - No change' in 2015.

#### 4.1.2 Fish Habitat

Information provided by the Hampshire Biological Information Centre (see Appendix xx) included records of fish species recorded within 2km of the One Horton Heath site. The following species of fish were included (which also includes local records from the River Itchen on a precautionary basis):

- European Eel *Anguilla anguilla*
- Stone loach *Barbatula barbatula*
- Bullhead *Cottus gobio*
- Pike *Esox lucius*
- Gudgeon *Gobio gobio*
- Brook lamprey *Lampetra planeri*
- Perch *Perca fluviatilis*
- Minnow *Phoxinus phoxinus*
- Atlantic salmon *Salmo salar*
- Brown/sea trout *Salmo trutta*

- Chub *Squalius cephalus*
- Grayling *Thymallus thymallus*

General riverine habitat requirements for these species are listed in Table 4.2.

**Table 4.2: Overview of biology and riverine habitat requirements for fish species**

| Species      | Biology and habitat requirements                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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> |
| Stone loach  | <p>Usually found in flowing stretches of streams and medium-sized rivers with gravel to stone bottom, but also in a variety of other habitats, including sandy canals and lake shores. Larvae are benthic. Larvae and small juveniles prefer sand bottom and slow current, shifting to gravel bottom and fast current when growing. Adults prey on relatively large benthic invertebrates such as gammarids, chironomids, insect larvae. They breed on gravel, sand or among aquatic vegetation. Tolerate moderate organic pollution and stream canalization and very sensitive to pollution by heavy metals. Sensitive to pollution and low oxygen levels, therefore, its presence in a river can be taken as an indication of good water quality. Spawns once a year for several years in low productivity streams, but exhibits multiple spawning within a season in high productivity environments. Releases eggs in open water, often close to surface. Eggs drift and adhere to different substrates and are often covered by sand or detritus. Individual females may spawn daily for a short period.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

| Species       | Biology and habitat requirements                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bullhead      | Occurs in cold, clear and fast-flowing water of small stream to medium-sized rivers as well as on gravel or rocky shores of cold lakes and in slightly brackish waters along eastern coast of Baltic coast. Feeds on small bottom invertebrates, mainly insects, crustaceans. Pink to yellow eggs are found in clumps attached to undersides of large stones. Spawns once a year for several years in low productivity streams, but exhibits multiple spawning within a season in high productivity environments. Male protects several batches of eggs--deposited below a stone--for about 3 weeks. Larvae are not guarded and may occasionally been eaten.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Pike          | Occurs in clear vegetated lakes, quiet pools and backwaters of creeks and small to large rivers. Usually solitary and highly territorial. Adults feed mainly on fishes, but at times feed heavily on frogs and crayfish. Cannibalism is common. 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Gudgeon       | 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 and prefer detritus-rich sandy habitats and low current.                                                                                                                                                                                                      |
| Brook lamprey | Adults are found in the lowland, piedmont and montane zone in clear, well oxygenated brooks. They live exclusively in freshwater; in middle and upper reaches of small streams and rivers, occasionally in lakes. Larvae lie buried in the substrate while adults live in the open water. Sexually mature adults have been observed burrowing in fine sand. Larvae of this species can serve as mid-term bio-indicators. They live in detritus-rich sands or clay sediments. Larval life is 5+ to 6+ years, with the smaller individuals of the latter year class delaying metamorphosis by one year. Filter feeding larvae, non-feeding adults (= non-parasitic). Reproduction takes place upstream, from April to May. Duration of the life cycle is believed to last 6 years on average. Communal spawning in the same redd by <i>L. fluviatilis</i> and <i>L. planeri</i> has been reported in the River Tywi Basin, Wales (UK), in April, at a water temperature of 11 °C. Both species participated in constructing a redd about 23 cm in diameter and 5-8 cm deep, consisting of pebbles, gravel, and coarse sand. In the river Yeo, England (UK), peak spawning activity varies between 26 March and 24 April when water temperatures reach 10-11 °C. As the spawning season progresses, male:female ratios shift from 3.54:1 to 1.60:1. |
| Perch         | 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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

| Species         | Biology and habitat requirements                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | submerged objects. Eggs are laid in sticky strings becoming fixed to aquatic plants and rocks.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Minnow          | <p>Gregarious . Found in a wide range of cold and well oxygenated habitats from small, fast-flowing streams to large Nordic lowland rivers and from small upland lakes to large oligotrophic lakes. Usually occurs in association with salmonid fishes. Feeds on algae, plant debris (in rivers), molluscs, crustaceans and insects. Spawns over clean gravel areas in flowing water or on wave-washed shores of lakes. Overwinters in coarse substrate or in deep pools with low current (Ref. 59043). Migrates upstream for spawning in shallow gravel areas. Mean maximum age is 6 years. Locally threatened due to pollution and excessive stocking of species of <i>Salmo</i>. Males and females form school separately and arrive on the spawning site at different times. Spawn over clean gravel areas in flowing water or on wave-washed shores of lakes. Deposit eggs in shallow water on sand or gravel bottom which hatch in 4-5 days at 18°C. Females lay sticky eggs deep into clean gravel.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Atlantic Salmon | <p>Amphihaline species, spending most of its life in freshwater. Occurs in lakes and rocky runs and pools of small to large rivers. Found in all rivers where temperature rises above 10° C for about 3 months per year and does not exceed 20° C for more than a few weeks in summer (preferred temperatures 4-12°C). Parr (i.e. juveniles) are territorial and are found in the upper reaches of rivers and streams, in riffle areas with strong current and rough gravel bottoms. During winter, parr seek refuge in small spaces or under stones during the day. Young remain in freshwater for 1 to 6 years, then migrate to coastal marine waters or even to open oceans where they remain for 1 to 4 years before returning to freshwater for spawning. Adults inhabit cooler waters with strong to moderate flow. The Atlantic salmon is reported to live up to 10 years, but most individuals only reach 4-6 years. Juveniles feed mainly on aquatic insects, mollusks, crustaceans and fish; adults at sea feed on squids, shrimps, and fish. At the onset of sexual maturity this species is known to return from the ocean to the river where it was born, and even to its specific natal site. Spawning migration into freshwater lasts from June to November. Spawns at 6-10°C in gravel river areas far upstream with moderate to fast-flowing, well-oxygenated waters and a succession of riffles and pools. The female selects a site where the gravel is of the right size and of sufficient depth (0.1 to 0.3 m) and water depth is around 0.5-3 m. The female digs a depression ("redd") by turning on her side and flexing her body up and down, without touching the stones. This species spawns in pairs. The male guards and defends the female against other males. A female releases between 8,000-25,000 eggs during a spawning season; 500 to 2000 per kg. Fertilized eggs sink into the redd and are covered with a layer of gravel (0.1-0.3 m) usually by the male. Females are also observed to cover the eggs. Individual spawning is completed in 2-3 days after a female digging several redds and spawning with several males. Period of spawning lasts for 1-2 weeks. Most males die after spawning, while 10-40% of females may survive and return to the sea in autumn or overwinter in rivers, feed one summer, and migrate again. They may spawn in the year following the first reproduction or may remain at sea for 18 months before returning once more to the river. Of the returning females, about 0.3-6 % spawn a second time and very few spawn a third or fourth time. In short rivers with presumably less exhaustive upstream migration, up to 34% of returning individuals spawn a second time; some individuals may spawn for up to six seasons. Eggs hatch in spring, usually after 70-160 days. Upon hatching, alevins (i.e. newly-hatched young up to 1 month) are negatively phototactic and move deeper into the gravel. As their yolk sac is absorbed, the fry emerge from the bottom and move to shallow riffles just downstream of their redd. Mortality of young individuals during the first months may range from 14-61 %. Parr (i.e. juveniles) may remain in freshwater environments for 1-7 years (depending on temperature and feeding conditions) but most stay for 2-3 years. Parr undergo morphological and physiological changes called smoltification which prepares them for life in the sea. At the southern end of their range, many reach a length of 12-15 cm, transform into smolts and are ready for migration in spring of the first year after hatching. At the northern end of the</p> |

| Species               | Biology and habitat requirements                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                       | range they may take 5-6 years to reach smolt stage. Smolts move towards estuaries, the continental shelf and eventually the open ocean. The Atlantic salmon matures between 3-7 years. After 1-4 years at sea, it migrates back to the upper reaches of its natal river to spawn. It has an acute sense of smell and it is suggested that it imprints a sequence of odours while inhabiting rivers and during its smolt run. It presumably reverses this sequence to return to its natal site. Several studies have shown that smolt runs are strongly correlated to increasing water temperature and water flow during spring.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Brown trout/sea trout | Found in streams, ponds, rivers and lakes. Individuals spend 1 to 5 years in fresh water and 6 months to 5 years in salt water. Juveniles mature in 3-4 years. Lacustrine populations undertake migration to tributaries and lake outlets to spawn, rarely spawning on stone, wave-washed lake shores. Spawns in rivers and streams with swift current, usually characterized by downward movement of water into gravel. Spawning takes place normally more than one time. They prefer cold, well-oxygenated upland waters although their tolerance limits are lower than those of rainbow trout and favours large streams in the mountainous areas with adequate cover in the form of submerged rocks, undercut banks, and overhanging vegetation. Life history and spawning behaviour is similar to the salmon <i>Salmo salar</i> . Each female produces about 10,000 eggs. Mainly diurnal. Sea and lake trouts forage in pelagic and littoral habitats, while sea trouts mainly close to coast, not very far from estuary of natal river. Juveniles feed mainly on aquatic and terrestrial insects; adults on mollusks, crustaceans and small fish. Female covers the eggs by restirring the sand and fine gravel. After hatching at 12 mm, larval brown trout remain in the gravel for 2-3 weeks until they are about 25 mm long, when they emerge to begin feeding in the water column. Brown trout are territorial and begin establishing territories as juveniles. Juvenile trout from lake populations move from their natal inlets to lakes during the first 2 years of life. |
| Chub                  | Most abundant in small rivers and large streams of barbel zone with riffles and pools. Found along shores of slow-flowing lowland rivers, even in very small mountain streams, and in large lake, 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. Spawning occurs in fast-flowing water above gravel bottom, rarely among submerged vegetation. Female spawn more than once during a season, individual females spawn with several males. Males assemble at spawning site and follow ripe females, often with much splashing, to shallow riffles. Females lays sticky eggs into the gravel. Pale yellow eggs are found attached to gravel, weed and stones in flowing water.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Grayling              | Inhabits submontane reaches of rivers with a hard sand or stone bottom and well oxygenated, cold and fast-flowing water. Prefers running, well-oxygenated waters of rivers. Usually lives in hollows behind boulders and shaded water under overhanging vegetation. Gregarious, forms schools. Feeds mainly on insects, nymphs, small worms and crustaceans. Breeds in shallow stretches, usually 20-40 cm deep, or riffles, with moderate current of about 0.5 m/s and clean gravel bottom. Can be captured with natural bait (insect larvae) or with artificial fly. Very sensitive to pollution.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

## 4.2 FIELD SURVEY

### 4.2.3 Physical Habitat / River Habitat Survey

River Habitat Survey was completed across the 10 survey reaches across the various watercourses associated with One Horton Heath. Each standard 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. Because of the location of the survey area in the catchment, some watercourses were less than the full 500m long. In these cases, only the existing length of channel to the nearest 50m was surveyed. The transects were established using calibrated paces also compared against a baseline showing transect locations. 10 RHS sites were assessed. The location of each RHS site and each transect can be seen on the plan in Annex A. Annex B presents the raw RHS survey data.

The watercourses, split by reaches are described below, in a logical order of flow and tributaries, and illustrated by the plates above.

#### 4.2.4 Western Boundary Watercourse. Reach 5. Main River

Reach 5 is characterized by a small and dry (at the time of survey) channel aligned with a hedgerow running through and area of cattle grazed grassland. Tree cover is semi-continuous throughout with related features associated with the dry channel. The channel was cattle poached and dominated by native soil (earth) and where not fully shaded, vegetation. There does not appear to be a direct link to the predominant flow path, despite this being a Main River. The main flow enters the One Horton Heath Site via the southern boundary watercourse site through a twin culvert at Reach 6. Reach 5 includes a part buried pipe at a field crossing and a simple pedestrian bridge indicating higher flows do occur. Reach 5 aligns with a woodland edge in a resectioned and potentially realigned channel that has evidence of reasonably recent management. This channel remains dry but includes extensive vegetation growth including species requiring wetter condition. Some of these features can be seen in the following plates.



Plate 1: Reach 5. Dry western boundary channel



Plate 2: Reach 5. Dry channel on woodland boundary



**Plate 3: Reach 5. Dry channel**

#### **4.2.5 Southern Boundary Watercourse. Reach 6. Ordinary Watercourse**

Reach 6 contains flowing water that enters the site through a twin culvert and defunct control structure. With this structure closed, flow may have been diverted to Reach 5 at some point. The channel runs along the boundary of the adjacent business park and woodland edge. Banks are dominated by native earth and the bed largely characterized by silt and clay, although there are some deposits of gravel (with silt). Aquatic macrophyte growth in the channel typically causes localized flow impoundment, the dominance of smooth and no perceptible flow, a reduction in velocity and silt deposition and stabilisation. In some locations this also creates a narrower channel, in increase in velocity and exposure of gravel. This channel is considered to have been realigned and resection as part of agricultural management. The channel is poached by cattle including evidence of watering. There is a discharge from the adjacent business park that increases flow downstream, with an associated section of wood reinforcement to the right hand bank. Downstream of this point, the small channel becomes aligned with an overgrown hedgerow with tunnel vegetation reducing light levels, a reduction in macrophytes and providing organic inputs from leaf litter. There are no notable riverine features associated with this watercourse



**Plate 4: Reach 6. Inflow of southern boundary channel through twin culverts**



**Plate 5: Reach 6. Southern boundary channel with diverse macrophytes, some gravel but dominated by silt**



**Plate 6: Reach 6. Discharge from business park**



**Plate 7: Reach 6. Southern channel poaching**



**Plate 8: Reach 6. Southern channel poaching and scrub**

#### **4.2.6 Western Boundary Watercourse. Reach 4. Main River**

The western watercourse (dry) passes under a field crossing and into a small hollow with alder and willow (plate 9) before forming a confluence with Reach 6, from that point the Main River has running water in it. It is strongly aligned with the field boundary hedgerow and associated scrub and tree corridor. This largely unmanaged vegetation dominates the character of the river, reducing light levels, introducing leafy debris and debris dams. Flow is sluggish and dominated by glides and silt bedload with only one location with rippled flow and gravel noted.



**Plate 9: Reach 4. Western channel dry confluence**



**Plate 10: Reach 4. Channel beneath overhanging hedge scrub with Reach 6 (looking upstream)**



**Plate 11: Reach 4. Channel subsumed under hedge**



**Plate 12: Reach 4. Open channel and nearby dense scrub**



**Plate 13: Reach 4. Imperceptible flow and silt**



**Plate 14: Reach 4. Glide within dense vegetation**

#### **4.2.7 Western Boundary Watercourse. Reach 3. Main River**

This reach remains strongly aligned with the One Horton Heath boundary and is associated with a linear woodland associated scrub and tree corridor. This largely unmanaged vegetation dominates the character of the river, reducing light levels, introducing leafy debris and debris dams. There is no visible channel vegetation only emergent marginal species. Flow is sluggish and dominated by glides and silt bedload. Exposed and submerged tree roots are present. The downstream reach ends below a road bridge and the confluence with the Fair Oak Stream (Reaches 1 and 2).



**Plate 15: Reach 3. Silt and organic debris**



**Plate 16: Reach 3. Imperceptible flow and silt**

**Plate 17: Reach 3. Downstream end**

#### **4.2.8 Solar Farm Channel. Reach 8. Ordinary Watercourse**

This reach is characterized by a modified agricultural ditch that in parts has become dominated by terrestrial vegetation including gorse and bramble. It was dry at the time of survey, with only a small amount of wet vegetation present upstream of a farm track crossing and construction in conveyance. The bed was characterized by native soil (earth). No tree cover was present. There are no notable riverine features associated with this watercourse.



**Plate 18: Reach 8. Vegetated ditch dry/no flow**

**Plate 19: Reach 8. Vegetated ditch dry/no flow**

#### **4.2.9 Solar Farm Channel. Reach 7. Ordinary Watercourse**

This reach is a continuation of Reach 6, but includes the presence of grazing cattle and considerable poaching of the channel. It is considered highly likely that runoff from Chalcroft Farm enters this watercourse and in its lower section, standing water was visible. The channel is not visible because it is subsumed by vegetation largely soft rush. The channel substrate was dominated by silt. There are no notable riverine features associated with this watercourse



**Plate 20: Reach 7. Vegetated ditch dry/no flow**



**Plate 3: Reach 7. Vegetated ditch standing water**

#### **4.2.10 Central Woodland Channel. Reach 10. Ordinary Watercourse**

This watercourse drains from an urban area and comprises a small channel, before this is blocked and enters a wider area of grassland, before resuming a more channelised form directly associated with a linear hedgebank. The channel was dry at the time of survey and the bed was characterized by native soil (earth) and silt. Limited vegetation types were recorded, and the channel was associated with boundary features including hedgerows and associated overhanging vegetation. The has led to the presence of woody debris in the dry channel. The channel enters a woodland area where its gradient increases slightly and a more defined channel can be seen. There are no notable riverine features associated with this watercourse



**Plate 22: Reach 10. Wet grass no flow**



**Plate 23: Reach 10. Dry ditch no flow**

Central Woodland Channel. Reach 9. Ordinary Watercourse

The woodland channel develops a more sinuous form and a wider range of physical habitat features were noted including exposed roots, overhanging boughs and leafy debris. The channel was either dry or contained standing water with no perceptible flow. The bed was dominated by silt and native soil (earth) but evidence of flow, erosion and deposition (of silt and soil) was visible indicating higher flows in the winter and during storms.



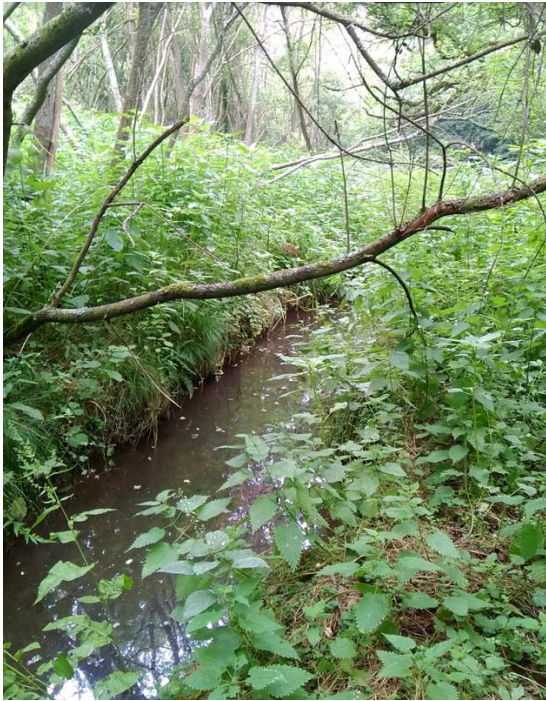
**Plate 24: Reach 9. Occasional standing water, no flow**



**Plate 25: Reach 9. Standing water, no flow**

#### **4.2.11 Fair oak Stream. Reach 1. Main River**

Fairoak Stream in this reach is associated with a former impounded waterbody, now characterized by extensive wet woodland with considerable Himalayan balsam. As such the channel is shaded by the overhanging canopy and more recent regrowth of willow and alder scrub and the associated balsam and other associated vegetation. The banks and bed are dominated by silt (the bed of the former impounded waterbody). A former impounding structure and sluices are present with water cascading over this barrier to fish migration. Below this structure there is no perceptible flow caused by an impoundment in the next reach. The channel emerges from the woodland and an increase in channel macrophytes starts to occur, with silt still dominating the bed.



**Plate 26: Reach 1. Glide, silty bed**



**Plate 27: Reach 1. Barrier to fish migration**



**Plate 28: Reach 1. Imperceptible flow, silty bed**



**Plate 29: Reach 1. Imperceptible flow, silty bed**

## **Fairoak Stream. Reach 2. Main River**

The upper parts of Reach 2 are character by no perceptible flow, deeper water and silts. This is caused by an impounding structure at a residential property forming an online pond. Tree cover is near continuous with associated overhanging boughs, leafy debris, fallen limbs, submerged roots. Macrophyte beds are present upstream of the online pond, taking advantage of the gentler river banks and silt deposits. Downstream of the impounding structure and associated road, flow is contained in a concrete half pipe. This artificial channel is aligned with the edge of the road until it ends and flow cascades down some 10-20cm into a confluence with the western boundary watercourse at Reach 3. There are no notable riverine features associated with the lower part of this watercourse (below the impounding structure).



**Plate 30: Reach 2. Imperceptible flow, silty bed**



**Plate 31: Reach 1. Imperceptible flow, silty bed**



**Plate 32: Reach 1. Confluence with Reach 3, barrier to fish migration and artificial (concrete half pipe) channel.**

#### 4.2.12 Walkover Visual Assessment of Fish Habitat

The walkover visual inspection of in-channel habitats concluded that the watercourses associated with the survey area and the One Horton Heath Site support a range of features that are promoting or limiting in terms of fish habitat. In particular, the following features were recorded:

- Effects of low flow were obvious and are unlikely to be unique to 2020.
- A number of the watercourses were dry and do not support habitat for fish during these conditions (e.g. reaches 5, 8, 7, 10, 9).
- Barriers to fish migration exist at reaches 5, 7/8, 9/10, 2/1 with no notable obstructions to fish passage recorded in the western watercourse (reaches 3, 4) and part of the southern watercourse (6).
- Silt dominates the bedload of all of these channels with gravel only being recorded in two RHS cross sections out of 100. No riffles were recorded. This significantly restricts the suitability for a wide range of species recorded in the near vicinity.
- The lack of physical diversity is highly likely to reduce macro-invertebrate and fish prey diversity restricting the viability of self-sustaining fish populations for a range of species.
- The watercourses receive extensive agricultural runoff and inputs (likely to contain silts, nutrients, and other chemicals), alongside the discharge from the southern boundary business park, roads and urban development (also likely to contain a range of contaminants). This is likely to limit the presence of fish species sensitive to these conditions.
- The flow is dominated by smooth glides or no perceptible flow, indicative of the lower flow conditions observed. Higher flows do pass through these watercourses although these would not support a broad fish population throughout the year when flows are limited, depths low and conditions unfavorable.

- The channels are dominated by trees, hedgerows and/or woodland with only reaches 8, 7 not being covered by woody vegetation.
- There is a paucity of in-channel vegetation and where this exists, it is dominated by marginal emergent species restricting the opportunities for fish spawning and food for a range of species.

Table 4.1 provides a summary comparison on the presence/absence of key features within the One Horton Heath watercourses for the fish species identified to be associated with the local area.

**Table 4.1 Fish Habitat Suitability Matrix**

| Species       | Suitable food | Barrier to migration                 | Spawning habitat | Juvenile habitat | Other threats       | Overall suitability |
|---------------|---------------|--------------------------------------|------------------|------------------|---------------------|---------------------|
| European Eel  | Yes           | Potentially                          | No               | No               | Yes - contamination | Moderate            |
| Stone loach   | Yes           | Yes (apart from western watercourse) | Very limited     | Very limited     | Yes - contamination | Poor                |
| Bullhead      | Potentially   | Yes (apart from western watercourse) | Very limited     | Very limited     | Yes - contamination | Poor                |
| Pike          | Potentially   | Yes (apart from western watercourse) | Limited          | Limited          | Yes - contamination | Poor                |
| Gudgeon       | Yes           | Yes (apart from western watercourse) | Yes              | Yes              | Yes - contamination | Moderate            |
| Brook lamprey | Yes           | Yes (apart from western watercourse) | Very limited     | Yes              | Yes - contamination | Moderate            |
| Perch         | Potentially   | Yes (apart from western watercourse) | Limited          | Limited          | Yes - contamination | Poor                |
| Minnow        | Yes           | Yes (apart from western watercourse) | Very limited     | Limited          | Yes - contamination | Moderate            |

| Species               | Suitable food | Barrier to migration                 | Spawning habitat | Juvenile habitat | Other threats       | Overall suitability |
|-----------------------|---------------|--------------------------------------|------------------|------------------|---------------------|---------------------|
| Atlantic Salmon       | Limited       | Yes (apart from western watercourse) | Very limited     | Limited          | Yes - contamination | Poor                |
| Brown trout/sea trout | Limited       | Yes (apart from western watercourse) | Very limited     | Limited          | Yes - contamination | Poor                |
| Chub                  | Yes           | Yes (apart from western watercourse) | Very limited     | Limited          | Yes - contamination | Poor                |
| Grayling              | Yes           | Yes (apart from western watercourse) | Very limited     | Limited          | Yes - contamination | Poor                |

## 5 CONCLUSIONS

Based on the surveys conducted in 2020, it is clear that the watercourses associated with One Horton Heath and in a generally poor condition with limited habitat diversity. This arises from a range of influencing factors including:

- Low flows/dry channels dominated by largely terrestrial vegetation;
- Contamination from agricultural inputs (silts, nutrients, chemicals), urban and road runoff (a range of potential contaminants);
- A lack of management of the dominant woodland and hedgerow/scrub cover;
- Barriers to fish migration and the presence of artificial channel, structures and features;
- Modification to channel form and connectivity (in the south)
- Disturbance from cattle poaching.

At the time of surveying, the only potentially viable fish habitat is associated with the southern boundary watercourse, the lower parts of the western boundary watercourse and in the upper parts of the Fairoak Stream, noting these would also be separated by barriers to migration.

Based on a comparison between the features recorded, fish habitat requirements for the species recorded in the local area, and in particular the constraints and opportunities present, it is considered unlikely that: stone loach, bullhead, pike, perch, Atlantic salmon, brown/sea trout, chub or grayling would be present, or if present, the absence of one of more critical features or presence of a key constraint will make it highly unlikely a sustainable population is currently present. The watercourses do provide better opportunities for minnow, brook lamprey, gudgeon, and European eel, although even for these species, constraints are also present.

It must be remembered that despite this, the watercourses remain part of a dynamic system, that although modified, influenced and managed, are trying to revert to a state of equilibrium in terms of processes and energy/flow efficiency. Management intervention has a critical role to play in the maintenance of the existing poor conditions as well as the accelerated restoration of the watercourses, to enhance the quality and diversity of habitat, opportunities for fish and biodiversity in general.

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)

### **Third party disclaimer**

Any disclosure of this report to a third party is subject to this disclaimer. The report was prepared by Johns Associates at the instruction of, and for use by, our client named on the front of the report. It does not in any way constitute advice to any third party who is able to access it by any means. Johns Associates excludes to the fullest extent lawfully permitted all liability whatsoever for any loss or damage howsoever arising from reliance on the contents of this report. We do not however exclude our liability (if any) for personal injury or death resulting from our negligence, for fraud or any other matter in relation to which we cannot legally exclude liability.