ARUP

Bristol City Council

Bristol Avon Flood Strategy

Preliminary Ecological Appraisal (PEA) Report

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1. Introduction

1.1 Scope of the Report

Bristol City Council is working with the Environment Agency and other partners to create a vital long-term strategy for managing the flood threat from the River Avon, supported by The Capital Strategic Partnership (consisting of Arcadis, Arup and Mott Macdonald), referred to as the Bristol Avon Flood Strategy (the Strategy). Ove Arup and Partners Ltd. (Arup) has been instructed produce a Preliminary Ecological Appraisal (PEA) report for the Strategy across the city of Bristol. The site locations are shown on Figure 1.

This report presents the findings of the PEA and has been prepared to identify any ecological opportunities associated with the Strategy and inform the construction process by outlining appropriate mitigation measures and further surveys as required, with reference to the 'Mitigation Hierarchy'[1].

1.2 Site Description

The Strategy is proposed primarily along the edges of the tidal River Avon, which runs through Bristol city. This PEA assesses 13 discrete sites between Pill and Hanham, as follows: Pill, Shirehampton, Sea Mills, Bower Ashton, Entrance Lock, City Centre (including Feeder Canal), Netham, Netham Left Bank, Netham Right Bank, St Annes, Revised Area 10 (Pump House), Upstream Left Bank (BEESES) and Upstream Right Bank (Riverside Cottages). All sites are shown in Figure 1.

The proposed works occur primarily along the edge of the river channel, both landward and into the river channel itself. Works within the river channel may involve impacts to estuarine habitats including mudflats and saltmarsh. The total length of existing flood defences within this Strategy is approximately 15.8km; riparian defences amount to approximately 10.3km.

1.3 Description of the Proposed Works

The Strategy will outline action to be taken in phases to reduce the chance and impact of flooding from the River Avon, and how each phase will be funded. The Strategic Outline Case (SOC) for the Bristol Avon Flood Strategy was consulted on in 2020 prior to adoption by Bristol City Council in partnership with the Environment Agency.

The Strategy in 2020 reviewed the preferred option identified in 2017 through technical assessments and maintained the core approach of the preferred option comprising of the construction of Low and High defences, however the time periods in which they are implemented were amended. The Low defences would be constructed to a 1 in 200 year standard of protection for 2065. The upgraded High defences would provide a 1 in 200 year standard of protection for 2125.

The preferred option for the Strategy comprises raised defences along the River Avon including new tidal stop gates for the Floating Harbour. As well as providing flood protection, the Strategy will look to enhance the river corridor for a range of outcomes. To develop the costing of the defences, the Strategy assumes an adaptive approach to defences which means:

- an initial phase of construction (Phase 1) expected to be delivered in the 2020s; and
- a subsequent phase of construction of additional defences and defence raising in the 2060s (Phase 2). Phase 2 would be subject to its own planning consent and assessment appropriate to the time when consent is required, therefore, is excluded from this report.

[1] The overarching aims of ecological work used to inform the planning process are to minimise harm and to maximise benefits for biodiversity resulting from development. The generally accepted way of doing this, now embedded within the planning system, is to follow the "mitigation hierarchy". This seeks as a preference to avoid impacts then to mitigate unavoidable impacts, and, as a last resort, to compensate for unavoidable residual impacts that remain after avoidance and mitigation measures (BS42020:2013 Biodiversity Code of Practice for Planning and Development. BSI Standards Limited 2013).

The Strategy consists of 'main' defences, designed to protect the centre of Bristol from flooding, and 'detriment mitigation' defences. For the purposes of design and ease of reference the main defences have been split into six geographical areas:

- Entrance Lock – from Hotwell Road, around the Tongue Head and end of Spike Island to the Brunel Way flyover, and including new lock gates;
- Spike Island – from the Brunel Way flyover along the north bank of the River Avon to the eastern end of the Chocolate Path, including a new flood gate under Cumberland Road;
- Redcliffe – from God's Garden along the north Bank of the River Avon to Bristol Temple Meads;
- Feeder Road – from Bristol Temple Meads along the south bank of the Feeder Canal;
- St Philip's Marsh - from Bristol Temple Meads to Sparke Evans park on the north bank of the River Avon;
- Netham Lock – from the Avon railway bridge along the north bank of the River Avon to Netham Lock, including a new flood gate;

Detriment mitigation defences outside of these areas are designed primarily to prevent detriment – i.e. to ensure that no areas are at an increased risk of flooding due to the presence of the main defences. These will be categorised similarly once the extents are defined.

This report updates a previous version to include updated areas for proposed flood defences.

1.4 Legislative Context and Policy Framework

A framework of international (European), national and local legislation and planning policy guidance exists to protect and conserve wildlife and habitats. The following core legislation exists to protect habitats and species of nature conservation importance:

- The Conservation of Habitats and Species Regulations 2017 (as amended) (EU Exit) transposes Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the Habitats Directive) into UK law[2];
- Ramsar Convention 1971;
- Wildlife and Countryside Act 1981 (as amended) (WCA);
- The Invasive Alien Species (Enforcement and Permitting) Order 2019;
- National Park and Access to the Countryside Act 1949 (as amended);
- The Environment Act 2021;
- Natural Environment and Rural Communities (NERC) Act 2006;
- The Hedgerow Regulations 1997;
- Protection of Badgers Act 1992;
- The Wild Mammals (Protection) Act 1996;
- The Salmon and Freshwater Fisheries Act 1975 (as amended); and
- The Eels (England and Wales) Regulations 2009.

These pieces of legislation include a number of offences relating to protected species and requirements for licences to allow construction works to proceed. In addition, the Habitats Regulations set out the requirement for the consideration of the potential effects of a project on International Sites.

[2] As a result of The Beavers (England) Order 2022, the Eurasian beaver (*Castor fiber*) is now listed under Schedule 2 of the Conservation of Habitats and Species Regulations, meaning beaver are protected against unlicensed capture, killing, or disruption.

Actions which are prohibited by legislation can be made lawful on the approval and granting of a protected species licence, subject to conditions.

The following pieces of policy and guidance have also been considered with regards to requirements for protection as well as enhancement opportunities:

- National Planning Policy Framework (NPPF);
- UK Post-2010 Biodiversity Framework;
- Bristol Development Framework Core Strategy Adopted June 2011[3] (notably PPS9, Policy BCS14, BCS15 and BCS23);
- Bristol Biodiversity Action Plan (BAP)[4] and Species and Habitat Action Plans[5];
- One City Ecological Emergency Strategy[6]; and,
- Ecological Emergency Action Plan 2021 – 2025[7].

[3] Bristol Development Framework Core Strategy Adopted June 2011 https://www.bristol.gov.uk/files/documents/64-core-strategy-web-pdf-low-res-with-links/file [Accessed May 2023]

[4] Bristol BAP https://www.bristol.gov.uk/files/documents/786-bbap/file [Accessed May 2023]

[5] Bristol BAP Species and Habitat Action Plans https://www.bristol.gov.uk/council-and-mayor/policies-plans-and-strategies/energy-and-environment/bristol-biodiversity-action-plan#:~:text=The%20Bristol%20Biodiversity%20Action%20Plan%20aims%3Aandtext=Encourage%20a%20common%20approach%20to,essential%20element%20of%20sustainable%20development [Accessed May 2023]

[6] Bristol One City Ecological Emergency Strategy https://www.bristolonecity.com/wp-content/uploads/2020/09/One-City-Ecological-Emergency-Strategy-28.09.20.pdf [Accessed May 2023]

[7] Bristol City Council Ecological Emergency Action Plan 2021 - 2025 https://www.bristol.gov.uk/files/documents/794-ecological-emergency-action-plan/file [Accessed May 2023].

2. Methodology

2.1 Desk Study

A desk study was undertaken to identify any existing ecological information relating to the Site and its surroundings. The Multi-Agency Geographic Information for the Countryside (MAGIC)[8] website was reviewed for information on internationally designated sites of nature conservation importance within 10km of the Strategy, nationally and locally designated sites of nature conservation importance within 2km.

The search included Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Ramsar Sites, Sites of Special Scientific Interest (SSSIs), National Nature Reserves (NNRs) and Local Nature Reserves (LNRs). MAGIC was also searched for the presence of Habitats of Principal Importance (HPIs)[9] and Ancient Woodland Inventory (AWI) sites within 500m. The Woodland Trust's Ancient Tree Inventory map[10] for the UK was also used to search for veteran tree data within 500m of the 13 Strategy sites.

In addition, biodiversity data was obtained from the Bristol Regional Environmental Records Centre (BRERC) on 15th June 2023. The data included records of protected and priority species within 2km of the Strategy, local non-statutory designations such as Sites of Nature Conservation Importance (SNCIs), Bristol Wildlife Network Sites (BWNSs), Strategic Nature Areas (SNAs) and Avon Wildlife Trust Reserves (AWTRs) within 1km, and invasive non-native species within 500m. The search was extended to 5km for records of bats. The MetroWest National Infrastructure Planning website[11] was reviewed for any protected species/notable habitat records within 2km of the Strategy Sites.

2.2 Field Survey

Due to the size of the site, the field survey was conducted over several days across spring and summer 2022 and 2023. Surveys were conducted by suitably experienced and suitably qualified Arup ecologists, as detailed in Table 1 and as follows:

- Charlotte Phillips BSc (Hons) MSc (MoRPh survey qualified)
- Adam Cross PhD BSc (Hons) MCIEEM
- Eloise Arif BSc (Hons) ACIEEM (MoRPh survey qualified)
- Chloe Hooper BSc (Hons), MSc, QCIEEM
- Bethan Follis BSc (Hons) MSc AIEMA
- Eleanor Harrison MSci, QCIEEM
- Emma Hardwick, QCIEEM

The field survey comprised UK Habitats Classification (UKHab), Modular River Physical (MoRPh) and European University Information Systems organisation (EUNIS) surveys, more details of which are provided within this section in subsequent paragraphs.

[8] https://magic.defra.gov.uk/Metadata_for_MAGIC/Metadata%20for%20Priority%20Habitats%20%20Inventory%20verison%202.1%20-%20Deciduous%20Woodland.pdf [Accessed May 2023]

[9] Habitats of principal importance (HPIs) as listed in response to Section 41 of the NERC Act 2006.

[10] Woodland Trust Ancient Tree Inventory. Available at: https://ati.woodlandtrust.org.uk/ [Accessed June 2023].

[11] https://infrastructure.planninginspectorate.gov.uk/projects/south-west/portishead-branch-line-metrowest-phase-1/?ipcsection=docs&stage=app&filter1=Environmental+Statement

Table 1: Survey dates, locations and surveyor details

Date	Survey area	Survey type	Surveyors
13th May 2022	Pill, Shirehampton	Terrestrial UK Habs	Charlotte Phillips Adam Cross
17th May 2022			
30th May 2022	Sea Mills, Bower Ashton, Entrance Lock	Terrestrial UK Habs	Eloise Arif Chloe Hooper
31st May 2022			
14th June 2022	Netham, Netham Left Bank, Netham Right Bank, St Annes	Terrestrial UK Habs and MoRPh	Charlotte Phillips Adam Cross
23rd June 2022	Netham, Netham Left Bank, Netham Right Bank	Terrestrial UK Habs	Adam Cross Chloe Hooper
30th June 2022	Revised Area 10 (Pump House), Upstream Right Bank	Terrestrial UK Habs and MoRPh	Eloise Arif Chloe Hooper
12th July 2022	Revised Area 10 (Pump House), Upstream Left Bank	Terrestrial UK Habs and MoRPh	Charlotte Phillips Chloe Hooper
21st July 2022	Netham, Netham Left Bank, Netham Right Bank	Terrestrial UK Habs and MoRPh	Charlotte Phillips Chloe Hooper
1st August 2022	Pill, Shirehampton, Sea Mills	Intertidal EUNIS	Eloise Arif Bethan Follis
15th August 2022	Netham, Netham Right Bank	Terrestrial UK Habs and MoRPh	Charlotte Phillips Eloise Arif
27th April 2023	Chocolate path, City Centre	Terrestrial UK Habs	Chloe Hooper Eleanor Harrison
3rd May 2023	Chocolate path, City Centre	Terrestrial UK Habs	Chloe Hooper Eleanor Harrison
16th May 2023	Feeder Canal, City Centre	Terrestrial UK Habs and MoRPh	Eloise Arif Emma Hardwick
30th May 2023	Chocolate path, City Centre	Intertidal EUNIS	Bethan Follis Eleanor Harrison
31st May 2023	Chocolate path, City Centre	Intertidal EUNIS	Bethan Follis Eleanor Harrison

The terrestrial survey was undertaken following the UKHab[12] methodology. This is a standard technique for rapidly obtaining baseline ecological information over a large area of land. It is primarily a mapping technique and uses a standard set of habitat definitions for classifying areas of land on the basis of the vegetation communities present. Surveyors also assessed the potential for those habitats present to support legally protected or otherwise notable species.

Relevant faunal species included all those protected by European or UK law, and notable species including those species identified as being of principal importance (SPIs) in England, in response to Section 41 of the NERC Act 2006, as follows: bats, badger (*Meles meles*), hazel dormouse (*Muscardinus avellanarius*), otter (*Lutra lutra*), water vole (*Arvicola amphibius*), white-clawed crayfish (*Austropotamobius pallipes*), nesting and wintering birds, common reptile species (including adder (*Vipera berus*), grass snake (*Natrix helvetica*), slow-worm (*Anguis fragilis*) and common lizard (*Zootoca vivipara*)), amphibians (including a Habitat Suitability Index (HSI) assessment[13] of waterbodies on site for great crested newt (*Triturus cristatus*)), fish

[12] Butcher, B. et al. (2020). The UK Habitat Classification – Habitat Definitions Version 1.1

[13] Odiham *et al.* (2000). in ARG UK Advice Note 5: Great Crested Newt Habitat Suitability Index.

and assemblages of notable invertebrates. The habitats were also appraised for their potential to contain SPI other groups including vascular plants, bryophytes and fungi.

Evidence was also searched for of the presence of invasive non-native species (INNS) listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) and The Invasive Alien Species (Enforcement and Permitting) Order 2019 and subject to strict legal control, such as Japanese knotweed (*Reynoutria japonica*), Himalayan balsam (*Impatiens glandulifera*) and giant hogweed (*Heracleum mantegazzianum*).

For the unvegetated intertidal areas, the habitats were classified to at least EUNIS[14] Level 3, and to EUNIS Level 4 where possible. The EUNIS habitat classification is a comprehensive pan-European system for habitat identification. The classification is hierarchical and covers a range of habitats, including natural, artificial and marine. The habitat types are identified by specific codes, names and descriptions.

All accessible areas of the sites were walked, and the relevant habitat types classified according to their vegetation types. Condition assessments were also undertaken of assessed habitats to inform a calculation of baseline biodiversity units using the industry standard Biodiversity Metric 3.1[15] (the 'Metric'). The methodology and results of these assessments will be reported in a separate Biodiversity Net Gain (BNG) Assessment report, along with the River Condition Assessment (RCA)[16] of the River Avon. The RCA included MoRPh surveys[17] of the sections of River Avon that fell within the 13 Strategy sites on survey dates where at least one surveyor was accredited surveyor in the MoRPh survey technique (see Table 1), full methodology and results of which will also be reported within the separate BNG Assessment report.

2.3 Limitations

The findings presented in this report represent those at the time of survey and reporting, and data collected from available sources. Ecological surveys can be limited by factors affecting the presence of plants and animals, such as the time of year, migration patterns and behaviour.

Whilst not a full protected species or botanical survey, the survey types undertaken allow an experienced ecologist to obtain a sufficient understanding of the ecology of a site in order to either evaluate its conservation importance and assess the potential for impacts on habitats and species likely to represent a material consideration in planning terms, or to ascertain whether further surveys will be required before such an evaluation can be made.

In some discrete areas, access was restricted either due to dense vegetation (e.g. scrub), health and safety issues (e.g. steep river banks), construction works, or landowner permissions. However, in these cases observations and some assumptions were possible from adjacent areas, using binoculars where necessary. This includes the classification of the intertidal mudflats to EUNIS level four; observations of infaunal communities are required for this level of classification, which was not possible due to health and safety constraints. As such, classification to this level has required assumptions made by a suitably experienced ecologist. It is considered that sufficient detail was still acquired to indicate what species these habitats may support and to inform this PEA and associated BNG Assessment report.

The absence of evidence of any particular species should not be taken as conclusive proof that the species is not present or that it will not be present in the future.

[14] Moss, D., (2008) EUNIS habitat classification – a guide for users

[15] The Biodiversity Metric 3.1 (JP039) (2022) http://publications.naturalengland.org.uk/publication/6049804846366720

[16] https://modularriversurvey.org/river-condition/ [Accessed May 2023]

[17] The MoRPh Survey Technical Reference Manual 2020 version

3. Results

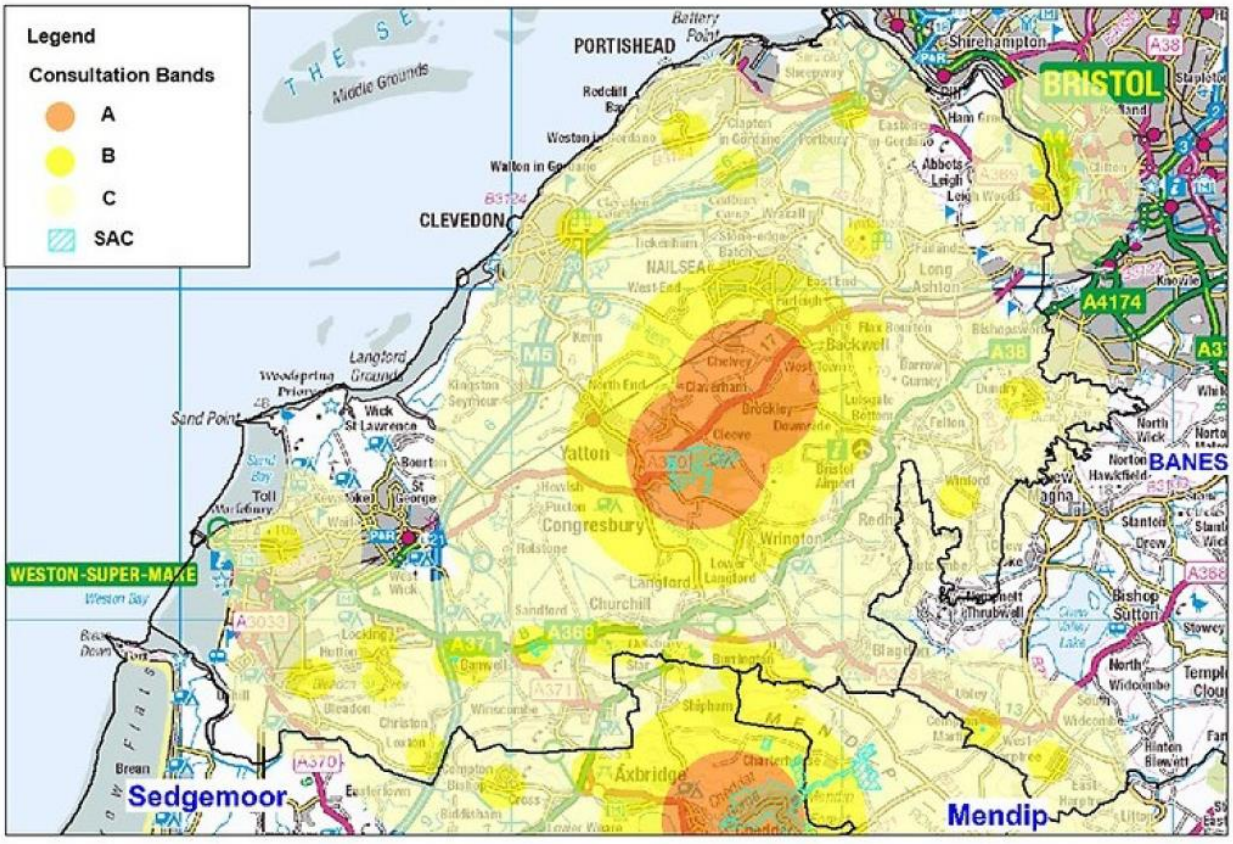
3.1 Desk Study

3.1.1 Statutory Designated Sites

The search using MAGIC highlighted four International Sites within 10km, eight national statutory sites within 2km and nine local statutory sites within 2km of the Strategy. These comprise two SACs, one SPA, one Ramsar site, seven SSSIs, one NNR and nine LNRs.

Details of these sites are provided in Table 2 and locations are displayed on Figure 2 and Figure 3.

In addition, the Bower Ashton and Entrance Lock sites are within Band B of the North Somerset and Mendip Bats SAC consultation zone, and City Centre within Band C, noting the SAC is located approximately 12.2km south-west. As such, consultation with North Somerset County Council and Natural England would be required for this SAC[18]. The location of this SAC and associated consultation zones are displayed on Picture 1 with details provided in Table 2.



Picture 1. North Somerset and Mendips Bats SAC Bat Consultation Zones.

[18] Mendip SAC Flowchart. Available from: https://www.n-somerset.gov.uk/sites/default/files/2020-02/NSC%20and%20Mendip%20Bats%20SAC%20guidance%20-%20supplementary%20planning%20document.pdf [Accessed July 2023]

Table 2: Statutory designated sites. Distances are approximate and are measured from the edge of the closest Strategy site to the closest edge of the designated site.

Site	Features	Closest Strategy site	Distance and orientation
International Sites			
Severn Estuary SAC	**Annex I habitats that are a primary reason for selection of this site:** • Estuaries • Mudflats and sandflats not covered by seawater at low tide • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) **Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site:** • Sandbanks which are slightly covered by sea water all the time • Reefs • Annex II species that are a primary reason for selection of this site: • Sea lamprey (*Petromyzon marinus*) • River lamprey (*Lampetra fluviatilis*) • Twaite shad (*Alosa fallax*)	Pill	Overlaps
Severn Estuary SPA	**This site qualifies under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:** • Overwintering Bewick's swan (*Cygnus columbianus bewickii*) **This site also qualifies under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species:** • On passage ringed plover (*Charadrius hiaticula*) • Overwintering curlew (*Numenius arquata*) • Overwintering dunlin (*Calidris alpina alpina*) • Overwintering pintail (*Anas acuta*) • Overwintering redshank (*Tringa totanus*) • Overwintering shelduck (*Tadorna tadorna*) **The area qualifies under Article 4.2 of the Directive (79/409/EEC) by regularly supporting an assemblage of at least 20,000 waterfowl.**	Pill	Overlaps
Severn Estuary Ramsar site	Designated for the following Ramsar Criteria: **Ramsar criterion 1:** Due to immense tidal range (second-largest in world), this affects both the physical environment and biological communities. **Ramsar criterion 3:** Due to unusual estuarine communities, reduced diversity and high productivity. **Ramsar criterion 4:** This site is important for the run of migratory fish between sea and river via estuary. Species include Atlantic salmon (*Salmo salar*), sea trout (*Salmo trutta*), sea lamprey, river lamprey, allis shad (*Alosa alosa*), twaite shad, and eel (*Anguilla anguilla*). It is also of particular importance for migratory birds during spring and autumn. **Ramsar criterion 8:** The fish of the whole estuarine and river system is one of the most diverse in Britain, with over 110 species recorded. The fish described above use the Severn Estuary as a key migration route to their spawning grounds in the many tributaries that flow into the estuary. The site is important as a feeding and nursery ground for many fish species particularly allis shad and twaite shad which feed on mysid shrimps in the salt wedge.	Pill	Overlaps

Site	Features	Closest Strategy site	Distance and orientation
	Ramsar criterion 5: Supporting an overwintering assemblage of up to 70919 waterfowl. **Ramsar criterion 6**: Species / populations occurring at levels of international importance, including those mentioned in the SPA designation and greater white-fronted goose (*Anser albifrons*) and gadwall (*Anas strepera*),		
Avon Gorge Woodlands SAC	**Annex I habitats that are a primary reason for selection of this site:** • *Tilio-Acerion* forests of slopes, screes and ravines **Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site:** • Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*)	Bower Ashton	Overlaps
North Somerset and Mendip Bats SAC	**Annex I habitats that are a primary reason for selection of this site:** • Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) • Tilio-Acerion forests of slopes, screes and ravines **Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site:** • Caves not open to the public **Annex II species that are a primary reason for selection of this site** • Lesser horseshoe bat (*Rhinolophus hipposideros*) • Greater horseshoe bat (*Rhinolophus ferrumequinum*)	Bower Ashton and Entrance Lock are within Band B of the North Somerset and Mendip Bats SAC consultation zone	12.2km south-west
National sites (within 2km)			
Avon Gorge SSSI	The gorge has natural cliffs and quarry exposures of Carboniferous limestone, which are of great geological interest and, together with the screes, scrub, pockets of grassland and adjacent woodland, support an exceptional number of nationally rare and scarce plant species.	Bower Ashton	Overlaps
Severn Estuary SSSI	The immense tidal range (the second highest in the world) and classic funnel shape make the Severn Estuary unique in Britain and very rare worldwide. The intertidal zone of mudflats, sand banks, rocky platforms and saltmarsh is one of the largest and most important in Britain. The estuarine fauna includes: internationally important populations of waterfowl; invertebrate populations of considerable interest; and large populations of migratory fish, including the nationally rare and endangered allis shad. The SSSI forms a major part of a larger area of estuarine habitat, which includes the Upper Severn Estuary, the Taf/Ely Estuary and Bridgwater Bay.	Pill	Overlaps
Leigh Woods NNR	Forms part of the Avon Gorge SSSI and SAC. A high number of nationally rare and nationally scarce plant and insect species are present, along with a rich limestone rock flora and several Red List and WCA Schedule 1 bird species. The caves and veteran trees provide winter roosts for seven bat species. Grass snake are present. Likely the richest site for whitebeams (*Sorbus spp*.) in the world, with several species that grow only here.	Bower Ashton	Overlaps
Bickley Wood SSSI	This is the most extensive exposure of Carboniferous Downend Group strata in the Bristol Coalfield. This site is notified for geological features only and is therefore not considered further within this PEA.	Upstream Right Bank	36m north
Ashton Court SSSI	Ashton Court is important for its rich saproxylic invertebrate fauna including many species which are nationally scarce. Of major importance within the site is Clarkencombe Wood which by itself has the richest variety of saproxylic Coleoptera due to a significant concentration of ancient oak pollards. Elsewhere the ancient trees occur as open parkland trees either singly or in small groups and also as single trees within relatively modern plantations. The ancient trees	Bower Ashton	71m west

Site	Features	Closest Strategy site	Distance and orientation
	include ash (*Fraxinus excelsior*), wych elm (*Ulmus glabra*) and beech (*Fagus sylvatica*) although the majority are oak (*Quercus robur*).		
Horseshoe Bend, Shirehampton SSSI	This site comprises a wooded river cliff and a narrow fringe of saltmarsh on the north bank of the River Avon. The river cliff supports the largest known English population of the nationally rare true service-tree (*Sorbus domestica*). Other species of interest include field garlic (*Allium oleraceum*) and pale St John's-wort (*Hypericum montanum*). The saltmarsh at the base of the cliff is dominated by sea aster (*Aster tripolium*) and English scurvygrass (*Cochlearia anglica*). Two nationally scarce plant species slender hare's-ear (*Bupleurum tenuissimum*) and long-stalked orache (*Atriplex longipes*) also occur.	Sea Mills	550m north-east
Ham Green SSSI	This site is one of the last good exposures of 'high' terrace deposits along the Bristol Avon. This site is notified for geological features only and is therefore not considered further within this PEA.	Shirehampton	738m south-east
Cleeve Wood, Hanham SSSI	Cleeve Wood is situated on the steep south facing slopes of the River Avon valley. The primary scientific interest of the wood is the particularly large population of Bath asparagus (*Ornithogalum pyrenaicum*) which it supports. The wood is planted with several non-native species, but in the more natural areas of the wood ash is dominant with occasional pedunculate oak standards.	Upstream Right Bank	1.35km east
Local sites (within 2km)			
Lamplighters Marsh LNR	A nature reserve with a variety of semi-natural habitats including scrub, grassland and salt marsh. Lamplighter's Marsh lies at the mouth of the Severn Estuary, on the flood plain of the River Avon just above high-water level.	Shirehampton	Overlaps
Avon New Cut LNR	A wildlife rich waterway alongside the River Avon. The Avon New Cut is home to a wide variety of plants and animals, including some rare species.	Bower Ashton and City Centre	Overlaps
Eastwood Farm LNR	Riverside nature reserve with woodland, ponds and abundant wildlife.	Upstream Left Bank	Immediately south
Avon Valley Woodland LNR	The maturing broadleaved woodlands are home to a variety of species. Habitats include oak woodland, willow (*Salix spp.*) scrub and pasture.	Upstream Right Bank	31m north
Troopers Hill LNR	A unique area of acid grassland and heathland, providing a habitat and food source for many species.	Netham Right Bank	86m north-east
St George's Flower Bank LNR	One 50m stretch contains 50 different species of plant including primroses (*Primula vulgaris*), cowslips (*Primula veris*), meadow plants and a variety of orchids. Also present are a variety of birds and insects which include butterflies and moths.	Pill	1.16km south
Stockwood Open Space LNR	Most of the reserve is old grassland and unploughed meadows on lime-rich clay soils. Cowslip, dyer's greenweed (*Genista tinctoria*) and bird's-foot trefoil (*Lotus corniculatus*) provide splashes of yellow here in summer, and numerous butterflies include meadow brown (*Maniola jurtina*), marbled white (*Melanargia galathea*) and large skipper (*Ochlodes sylvanus*).	Upstream Right Bank	1.17km south
Royate Hill LNR	Unusual reserve on top of a 19th century railway viaduct. The habitats on the site range from limestone flora on the embankment top, to flower rich grassland, developing woodland and scrub on the embankment sides. Species such as oxeye daisy (*Leucanthemum vulgare*), mouse eared chickweed (*Cerastium fontanum*) and bee orchid (*Ophrys apifera*) have been recorded at the site.	Netham Right Bank	1.64km north
Callington Road LNR	A nature reserve supporting various wildlife species with wildflowers and a pond.	Netham	1.77km south

3.1.2 Non-Statutory Designated Sites

BRERC returned information on 48 non-statutory SNCIs, four SNAs, three AWTRs, and 88 BWNSs within 1km of the Strategy. Due to the volume of non-statutory designated sites within 1km, only those that overlap with or lie immediately adjacent to one of the Strategy sites are detailed in Table 3 below. All others are detailed within Table 21 in Appendix A. All 48 SNCIs are displayed on Figure 4, and the remaining non-statutory sites are displayed on Figure 6.

Table 3: Non-statutory designated sites that overlap with or lie immediately adjacent to the Strategy. Distances are approximate and are measured from the edge of the closest Strategy site to the closest edge of the designated site.

Site name	Features	Closest Strategy site	Distance and orientation
River Avon (Bristol) SNCI	Range from tidal saline region in west (confluence with the River Severn), through brackish to freshwater in the City Centre, then tidal to St. Anne's. Includes HPI mudflats, and possibly coastal saltmarsh. In mudflat Strategic Network Area (SNA).	Pill and City Centre	Overlaps
Land adjacent to Severn Estuary SSSI (Portbury) SNCI	Majority of site lies within Severn Estuary SPA, cSAC, Ramsar and SSSI, and includes areas of 5 HPIs plus ancient semi-natural woodland (East Wood) and several important geological features. Many scarce flora and fauna species present.	Pill	Overlaps
Lamplighter's Marsh SNCI	North of railway line is an area of demolished pre-fabricated housing and a sports ground. South of line are areas of saltmarsh-influenced grassland, ruderal communities, grassland, scrub and secondary woodland. Invertebrates and birds, especially warblers.	Shirehampton	Overlaps
Avon Gorge and Leigh Woods SNCI	Contains HPI upland mixed ashwoods, Wet woodland and lowland calcareous grassland. Protected fauna present and includes large parts of Avon Gorge SSSI, Leigh Woods NNR, Avon Gorge Woodlands cSAC and Leigh Woods/ Oak Woods AWI. Located within an SNA.	Bower Ashton	Overlaps
Feeder Side SNCI	Artificial water channel with semi-improved neutral grassland and scrub along banks. Rat's-tail fescue (*Vulpia myuros*), rue-leaved saxifrage (*Saxifraga tridactylites*), common scurvygrass (*Cochlearia officinalis*) and reed sweet-grass (*Glyceria maxima*).	Netham and City Centre	Overlaps
Conham Vale and Dundridge Farm Woodland SNCI	Semi-natural acid woodland including HPI lowland mixed deciduous woodland (much disturbed in the past by quarrying and industrial tipping). Semi-improved neutral and acidic grassland with shrubs and tall herbs.	Netham Right Bank	Overlaps
St Anne's Wood SNCI	The valley sides are clothed in semi-natural broadleaved woodland, with amenity grassland in the bottom of the valley, on either side of the Brook. The woodland has suffered disturbance and non-native species are present in some places.	St Annes	Overlaps
Birch Wood SNCI	Ancient semi-natural broad-leaved (some on AWI) and planted mixed woodland, which may include HPI lowland mixed deciduous woodland. Areas of grassland and scrub.	Revised Area 10	Overlaps
Eastwood Farm SNCI	Restored landfill site. Remnants of agricultural landscape, with broadleaved woodland, wildflower-rich meadows, ponds and water meadows. Includes HPI lowland mixed deciduous woodland. Diverse fauna present. Majority of the site is also an LNR.	Upstream Left Bank	Overlaps

Site name	Features	Closest Strategy site	Distance and orientation
River Avon (South Gloucestershire) SNCI	Flowing open water and bankside vegetation.	Upstream Right Bank	Overlaps
Severn Estuary SNCI	Intertidal zone of mudflats, sand banks, rocky platforms and saltmarsh form very important habitats for plants, waterfowl, invertebrates and migratory fish. HPIs mudflats and maritime cliff and slope. Rare bird and fish spp. Present, as well as important geological features.	Pill	Immediately north
Crew's Hole Woodland SNCI	Broadleaved woodland possibly including areas of HPI lowland mixed deciduous woodland and scrub.	Netham Right Bank	Immediately north
Avon Valley, Bickley Wood SNCI	Diverse AWI on acid soils with associated ground flora. Geological SSSI. HPI lowland mixed deciduous woodland.	Upstream Right Bank	Immediately north
Gorge and Downs SNA	Main habitat woodland. Additional habitats calcareous and neutral grassland.	Bower Ashton, Entrance Lock and Sea Mills	Overlaps
Abbots Leigh SNA	Main habitat woodland. Additional habitats calcareous and neutral grassland.	Bower Ashton	Overlaps
Mudflats SNA	Main habitat mudflats.	Pill, Shirehampton, Sea Mills, Bower Ashton, Entrance Lock, City Centre, Netham	Overlaps
Lamplighters Open Space	Bristol Wildlife Network Site.	Shirehampton	Overlaps
City and Port of Bristol Sports Ground	Bristol Wildlife Network Site.	Shirehampton	Overlaps
River Trym Confluence with River Avon	Bristol Wildlife Network Site.	Sea Mills	Overlaps
Cumberland Basin Lock	Bristol Wildlife Network Site.	Entrance Lock	Overlaps
Land between railway line and the River Avon	Bristol Wildlife Network Site.	Bower Ashton	Overlaps
Land between Brunel Way and the River Avon	Bristol Wildlife Network Site.	Bower Ashton	Overlaps
Bower Ashton Playing Fields	Bristol Wildlife Network Site.	Bower Ashton	Immediately south
Sparke Evans Park	Bristol Wildlife Network Site.	City Centre	Overlaps
Railway land Barrow Rd to River Avon	Bristol Wildlife Network Site.	City Centre	Overlaps
New Brislington Bridge	Bristol Wildlife Network Site.	Netham	Overlaps
Land West of Riverside Surgery	Bristol Wildlife Network Site.	Netham Left Bank	Overlaps
Land between River Avon and Riverside Steps.	Bristol Wildlife Network Site.	Netham Left Bank	Overlaps

Site name	Features	Closest Strategy site	Distance and orientation
WNS_BCC_296	Bristol Wildlife Network Site.	Netham Left Bank	Overlaps
Bower Ashton Railway Line	Bristol Wildlife Network Site.	Bower Ashton	Overlaps
Butterfly Junction	Bristol Wildlife Network Site.	Entrance Lock	Overlaps
Land between River Avon and Cattle Market Road	Bristol Wildlife Network Site.	City Centre	Overlaps
Land between Whitby Road and River Avon	Bristol Wildlife Network Site.	St Annes	Overlaps
Land near New Brislington Bridge	Bristol Wildlife Network Site.	St Annes	Overlaps
Land North of St Annes Wood SNCI	Bristol Wildlife Network Site.	St Annes	Overlaps
Manor Farm Sports Ground & Playing Fields	Bristol Wildlife Network Site.	Sea Mills	Overlaps
Netham Park	Bristol Wildlife Network Site.	St Annes	Overlaps
Railway by Manor Farm Sports Ground	Bristol Wildlife Network Site.	Sea Mills	Overlaps
Railway land between Barrow Rd and Lawrence Hill	Bristol Wildlife Network Site.	City Centre	Overlaps
Signal Station Allotments & Harbour Wall	Bristol Wildlife Network Site.	Sea Mills	Overlaps
White City Allotments	Bristol Wildlife Network Site.	Bower Ashton	Overlaps

3.1.3 Habitats

The search using MAGIC and BRERC data search highlighted eight AWI sites (all 'Ancient and Semi-natural Woodland' sites) and nine HPI types within 500m of the Strategy sites. Details are provided in Table 4 and locations of AWIs are displayed on Figure 5.

A review of the Woodland Trust's Ancient Tree Inventory and the BRERC record search revealed no ancient, veteran or notable trees within any of the Strategy site boundaries, though there are several present within 500m of some of the sites. It should be noted that the absence of records does not necessarily mean that no ancient, veteran or notable trees are present, it may just mean that it has not been recorded. There is an ancient pedunculate oak (*Quercus robur*) approximately 270m south-east of the Pill site and 160m south of the Shirehampton site. There is a veteran pedunculate oak approximately 210m north-east of the Sea Mills south, with a cluster of ancient, veteran and notable trees[19] within Old Sneed Park approximately 230m south. There are numerous veteran trees in Leigh Woods running adjacent to the north western boundary of the Bower Ashton site (though none appear to fall within the site boundary itself). There are several veteran trees within Ashton Park approximately 250m south-west of the Entrance Lock site. A notable sycamore (*Acer pseudoplatanus*) is located approximately 430m west of the Upstream Left Bank site. One veteran oak is present approximately 500m south of the City Centre Cite, within Arnos Vale Cemetery. No ancient,

[19] Ancient trees are classified as a tree that has passed beyond maturity, and is old in comparison with other trees of the same species, Veteran trees are those with habitat features such as wounds or decay, whilst notable trees are usually mature trees which stand out in their local environment. (Woodland Trust, 2008. Available at: https://www.woodlandtrust.org.uk/media/1836/what-are-ancient-trees.pdf. [Accessed 20/07/2023]).

veteran or notable trees are present within 500m of Netham, Netham Left Bank, Netham Right Bank, St Annes, Revised Area 10 (Pump House) and Upstream Right Bank (Riverside Cottages).

Table 4. HPIs and AWI sites within 500m of the Strategy. Distances are approximate and are measured from the edge of the closest strategy site to the edge of the closest habitat type / AWI site.

HPI type / woodland name	Closest Strategy site	Distance and orientation
HPIs		
Coastal and floodplain grazing marsh	Pill	Overlaps
Coastal saltmarsh	Sea Mills	Overlaps
Mudflats	Bower Ashton and City Centre	Overlaps
Deciduous woodland	Upstream Left Bank	Overlaps
No main habitat but additional habitats present[20]	Upstream Right Bank	Overlaps
Lowland heathland	Netham Right Bank	94m east
Traditional orchard	Shirehampton	143m south
Lowland calcareous grassland	Bower Ashton	388m north
Lowland dry acid grassland	Netham Right Bank	411m south east
AWI sites		
Rownham Wood/ Leigh Woods	Bower Ashton	Overlaps
Birch Wood	Revised Area 10	Overlaps
Unnamed	Netham Right Bank	21m south
Unnamed	Upstream Right Bank	23m north
Unnamed	Upstream Right Bank	52m south
Bickley Wood	Upstream Right Bank	157m east
Unnamed	Sea Mills	342m south
Leigh Wood/Markham Bottom	Pill	455m south

3.1.4 Protected/Notable Species

Data was returned on several protected and notable species within 2km of the Strategy by BRERC (5km for bats). Details are provided in Table 5 below. Only those records from the past ten years (2014 onwards) are described, unless the historic records are worth noting, in which case the age of the data is highlighted within the table.

[20] Where candidate habitats remain but no main habitat can be identified the whole polygon is mapped as 'No main habitat but additional habitats' and the priority habitats thought to be present are shown within the attribution as additional habitats. For example, this may occur when different habitats overlay each other or habitat areas are smaller than the minimum mapping unit (0.25ha). https://magic.defra.gov.uk/Metadata_for_MAGIC/Metadata%20for%20Priority%20Habitats%20%20Inventory%20verison%202.1%20-%20Deciduous%20Woodland.pdf [Accessed May 2023]

Table 5. Protected and notable species data from the past ten years (2014 onwards) within 2km of the Strategy (5km for bats). Distances are approximate and are measured from the edge of the closest Strategy site to the record. Invasive non-native species are not included within their respective taxa's descriptions, but listed as a separate line item.

Species/group	Description
Bat	736 recent records of bat were returned by the data search within 5km of the Strategy. Species included three Annex II species: Barbastelle (*Barbastella barbastellus)* (one record), greater horseshoe bat (19 records), and lesser horseshoe bat (21 records). In addition, the following species/genera were recorded: *Plectotus* sp. (6 records), *Myotis* sp. (23 records), *Pipistrellus* sp. (40 records), *Vespertilionidae* sp. (3 records), brown long-eared bat (*Plecotus auritus*) (17 records), common pipistrelle (*Pipistrellus pipistrellus*), (163 records), Daubenton's bat (*Myotis daubentonii*) (4 records), Leisler's bat (*Nyctalus leisleri*) (45 records), Nathusius' pipistrelle (*Pipistrellus nathusii*) (10 records), Natterer's bat (*Myotis nattereri*) (3 records), noctule (*Nyctalus noctula*) (101 records), serotine (*Eptesicus serotinus*) (77 records), soprano pipistrelle (*Pipistrellus pygmaeus*) (63 records), whiskered bat (*Myotis mystacinus*) (10 records), *Nyctalus* sp. (1 record), and *Nyctalus/Eptesicus* sp. (3 records). Four bat records fall on or within the Strategy boundary (at Shirehampton and City Centre). In addition to the above species records, 420 bat roost records were returned by the data search, including roosts of the Annex II species greater and lesser horseshoe bat. These records covered all areas of the Strategy, and include fourteen records of greater horseshoe roosts and over 100 records of lesser horseshoe roosts (most recent records from 2020). Nine of these records are located within 1km of the Strategy Sites.
Beaver	No records of beaver were returned by the data search within 2km of the Strategy, however a recent report by Natural England reports 13 known beaver territories within the River Avon and surveyed tributaries[21]. In addition, an individual was recently sighted by a member of the public within the River Avon adjacent to the City Centre site of the Strategy[22]. As such, beaver are known to be present within the wider catchment.
Hazel dormouse	13 records of dormouse since 2014 were returned by the data search, within 2km of the Strategy. All of these records were within Leigh Woods/Abbots Leigh, which overlaps with the Bower Ashton site.
Otter	The data search returned 89 records of otter within 2km of the Strategy, since 2014. Otter are known to be present along the River Avon and it is assumed they would likely be present within all suitable habitat across all Strategy sites, even in the absence of nearby records.
Water vole	Eight records of water vole were provided, from between 2015 and 2017. The nearest records and most recent records are three records from Lawrence Weston Rhines in 2017, approximately 1.4km from Shirehampton. Three of the remaining records are similarly from the Lawrence Weston area, with the remaining two further east, 950m south of Bower Ashton and in the River Avon by Feeder Road, immediately adjacent to Netham. The Water Vole habitats layer returned by BRERC returned one watercourse from the last ten years – Colliter's Brook, approximately 1km south of Bower Ashton.
Badger	142 recent records of badger were returned by the data search, including live sighting, trail camera footage, road casualties, latrines and tracks. Records were particularly common within and in close proximity to Abbots Leigh and Shirehampton.
Birds	Over 10,000 recent records of 150 species of bird were returned by the data search (excluding invasive species). This included over 3000 records of Schedule 1 species, including barn owl (*Tyto alba*), black redstart (*Phoenicurus ochruros*), redwing (*Turdus iliacus*), Mediterranean gull (*Ichthyaetus melanocephalus*), crossbill (*Loxia curvirostra*), and firecrest (*Regulus ignicapilla*). Other species recorded include common passerine species (such as blue tit (*Cyanistes caeruleus*) and chiffchaff (*Phylloscopus collybita*)) and water birds (such as mute swan (*Cygnus olor*) and little egret (*Egretta garzetta*). Historic records were provided of other birds such as grey heron (*Ardea cinerea*), lesser black-backed gull (*Larus fuscus*) and mallard (*Anas platyrhynchos*). In addition, several raptor nests were returned within the search radius, including those of peregrine (*Falco peregrinus*), sparrowhawk (*Accipiter nisus*) and kestrel (*Falco tinnunculus*).

[21] Natural England. (2023). Wild beaver population assessment on the River Avon and Tributaries. Natural England Research Report NECR470.

[22] https://www.bbc.co.uk/news/av/uk-england-bristol-65276693

Species/group	Description
	Three wader and one gull high tide roost sites are present within or immediately adjacent to Sea Mills. The wading bird roosts are within the coastal saltmarsh, whilst the gull roost is recorded in open water. An additional wader roost is present on the opposite side of the River Avon to Sea Mills[23].
Reptiles	The record search returned 133 records of reptiles from within 2km of the Strategy boundary, from the last ten years. The following species were recorded: common lizard (1 record), grass snake (*Natrix helvetica*) (9 records), slow worm (*Anguis fragilis*) (118 records), and the non-native wall lizard (*Podarcis muralis*) (5 records).
Amphibians	The record search returned 216 recent records of amphibians within the search area. These records include 40 records of common frog (*Rana temporaria*), 25 records of common toad (*Bufo bufo*), 41 records of great crested newt (*Triturus cristatus*), 35 records of palmate newt (*Lissotriton helveticus*) and 55 records of smooth newt (*Lissotriton vulgaris*). The remaining records were of unidentified frogs, toads, and newts. The closest record of great crested newt is approximately 560m north of City Centre.
White-clawed crayfish	No recent records of white-clawed crayfish were provided by BRERC within 2km of the Strategy sites.
Other invertebrates	Over 1000 recent records of invertebrates were returned by the data search, within 2km of the Strategy sites, comprised of 258 species. These records included (but were not limited to) the following Section 41 NERC and Avon BAP species: blood-vein (*Timandra comae*), brindled beauty (*Lycia hirtaria*), buff ermine (*Spilosoma lutea*), centre-barred sallow (*Atethmia centrago*), chalk carpet (*Scotopteryx bipunctaria*), cinnabar (*Tyria jacobaeae*), dark brocade (*Mniotype adusta*), dark spinach (*Pelurga comitata*), dingy skipper (*Erynnis tages*), dot moth (*Melanchra persicariae*), dusky thorn (*Ennomos fuscantaria*), feathered gothic (*Tholera decimalis*), garden dart (*Euxoa nigricans*), garden tiger (*Arctia caja*), and ghost moth (*Hepialus humuli)*.
Fish	Nine recent records of fish were returned by the data search, comprised of predominantly European eel (*Anguilla anguilla*) and one brown trout (*Salmo trutta* subsp. *fario*). The closest record was of eel, within 50m of the Strategy at St Annes.
Plants	The data search returned over 1000 recent records of plants within the search area. Of these records, the following species are listed under the Avon BAP and Section 41 NERC: Round-leaved whitebeam (*Sorbus eminens*), cornflower (*Centaurea cyanus*), Wilmott's whitebeam (*Sorbus wilmottiana*), Bristol whitebeam (*Sorbus bristoliensis*). The following plants are also recorded as rare in the BRERC region: round-headed leek (*Allium sphaerocephalon*), service tree (*Sorbus domestica*), western spiked speedwell (*Veronica spicata subsp. hybrida*), lesser meadow rue (*Thalictrum minus*), and four-leaved all-seed (*Polycarpon tetraphyllum*).
Other SPIs	One record of common porpoise (*Phocoena phocoena*) was returned by the data search, from 2020 and recorded between Hotwells and Sea Mills. Additionally, abundant records of hedgehog (*Erinaceus europaeus*) were returned, in addition to occasional records of harvest mouse (*Micromys minutus)*.
Invasive non-native species (INNS)	268 records of INNS of bird were returned by the data search, predominantly Canada goose (*Branta canadensis*), with seven records of mandarin duck (*Aix galericulata*) and singular records of Egyptian goose (*Alopochen aegyptiaca*), monk parakeet (*Myiopsitta monachus*) and bar-headed goose (*Anser indicus).* These records are scattered within and outside of the Strategy as a whole. 146 records of harlequin ladybird (*Harmonia axyridis*) were returned by the data search, within an in close proximity to several of the Strategy sites, with a large number of records from the Leigh Woods and Long Ashton areas. One record of American mink (*Neovison vison*) was returned from 2015, within the River Avon at Broom Hill. A large abundance (approximately 2000) of zebra mussel (*Dreissena polymorpha*) was recorded in 2019 within Bathurst Basin. Several floral INNS were returned by the data search, including the following species listed under Schedule 9 of the WCA 1981: Japanese knotweed, giant hogweed, variegated yellow archangel (*Lamiastrum galeobdolon* subsp. *argentatum*), Himalayan balsam, Virginia creeper (*Parthenocissus quinquefolia*), wall cotoneaster (*Cotoneaster horizontalis*), three-cornered garlic (*Allium triquetrum*), and montbretia (*Crocosmia pottsii x aurea = C. x crocosmiiflora*).

[23] https://naturalengland-defra.opendata.arcgis.com/datasets/severn-estuary-high-tide-waterbird-roost-sites-clevedon-to-oldbury-in-bridgwater-bay/explore?location=51.483537%2C-2.652460%2C15.18

3.2 Field Survey

3.2.1 Habitats

3.2.1.1 Pill

The habitats identified at the Pill site are described in Table 6 and displayed on Figure 7A.

Table 6. Description of UKHab Classification types present at Pill.

UKHab type (code)	Description
Arrhenatherum (oatgrass) neutral grassland (g3c5)	Several areas of grassland were recorded across the Pill site, including one area of more diverse and less modified Arrhenatherum (oatgrass) neutral grassland. Species included meadow foxtail (*Alopecurus pratensis*), marsh foxtail (*Alopecurus geniculatus*), yellow rattle (*Rhinanthus minor*), false oat-grass (*Arrhenatherum elatius*), hairy tare (*Vicia hirsuta*), mouse-ear (*Cerastium fontanum*), common nettle (*Urtica dioica*), tufted vetch (*Vicia cracca*), greater plantain (*Plantago major*), ribwort plantain (*Plantago lanceolata*), creeping buttercup (*Ranunculus repens*), dandelion (*Taraxacum* sp.), broad-leaved dock (*Rumex obtusifolius*), soft brome (*Bromus hordeaceus*) and cut-leaved cranesbill (*Geranium dissectum*).
Modified grassland (g4)	Three areas of more intensively managed, modified grassland were recorded: extending around the embankment along a Public Right of Way (ProW) to the west and amenity areas around the old harbour. The modified grassland areas comprised cock's-foot (*Dactylis glomerata*), Yorkshire fog (*Holcus lanatus*), annual meadow-grass (*Poa annua*), dandelion, musk stork's-bill (*Erodium moschatum*), creeping buttercup, clover (*Trifolium* sp.), bristly oxtongue (*Helminthotheca echioides*), ribwort plantain, greater plantain, perennial ryegrass (*Lolium perenne*), meadow foxtail and common daisy (*Bellis perennis*).
Hedgerow (priority habitat) (h2a)	A priority hedgerow was located to the west, between an area of modified grassland and a residential property, comprising hawthorn (*Crataegus monogyna*), silver birch (*Betula pendula*), bramble and a Viburnum species.
Mixed scrub (h3h)	One small area of mixed scrub was located to the west, between the g3c5 grassland and the coastal saltmarsh. Species comprised plum (*Prunus domestica*), elm (*Ulmus* sp.), hawthorn and bramble (*Rubus fruticosus* agg.).
Coastal saltmarsh (t2a)	Coastal saltmarsh was present along the length of the site, comprising the upper, vegetated section of the intertidal mudflats. In some areas, the saltmarsh was interrupted due to the presence of artificial features such as the retaining wall. Species present within the coastal saltmarsh included sea couch grass (*Elymus pungens*), English scurvy grass (*Cochlearia anglica*), sea arrow grass (*Triglochin maritima*), spear-leaved orache (*Atriplex prostrata*), sea aster (*Tripolium pannonicum*) and tall fescue (*Festuca arundinacea*). Coastal saltmarsh is categorised to EUNIS Level 2 as littoral sediment and Level 3 as A2.5 Coastal saltmarshes and saline reedbeds. The saltmarsh also extended back from the riverbank into a field (Figure 7A) which was historically stock-grazed (approximately ten years ago). It is considered likely that at that point, the habitat would have been considered a HPI of coastal and floodplain grazing marsh, however, is no longer given the area is not grazed[24]. As such, there could be potential for this HPI to be restored, which may require the re-introduction of stock-grazing.
Intertidal mudflat (t2d)	Below the vegetated coastal saltmarsh was an area of littoral mud forming extensive mudflats, also occasionally interrupted by artificial features such as outfalls, the slipway and the river wall. This was categorised to EUNIS Level 3 as littoral mud and to EUNIS Level 4 as A2.32 Polychaete/oligochaete-dominated upper estuarine mud shores (JNCC code LS.Lmu.Uest). Some rocks were sparsely present, along with occasional presence of fucoids, including *Fucus ceranoides* to the west then more frequent along the wall to east. Filamentous algae mats were identified adjacent to the river wall which could be attributed to nutrient enrichment. Some pieces of large litter (likely tipped), such as trolleys and office chairs were identified throughout the habitat. There were some small areas of shingle and small rocks present at the lower shower, exposed by low tide.

[24] JNCC. (2008). UK Biodiversity Action Plan Priority Habitat Descriptions. Coastal and Floodplain Grazing Marsh. Available from: https://jncc.gov.uk/our-work/uk-bap-priority-habitats/ [Accessed July 2023].

UKHab type (code)	Description
Developed land; sealed surface (u1b)	Several areas of hardstanding were present across the site, including pavements and roads.
Suburban/ mosaic of developed/ natural surface (u1d)	Several residential buildings with associated gardens were present to the south of the site.
Built linear features (u1e)	An artificial stone river wall runs along the Marine Parade and around to the old harbour, which interrupts some of the natural intertidal transitional zones.
Other lowland mixed deciduous woodland (w1f7)	Lowland mixed deciduous woodland was present to the south-east of the site, extending along the river banks. Species included oak, ash, Scot's pine (*Pinus sylvestris*), cherry (*Prunus avium*), hazel (*Corylus avellana*), silver birch, field maple (*Acer campestre*), blackthorn (*Prunus spinosa*), hawthorn, dogwood (*Cornus* sp.), bramble, pignut (*Conopodium majus*), ivy (*Hedera helix*), rose (*Rosa* sp.), woodrush (*Luzula* sp.) and cleavers (*Galium aparine*).
Other broadleaved woodland types (w1g7)	A small block of other broadleaved woodland was located within the g3c5 grassland to the north of the site. Species comprise hawthorn, crack willow (*Salix × fragilis*), grey willow (*Salix cinerea*), poplar (*Populus* sp.), ash, oak, field maple, bramble, common nettle, hogweed (*Heracleum sphondylium*) and ivy.

3.2.1.2 Shirehampton

The habitats identified at the Shirehampton site are described in Table 7 and displayed on Figure 7A.

Table 7. Description of UKHab Classification types present at Shirehampton.

UKHab type (code)	Description
Other neutral grassland (g3c)	An area of neutral grassland was present around the Shirehampton sailing club slipway, comprising red fescue (*Festuca rubra*), sea couch grass, perennial ryegrass, dandelion, black medick (*Medicago lupulina*), mouse-ear, common daisy, ribwort plantain, wild carrot (*Daucus* sp.), clover, buck's-horn plantain (*Plantago coronopus*) and fern-grass (*Catapodium rigidum*). A rubble pile (TN A1) was present adjacent to this grassland area. Other neutral grassland was present in discrete areas in the north of the Shirehampton site, comprising rough meadow-grass (*Poa trivialis*), annual meadow-grass, tufted vetch, narrow-leaved everlasting-pea (*Lathyrus sylvestris*), traveller's joy (*Clematis vitalba*), white campion (*Silene latifolia*), red clover (*Trifolium pratense*), hedgerow crane's-bill (*Geranium pyrenaicum*), dandelion, melilot (*Melilotus sp.*).
Modified grassland (g4)	Large areas of modified grassland were present in amenity spaces across the Shirehampton site, including a large park area to the south. Species across this habitat type included rough meadow-grass, sterile brome (*Bromus sterilis*), common nettle (dominant in area to north), cleavers, hogweed, ground ivy (*Glechoma hederacea*), common reed (*Phragmites australis*), broad-leaved dock, white dead nettle (*Lamium album*), wall barley (*Hordeum murinum*), wild carrot, fern-grass, black medick, clover, dandelion, annual meadow-grass, perennial ryegrass and ribwort plantain.
Hedgerow (priority habitat) (h2a)	Several priority hedgerows were present to the north of the site, around the grassland and scrub areas and through the parkland to the south. Species comprised hawthorn (dominant in hedgerow to north), dog rose (*Rosa canina*), bramble, clematis (*Clematis* sp.), wild privet (*Ligustrum vulgare*) and hazel.
Other hedgerows (h2b)	A non-priority hedgerow, comprising largely bramble, was present alongside a ditch within the centre of the site around the sea cadets building, at the base of an embankment.
Bramble scrub (h3d)	A large area of bramble-dominant scrub was present to the north of the site. Other species included hawthorn, elder (*Sambucus nigra*), buddleia (*Buddleja* sp.), with some scattered fruit trees (possible pear (*Pyrus* sp.)). Japanese knotweed was also present.
Mixed scrub (h3h)	South of the bramble scrub was a large mixed scrub area with scattered trees, comprising hawthorn, blackthorn, bramble, hazel, elder and rowan (*Sorbus aucuparia*).
Coastal saltmarsh (t2a)	As with Pill, coastal saltmarsh was present along the length of the site, comprising the upper, vegetated section of the intertidal mudflats but occasionally being interrupted by artificial structures, such as the slipway. Species included sea couch grass, common saltmarsh grass (*Puccinellia*

UKHab type (code)	Description
	fasciculata), sea aster, English scurvy grass, common reed, spear-leaved orache, wild garlic (*Allium vineale*) and one pampas grass plant (*Cortaderia selloana*), rough meadow-grass and hoary cress (*Lepidium draba*) on the upper regions. Towards the south-eastern end of the site, the habitat was gradually transitioning to reedbed (TN A2). Coastal saltmarsh is categorised to EUNIS Level 2 as littoral sediment and Level 3 as A2.5 Coastal saltmarshes and saline reedbeds.
Intertidal mudflat (t2d)	Below the vegetated coastal saltmarsh was an area of littoral mud forming extensive mudflats, also occasionally interrupted by artificial features such as a large culvert outfall to the west and a large slipway from the sailing club. This was categorised to EUNIS Level 3 as littoral mud and to EUNIS Level 4 as A2.32 Polychaete/oligochaete-dominated upper estuarine mud shores (JNCC code LS.Lmu.Uest). Some rocks were sparsely present. The eastern half of the habitat was not accessible due to health and safety concerns, but it was assumed that occasional presence of fucoids and filamentous algae was likely. There were some small areas of shingle and small rocks present at the lower shower, exposed by low tide.
Developed land; sealed surface (u1b)	Several areas of hardstanding were present across the site, including the car park, pathways, slipway and within the school playing field.
Buildings (u1b5)	A few residential and commercial buildings were present within the site, including the sea cadet building, with some made of brick and one made of corrugated metal sheeting.
Built linear features (u1e)	A wire fence with concrete posts surrounded the sewage pump station, and another wire mesh fence and concrete post surrounded the boat yard. A river wall defence is present above the neutral grassland around the car park.
Line of trees (w1g6)	Several planted lines of trees were present in the amenity areas around the car park and park. Species included white poplar (*Populus alba*), crack willow, broad-leaved limes (*Tilia platyphyllos*), mature sycamores and oaks.
Other woodland; mixed; mainly broadleaved (w1h5)	A small parcel of trees and scrub was present to the north of the park area, including willow, sycamore, cherry, Japanese spindle (*Euonymus japonicus*), white poplar and hazel with some coppice.

3.2.1.3 Sea Mills

The habitats identified at the Sea Mills site are described in Table 8 and displayed on Figure 7B.

Table 8. Description of UKHab Classification types present at Sea Mills.

UKHab type (code)	Description
Other neutral grassland (g3c)	Areas of other neutral grassland were scattered across the Sea Mills site. Scrub was beginning to encroach in some areas (comprising hawthorn, bindweed (*Convolvulus* sp.), bramble, ivy and common nettle), other areas were more eroded by recreational use or mown for a ProW, and to the north some saltmarsh species (sea couch grass) were present as the grassland transitioned to coastal saltmarsh. Species included creeping bent (*Agrostis stolonifera*), common bent (*Agrostis capillaris*), other bent species (*Agrostis* sp.), perennial ryegrass, cock's-foot, ribwort plantain, red clover, white clover (*Trifolium repens*), dandelion, black medick, common vetch (*Vicia sativa*), yarrow (*Achillea millefolium*), caper spurge (*Euphorbia lathyris*), crane's-bill (*Geranium* sp.), bindweed, cleavers, herb-robert (*Geranium robertianum*), lords-and-ladies (*Arum maculatum*), cow parsley (*Anthriscus sylvestris*), comfrey (*Symphytum* sp.), wall barley, common daisy, false oat-grass, *Solanum* sp., creeping thistle (*Cirsium arvense*), sow thistle (*Sonchus* sp.), curled dock (*Rumex crispus*), greater plantain, wild garlic and beetroot (*Beta vulgaris* subsp. *vulgaris*) (likely allotment escape).
Modified grassland (g4)	An area of mown amenity grassland was present to the east of the site, opposite some residential properties. Dominated by perennial ryegrass, other species included white clover, common daisy, wall barley and meadow buttercup (*Ranunculus acris*).
Bramble scrub (h3d)	Dense bramble scrub was present in the northern half of the site, with a narrow tall herb margin including cow parsley, field mustard (*Brassica rapa*) and creeping thistle. Other occasional woody species included sycamore, hawthorn and elder.
Mixed scrub (h3h)	Mixed scrub as present in the southern half of the site, forming two strips running alongside the ProW. Woody species included bramble, elder, oak, hawthorn, hazel and blackthorn. A narrow tall herb and grass margin included bindweed, docks (*Rumex spp.*), common nettle, false-oat grass, ribwort plantain,

UKHab type (code)	Description
	dandelion, cleavers, spear thistle (*Cirsium vulgare*), common bent, crane's-bill, willowherb (*Epilobium sp*.), woundwort (*Stachys sp*.), sow thistle, herb-Robert, cow parsley and garlic mustard (*Alliaria petiolata*).
Coastal saltmarsh (t2a)	Coastal saltmarsh (Figure 7B) was present along the length of the site, comprising the upper, vegetated section of the intertidal mudflats. In the southern half of the site, the vegetated area is fairly narrow due to the presence of a retaining wall. In the northern half of the site, there are no artificial structures and the saltmarsh extends to an area of scrub and grassland along the edge of the railway. Species included common saltmarsh grass, sea aster, sea couch grass (dominant in northern half), English scurvy grass, orache (*Atriplex* sp.). This habitat was categorised as EUNIS Level 2 as littoral sediment and Level 3 as A2.5 Coastal saltmarshes and saline reedbeds.
Intertidal mudflat (t2d)	Below the vegetated coastal saltmarsh was an area of littoral mud forming extensive mudflats, frequently interrupted and modified by walls, railway bridge footings, and boats and buoys on mooring ropes (particular in the centre and south of the site). This was categorised to EUNIS Level 3 as littoral mud and to EUNIS Level 4 as A2.32 Polychaete/oligochaete-dominated upper estuarine mud shores (JNCC code LS.Lmu.Uest). Some rocks were sparsely present, along with large clumps of fucoids in the midshore of the southern half of the site, and on the wall in the centre of the site. There was some occasional presence of fucoids to the north, and some filamentous algae observed at the southernmost point of the site (which could be attributed to nutrient enrichment), but none identified elsewhere. Some pieces of large litter were identified in the centre and south of the site. There were some small areas of shingle and small rocks present at the lower shower, exposed by low tide.
Developed land; sealed surface (u1b)	Sea Mills Lane is present in the southern half of the site, leading towards Sea Mills train station and across the railway.
Buildings (u1b5)	Several residential properties are present within the southern half of the site, one of which (on the corner of Hadrian Close) had a green roof (TN B1), comprising predominantly soil, mosses and short grasses.
Artificial unvegetated, unsealed surface (u1c)	Parts of the railway run through the centre of the site, with the abutments being built into the coastal saltmarsh and intertidal zone.
Suburban/ mosaic of developed/ natural surface (u1d)	A large part of the southern half of the site comprised the Sea Mills Signal Station Allotments. These were not accessed for detailed survey, and it is assumed that the majority of species are introduced typical allotment species. An assumed allotment escape (beetroot) was present within the adjacent neutral grassland.
Built linear features (u1e)	An artificial retaining stone river wall is present along the length of the southern half of the site, interrupting the natural transition of coastal saltmarsh to terrestrial. A stone wall in a state of disrepair was also present across the centre of the bay.
Line of trees (w1g6)	A mature line of trees was present bordering the south of the football pitches, comprising white willow (*Salix alba*), sycamore, hornbeam (*Carpinus betulus*) and ash with an ivy and bramble scrub understorey. A line of semi-mature amenity trees were present in the modified grassland, including horse chestnut (*Aesculus hippocastanum*), elder, false acacia (*Robinia pseudoacacia*), poplar and some hornbeam saplings.
Other broadleaved woodland types (w1g7)	A semi-mature strip of woodland was present running between Hadrian Close and the Portway, comprising sycamore, elder, hawthorn, ash, ivy, horse chestnut, poplar and blackthorn with an understorey of herb-robert, cock's-foot, bramble, common nettle, cleavers, common nipplewort (*Lapsana communis*), soft brome, rhubarb (*Rheum* sp.) and garlic mustard. A small pocket of immature woodland was present next to the railway, comprising horse chestnut, sycamore, blackthorn with an understorey of bramble scrub, perennial ryegrass, crane's-bill, soft brome, clover, false-oat grass, common salsify (*Tragopogon porrifolius*), cow parsley, cock's-foot, comfrey and spear thistle.

3.2.1.4 Bower Ashton

The habitats identified at the Bower Ashton site are described in Table 9 and displayed on Figure 7C.

Table 9. Description of UKHab Classification types present at Bower Ashton.

UKHab type (code)	Description
Other neutral grassland (g3c)	Other neutral grassland was present in amenity areas across the site (Figure 7C), with hardstanding public footpaths running throughout. At the time of the survey (end of May 2022), certain areas had been left unmown, so the overall grassland had a diverse structure, though species composition was relatively similar throughout with the exception of very localised differences. There was a small presence of ant hills where the grassland transitioned to scrub in the west. Species included cock's-foot, common bent, false-oat grass, Yorkshire fog, meadow buttercup. Creeping buttercup, crane's-bill, white clover, red clover, common hogweed, docks, common daisy, redshank (*Persicaria maculosa*), creeping cinquefoil (*Potentilla reptans*), dandelion, ragwort, cow parsley, thistles, perennial ryegrass, ribwort plantain, yarrow, rosebay willowherb (*Chamaenerion angustifolium*), bird's-foot trefoil (*Lotus corniculatus*), Timothy grass (*Phleum pratense*), hairy sedge (*Carex hirta*), ground ivy, bindweed, oxeye daisy (*Leucanthemum vulgare*) and a Turkey oak (*Quercus cerris*) sapling.
Arrhenatherum (oatgrass) neutral grassland (g3c5)	A narrow strip of unmown, more diverse, less managed Arrhenatherum (oatgrass) neutral grassland was present to the south of the site, bordering the footpath. Species included false-oat grass, common bent, cock's-foot, crane's-bill, ragwort (*Jacobaea vulgaris*), herb-Robert, hoary cress, buttercup (*Ranunculus* sp.), dandelion, cleavers, white clover, red clover, common daisy, thistles (*Cirsium* sp.) and an oak sapling.
Bramble scrub (h3d)	Several areas of bramble-dominant scrub were present across Bower Ashton. Other occasional woody species included sycamore, oak, dogwood, buddleia, hawthorn, elder and ash. Tall herbs and grasses scattered within and adjacent to the scrub areas included rosebay willowherb, common nettle, cow parsley, bindweed, cleavers, crane's-bill, ragwort, dandelion, white clover, buttercup, docks, common hogweed and teasel (*Dipsacus fullonum*).
Mixed scrub (h3h)	A small area of mixed scrub was present, transition into the woodland in the north, comprising bramble, dogwood, blackthorn, ivy, herb-robert, common nettle, dog-violet (*Viola riviniana*), common hogweed, docks, dandelion, forget-me-nots (*Myosotis* sp.), bindweed, ground ivy, ivy broomrape (*Orobanche hederae*), common bent, ribwort plantain, meadow buttercup, cock's-foot, black medick, yarrow and common daisy.
Coastal saltmarsh (t2a)	Coastal saltmarsh was present along the length of the site, comprising the upper, vegetated section of the intertidal mudflats. Again, the saltmarsh was occasionally impacted by artificial structures, such as bridge abutments, culverts and retaining walls. Species included sea aster, English scurvy grass, sea couch grass, common saltmarsh grass and orache (*Atriplex* sp.). The sea couch grass became more prevalent further west. Coastal saltmarsh is categorised to EUNIS Level 2 as littoral sediment and Level 3 as A2.5 Coastal saltmarshes and saline reedbeds.
Intertidal mudflat (t2d)	Below the vegetated coastal saltmarsh was an area of littoral mud forming extensive mudflats. This was categorised to EUNIS Level 3 as littoral mud and to EUNIS Level 4 as A2.32 Polychaete/oligochaete-dominated upper estuarine mud shores (JNCC code LS.Lmu.Uest). Mats of algae formed on the surface of the mud, particularly nearest to the more heavily modified area, which could be attributed to nutrient enrichment. A heavily modified area was present with large amounts of artificial structures encroaching on sediment and extending into the river, including concrete structures, walls along the riverbank and historical wooden structures. Several bridges also cross the site, with abutments within the mudflats. Several instances of litter were noted, including large items such as discarded trolleys and bikes, and smaller items such as plastic bottles.
Developed land; sealed surface (u1b)	A network of tarmac/concrete roads and footpaths were present throughout the Bower Ashton site.
Built linear features (u1e)	A retaining wall is present along the coastal saltmarsh to the north-west of the site.
Tilio-Acerion forests of slopes, screes and ravines (H9180) (w1b5)	The woodland to the north of the Bower Ashton site overlaps with the Avon Gorge Woodlands SAC, Avon Gorge SSSI, Leigh Woods NNR, the Avon Gorge and Leigh Woods SNCI and the Rownham Wood AWI site. The woodland has been classified as the Annex I habitat associated with the SAC to reflect the importance associated with the woodland as a feature of these designated sites and as species associated with this habitat type were recorded on site. However, only a relatively narrow margin of these sites fall into the Bower Ashton site boundary. The species recorded include small-leaved lime (*Tilia cordata*), sycamore, elm, ash, horse chestnut, hawthorn, buddleia, willow, oak, holm

UKHab type (code)	Description
	oak (*Quercus ilex*), alder (*Alnus glutinosa*), holly (*Ilex aquifolium*), apple (*Malus domestica*) and an unidentified conifer tree. The understorey and ground flora comprised sweet violet (*Viola odorata*), rosebay willowherb, hart's-tongue fern (*Asplenium scolopendrium*), bramble, meadow buttercup, dandelion, common vetch, ribwort plantain, white clover, ivy-leaved toadflax (*Cymbalaria muralis*), cock's-foot, common bent, common nettle, speedwell (*Veronica* sp.), crane's-bill, herb-Robert, dog's mercury (*Mercurialis perennis*), bindweed, hedge woundwort (*Stachys sylvatica*), ivy broomrape, black medick, perennial ryegrass, red clover, cow parsley, cleavers, male fern (*Dryopteris filix-mas*), docks, ragwort, wood avens (*Geum urbanum*), lords-and-ladies and pendulous sedge (*Carex pendula*).
Line of trees (w1g6)	Several semi-mature lines of planted trees were present across the amenity grassland areas, with species including horse chestnut, oak, Turkey oak, hornbeam, lime (*Tilia sp.*), ash, silver birch, wild cherry, field maple, sycamore and willow.
Other broadleaved woodland types (w1g7)	An area of mature (with some saplings) but sparse plantation / parkland trees was present on top of the neutral grassland to the south of the site. Sycamore was dominant with some London plane (*Platanus × acerifolia*).
Other woodland; mixed; mainly broadleaved (w1h5)	A strip of mixed semi-mature to mature woodland was present along the back of the Riverside Garden Centre, comprising elder, sycamore, dogwood, ash, horse chestnut and hawthorn, with a bramble, ivy and common nettle understorey.

3.2.1.5 Entrance Lock

The habitats identified at the Entrance Lock site are described in Table 10 and displayed on Figure 7C.

Table 10. Description of UKHab Classification types present at Entrance Lock.

UKHab type (code)	Description
Modified grassland (g4)	Narrow, heavily mown areas of modified grassland were present bordering hardstanding footpaths (Figure 7C), comprising perennial ryegrass, white clover, common daisy, dandelion, yarrow, plantain and herb-Robert.
Bramble scrub (h3d)	Some small areas of bramble-dominated scrub were present adjacent to the grassland, with some hawthorn, cleavers, common nettle, ragwort, cow parsley, herb-Robert and common daisy.
Mixed scrub (h3h)	Some ornamental introduced scrub/shrubs were also present adjacent to the grassland, including Japanese barberry (*Berberis thunbergii*), sycamore (one particularly large), Spanish gorse (*Genista hispanica*), blackthorn, bramble, ash and bindweed.
Coastal saltmarsh (t2a)	Coastal saltmarsh was present around the southern section of Entrance Lock. However, the coastal saltmarsh zone was absent from the northern sections due to the presence of an artificial retaining wall, which meant the intertidal mudflat zone transitioned immediately to terrestrial habitats. Species recorded were similar to elsewhere across the Strategy, including sea aster, English scurvy grass, sea couch grass and common saltmarsh grass. A narrow tall herb margin was present at the top of the saltmarsh, comprising teasel, field mustard, common hogweed, pellitory-of-the-wall (*Parietaria judaica*), bristly oxtongue and creeping cinquefoil. This habitat is categorised to EUNIS Level 2 as littoral sediment and Level 3 as A2.5 Coastal saltmarshes and saline reedbeds.
Intertidal mudflat (t2d)	Below the vegetated coastal saltmarsh was an area of littoral mud forming extensive mudflats. This was categorised to EUNIS Level 3 as littoral mud and to EUNIS Level 4 as A2.32 Polychaete/oligochaete-dominated upper estuarine mud shores (JNCC code LS.Lmu.Uest). Mats of algae formed on the surface of the mud, covering large areas of the site, which could be attributed to nutrient enrichment. It comprised a heavily modified area with large amounts of artificial structures encroaching on sediment and extending into the river, including concrete structures and walls along the riverbank. Several bridge abutments and lock gates are also located within the site. Transitions to other habitats are stunted by presence of walls and structures. Several instances of litter were noted, including large items such as discarded trolleys and bikes, and smaller items such as plastic bottles.
Developed land; sealed surface (u1b)	The majority of the Entrance Lock site comprised concrete, stone or tarmac hardstanding, associated with the lock. Some common species, such as dandelion, were colonising cracks in places, but in general the flora was extremely limited.

UKHab type (code)	Description
Buildings (u1b5)	Several built structures were present on the lock site, associated with the operation of the lock and harbour. Some were modern, well-sealed structures, while others were older and in a greater state of disrepair.
Suburban/ mosaic of developed/ natural surface (u1d)	A very small area of developed/natural surface was present in the southern section where tall herb has colonised a previously developed surface. Species included hedge mustard (*Sisymbrium officinale*), horse parsley (*Smyrnium olusatrum*), prickly lettuce (*Lactuca serriola*), comfrey, valerian (*Valeriana officinalis*), cow parsley, buddleia, cock's-foot, dandelion, herb-robert, ragwort, bramble and bindweed.
Built linear features (u1e)	A retaining wall is present around the majority of the site, with the exception of a small section of the southern area. The wall is generally built directly into the intertidal mudflat.
Line of trees (w1g6)	A strip of trees was present at the top of the coastal saltmarsh to the south of the site. Species included sycamore, lime, goat willow (*Salix caprea*), alder, ash, silver birch, hawthorn, field maple, buddleia, white poplar, cotoneaster sp. (likely to be *Cotoneaster lacteus*) and holly. The understorey and ground flora comprised cow parsley, ivy, bramble, valerian, cock's-foot, common hogweed, false-oat grass, garlic mustard, spear thistle, comfrey, field mustard, wood avens, dandelion, horse parsley, ivy broomrape and ragwort. A narrow line of trees was also present on the amenity grassland area, comprising predominantly sycamore with cherry, apple and ash.

3.2.1.6 City Centre (Leigh Woods to St Philips Marsh)

The habitats identified within City Centre are described in Table 11 and displayed on Figure 7D and E.

Table 11. Habitats identified within Bristol City Centre.

UKHab type (code)	Description
Other neutral grassland (g3c)	Occasional areas of semi-neutral grassland are present between the river and roads, adjacent to Cattle Market Road and Feeder Road, largely in the form of verges. Species recorded on the verge adjacent to Cattle Market Road include speedwells, teasel, dandelion, common vetch, ribwort plantain, docks, cleavers, common hogweed, nettles, cocks-foot, and Yorkshire fog. A larger area of this habitat is fenced off just west of Brock's Bridge. The species composition was similar to that of the verge, but with some additional species including buddleia, black medick, creeping cinquefoil, and fleabane *Erigeron* sp. The central patch of this area was more sparsely vegetated, becoming more ephemeral in places. The verge of grassland alongside Feeder Road contains species including ribwort plantain, cut-leaved cranes-bill (*Geranium dissectum*), dock, white dead nettle, false oat grass (*Arrhenatherum elatius*), bindweed, cleavers, herb-Robert (*Geranium robertianum*), nettles, garlic mustard, daisy, and cow parsley.
Modified grassland (g4)	Relatively small strips of modified grassland are present in several locations adjacent to the River Avon, generally between the coastal saltmarsh or intertidal mudflats and footpaths/roads. These areas are largely dominated by perennial rye grass, with common wildflower species such as daisy and dandelion, in addition to plantain, nettles and cock's-foot. Scattered buddleia scrub was recorded within some of these areas. A large area of modified grassland is present within Sparke Evans Pocket Park at the St Phillips Marsh end of the scheme and is used for amenity purposes. The park is dominated by perennial rye grass, with some dandelion, creeping buttercup, clover, and daisy. The border of the grassland appears less heavily managed, with some ruderal vegetation around trees, including nettles, cow parsley, and dock.
Mixed scrub (h3h)	Strips of dense mixed scrub were recorded at several locations running between coastal saltmarsh and footpaths/roads. Buddleia is often dominant within these areas, with hawthorn, common hogweed, elder and willow also being recorded. Mixed scrub to the east extent of this section of the scheme develops into linear woodland. A relatively large area of dense scrub was recorded underneath Brock's Bridge, with species including bramble, Spanish bluebell (*Hyacinthoides hispanica*), cock's-foot, holly, meadow buttercup, cow parsnip, and mouse-eared chickweed.
Bramble scrub (h3d)	Patches of bramble scrub border the east end of Feeder Road, adjacent to Feeder Canal. Aside from bramble, species recorded in this area include nettles, cow parsley, and bindweed. An additional area of bramble scrub was recorded to the west of Redcliffe roundabout, sitting above the coastal saltmarsh, with scattered elder and buddleia present.
Developed land; sealed surface (u1b)	Pavement and other sealed surfaces run alongside the majority of the bank of the River Avon through City Centre.

UKHab type (code)	Description
Suburban/ mosaic of developed/ natural surface (u1d)	A long strip of this habitat was recorded between the coastal saltmarsh and Cumberland Road, in the form of a disused railway track that is sparsely vegetated. Species recorded include perennial rye grass, dandelion, herb-robert, ragwort, and common groundsel (*Senecio vulgaris*). Resurfacing appeared to be taking place at the time of survey, so the habitat type may change to hardstanding in the future. In addition, this habitat is present on top of the riverbank, separated from the footpath by a concrete wall, just east of Gaol Ferry Bridge. A mosaic of brick, concrete and vegetation is present, with species including Spanish bluebell, daisy, nettle, herb-robert, dandelion, buddleia, and a sycamore tree.
Wet woodland (w1d)	A patch of other woodland; broadleaved was recorded to the western extent of Feeder Road, within the back waters of Feeder Canal. The woodland is dominated by willow.
Other woodland; broadleaved (w1g)	Strips of this habitat was commonly recorded coastal saltmarsh alongside the River Avon. Species frequently recorded within the canopy include small-leaved lime (*Tilia cordata*), sycamore, ash, field maple, oak, and hawthorn. Within the understorey and ground flora, cow parsley, Spanish bluebell, cleavers, dandelion, and bramble are common. Aside from strips of this habitat bordering the river, a patch of other woodland; broadleaved was noted within the west of Sparke Evans Pocket Park. This woodland is primarily hazel, with some lime, field maple, silver birch, London plane and oak. The hazel trees show signs of previous management by coppicing.
Other woodland; mixed(w1h)	Less frequent than the other woodland; broadleaved, this habitat was recorded in only two locations within this section of the scheme, between the coastal saltmarsh habitat and footpaths adjacent to Cumberland Road. An area of this habitat just east of Ashton Avenue bridge is dominated by white poplar with an understorey of bramble, whilst a strip further east is more species diverse, with ash, sycamore, hawthorn, small leaved lime, holm oak, silver birch, plum, and apple. The understorey and ground flora include bramble, dandelion, and Spanish bluebells.
Coastal saltmarsh (t2a)	Coastal saltmarsh runs along the majority of the River Avon through City Centre, with the only notable break being in the area of Wapping Wharf. Species included sea aster, sea couch grass, common saltmarsh grass, reed canary grass (*Phalaris arundinacea*), and English scurvy grass. Other species could not be identified due to safety risks associated with the mudflats of the River Avon. Under EUNIS classification, this habitat is categorised to EUNIS Level 2 as littoral sediment and Level 3 as A2.5 Coastal saltmarshes and saline reedbeds.
Intertidal mudflats (t2d)	Intertidal mudflats run below the vegetated coastal along the majority of the river. These mudflats were split into five sections for survey. Sections 1 – 3 (Sparke Evans Pocket Park to Gaol Ferry Bridge) were categorised to EUNIS Level 3 as littoral mixed sediments (JNCC code LS.LMx) and to EUNIS Level 4 as A2.41 Hediste-dominated gravely sandy mud shores (JNCC code LS.LMx.GyMu). Areas of mats of algae were present within these sections, varying from covering very little area to a large area towards Gaol Ferry Bridge. These are heavily modified areas with large amounts of artificial structures along the riverbank. Transitions to other habitats are stunted by the presence of walls and structures. Several instances of litter were noted, including large items such as bikes and smaller items such as pieces of metal and plastic. The two sections of intertidal mudflats between Gaol Ferry Bridge and Ashton Avenue Bridge were categorised to EUNIS Level 3 as Littoral Mud (JNCC code LS.LMu) and to EUNIS Level 4 as A2.32 Polychaete/oligochaete-dominated upper estuarine mud shores (JNCC code LS.Lmu.Uest). These areas were characterised by areas of mud shores, with sparse rock/artificial rock areas. Transitions to other habitats is stunted by presence of walls and structures. Very few areas to the east end of these sections were covered by algal mats, with mats becoming more common towards Ashton Avenue Bridge. The mudflats become encroached by more artificial structures to this western extent, and on the south side of the river an outfall provides freshwater influence. Litter is less common within these sections, including small and large items.
Other hedgerows (h2b)	Two hedgerows were recorded within this section of the scheme, one heavily managed privet hedge within Sparke Evans Pocket Park, and a less managed and more diverse hedgerow running adjacent to the chocolate path to the east of this section of the scheme. The latter is dogwood dominant, with some elder, sycamore, ash, hazel, goat willow, bramble, buddleia, dock, and Spanish bluebell.
Line of trees (w1g6)	Lines of trees are common throughout the City Centre section of the scheme, largely running either on top of the riverbanks or on paved footpaths to the north of the river. Those on paved footpaths are largely comprised of London plane, small leaved lime, and sycamore. Tree lines on the riverbank are generally more species diverse, including species such as hawthorn, apple, field maple, ash, and charry, with understorey species including horse parsley, bramble, lesser celandine, water dropwort, and cow parsnip.

3.2.1.7 Netham

The habitats identified at the Netham site are described in Table 12 and displayed on Figure 7F.

Table 12. Description of UKHab Classification types present at Netham.

UKHab type (code)	Description
Modified grassland (g4)	Three small areas of modified grassland were present at Netham, which were heavily managed and appeared to be species poor. Species included perennial ryegrass, yarrow, black medick, white clover, dandelion, creeping buttercup, false-oat grass, cock's-foot, Yorkshire fog and crane's-bill (*Geranium* sp.). Some occasional planted trees, including sycamore rowan and ash, were also present.
Hedgerow (priority habitat) (h2a)	A priority hedgerow was present to the west, connecting into a woodland parcel, comprising dogwood, field maple, ivy, elder, bindweed, silver birch, a Viburnum species, hawthorn, cherry and willow.
Bramble scrub (h3d)	A narrow strip of bramble-dominant scrub was present along the road verge on the northern side of the side. Other species scattered within the scrub included herb-robert, traveller's joy, sycamore, yarrow, red valerian (*Centranthus ruber*), false-oat grass, black medick, biting stonecrop (*Sedum acre*), mouse-ear-hawkweed (*Hieracium pilosella*). An INNS cotoneaster (*Cotoneaster* sp.) was also present.
Mixed scrub (h3h)	A very small area of mixed, mostly non-native and ornamental, scrub was present adjacent to the Feeder Road bridge, comprising grey alder (*Alnus incana*), spiny olive (*Elaeagnus pungens*), buddleia, bramble, dogwood, common reed and INNS Himalayan balsam.
Canals (r1e)	The canal runs along the northern edge of the Netham site and meets the River Avon at the eastern end. The canal has artificially reinforced banks, with scrub and small trees growing along the banks. Netham Lock is located within this section of the canal.
Other rivers and streams (r2b)	The River Avon runs along the southern edge of Netham and meets the canal at the eastern end. Netham Weir is located within this section of river. Much of the banks are reinforced with concrete, brick and corrugated metal sheeting. Scrub and trees are present along the banks, transitioning to intertidal mudflat and coastal saltmarsh downstream past the weir, and the banks along this stretch are steep and high.
Coastal saltmarsh (t2a)	The vegetated portion of the coastal saltmarsh was relatively limited due to the presence of an artificial retaining wall interrupting the intertidal transition. Species included reed and sea aster, though other species could not be identified due to health and safety risks associated with getting close to the vegetated area. Generally, the species composition appeared similar to elsewhere across the Strategy. Coastal saltmarsh is categorised to EUNIS Level 2 as littoral sediment and Level 3 as A2.5 Coastal saltmarshes and saline reedbeds.
Intertidal mudflat (t2d)	Below the vegetated coastal saltmarsh was an area of littoral mud forming areas of mud shores, rocky areas and artificial rock and boulders. This was categorised to EUNIS Level 3 as littoral mud and to EUNIS Level 4 as A2.32 Polychaete/oligochaete-dominated upper estuarine mud shores (JNCC code LS.Lmu.Uest). Mats of algae formed on the surface of the mud, covering a small area of the site, which could be attributed to nutrient enrichment. This was a heavily modified area with large amounts of artificial structures encroaching on sediment and extending into the river, including concrete structures, the weir and walls along the riverbank. Fast flowing freshwater influence. Transitions to other habitats were stunted by presence of walls and structures. Several instances of litter were noted, including large items such as discarded bikes, and smaller items such as plastic bottles and food packaging.
Developed land; sealed surface (u1b)	The majority of the site comprised concrete and tarmac hardstanding, associated with the industrial estate. Buddleia was growing on the hardstanding in some areas. A wooden footbridge in disrepair was present to the south of the site, adjacent to the railway.
Buildings (u1b5)	There were several large warehouse buildings associated with the industrial estate (Figure 7F).
Artificial unvegetated, unsealed surface (u1c)	Some areas of ornamental bark chippings were present around the entrance and within the industrial estate car park.
Built linear features (u1e)	A large retaining wall, comprising a mixture of brick, stone and sheet piling was present around the edge of the hardstanding, interrupting the intertidal habitats.
Line of trees (w1g6)	Some planted lines of trees were present along the road and around the edge of the industrial estate, comprising sycamore, willow, hawthorn, field maple, Italian alder (*Alnus cordata*), grey alder, spiny olive, with common hogweed, common nettle, bramble, garlic mustard and some common reed also present. INNS Himalayan balsam was present along the line of trees adjacent to the weir.

UKHab type (code)	Description
Other broadleaved woodland types (w1g7)	A parcel of woodland was present at the eastern tip of the site, comprising cherry, poplar, hawthorn, dogwood sp. (likely *Cornus rugosa*), ivy and common hogweed. Another area of woodland was located along the railway to the west, comprising weeping willow (*Salix babylonica*), Italian alder, grey alder, buddleia, elder, hazel, sycamore and laurel (*Laurus sp*.).

3.2.1.8 Netham Left Bank

The habitats identified at the Netham Left Bank site are described in Table 13 and displayed on Figure 7F.

Table 13. Description of UKHab Classification types present at Netham Left Bank.

UKHab type (code)	Description
Other neutral grassland (g3c)	A small discrete area of other neutral grassland was present on the riverbank, comprising dandelion, false-oat grass, cock's-foot, rough meadow-grass, ribwort plantain, creeping bent, hedge mustard, creeping cinquefoil, creeping buttercup, common sow thistle (*Sonchus oleraceus*), cow parsley, creeping thistle and ground elder (*Aegopodium podagraria*).
Other hedgerows (h2b)	Several small hedgerows were present bordering areas of hardstanding, with several species being introduced non-natives. Species comprised laurel, oak, hornbeam, buddleia, *Viburnum* sp., privet (*Ligustrum* sp.), forsythia (*Forsythia* sp.), sycamore, rose, *Choisya* sp., wild cherry, spiny olive, bramble, dogwood, box (*Buxus* sp.) and INNS Virginia creeper (*Parthenocissus quinquefolia*).
Bramble scrub (h3d)	Patches of bramble dominant scrub were identified adjacent to the woodland strips, with garlic mustard.
Mixed scrub (h3h)	Mixed scrub was recorded in small, discrete areas amongst the hardstanding areas and along the riverbank. Some areas were likely introduced shrub which has since been less managed and grown out, while others form a mosaic and connect into the woodland areas. Woody species included bramble, sycamore (including saplings), ivy, rose, holm oak, dogwood, hawthorn, laurel, cherry, buddleia, willow, elder, lime and forsythia. Tall herbs and grasses scattered amongst the scrub included yarrow, common nettle, bindweed, clematis and INNSs Virginia creeper and Himalayan balsam.
Other rivers and streams (r2b)	The River Avon runs along the northern edge of the Netham Left Bank site, with the banks dominated by scrub and trees, with some limited tall herb growth and larger areas of hardstanding. The river is less tidally influenced than at the downstream sites and the water is deeper and slow flowing, and the banks are steep and high.
Developed land; sealed surface (u1b)	Large areas of hardstanding (roads and car parks) were located throughout the site. Some planted trees were present within the car park off of Wyatts View.
Buildings (u1b5)	Residential, commercial and industrial buildings were present along the length of the site.
Suburban/ mosaic of developed/ natural surface (u1d)	Several fenced gardens were recorded amongst the residential buildings and hardstanding areas.
Built linear features (u1e)	A reinforcing wall was located along the riverbank at the western extent of the site, toward the Feeder Road bridge, and some fences were present around hardstanding areas.
Line of trees (w1g6)	Lines of trees were present around hardstanding areas and along fences to the west, comprising ash, lime, sycamore, spiny olive, elder, cherry, oak (including a potential northern red oak (*Quercus rubra*)), blackthorn, silver birch, horse chestnut, hawthorn, hazel, willow, buddleia, Italian alder, with a *Viburnum* sp. and privet.
Other broadleaved woodland types (w1g7)	Strips of woodland were present along the riverbank (Photograph 7), across the length of the site. Species included hazel, sycamore, hawthorn, field maple, bramble, lime, dogwood, willow, ash, blackthorn, holly, a whitebeam, oak, apple, cherry, silver birch, elder, alder, ivy and buddleia, with an understorey and ground flora of ragwort, curled dock, common hogweed, cock's-foot, male fern, dog rose, water hemlock, common nettle, snowberry (*Symphoricarpos sp*.), a *Viburnum* sp. and garlic mustard.
Other woodland; mixed (w1h)	A strip of mixed woodland was present along the road at the western extent of the Netham Left Bank site, and other strips were located alongside car park areas in the centre of the site. Species included

UKHab type (code)	Description
	elder, willow, hawthorn, broadleaved lime, other lime species, field maple, ash, sycamore, buddleia, dogwood, conifers, Leyland cypress (*Cupressus × leylandii*), white poplar and INNS Himalayan balsam.
Other woodland; mixed; mainly broadleaved (w1h5)	A strip of mixed, but predominantly broadleaved woodland was present along the riverbank to the east, alongside a footpath. Species included rowan, ash, Italian alder, sycamore, horse chestnut, dogwood and Leyland cypress.
Other coniferous woodland (w2c)	A woodland area of largely coniferous plantation was also located along the riverbank to the east. Present within this habitat were some likely self-seeded broadleaved trees and limited scattered scrub such as dogwood. Ground flora was extremely limited due to recreational pressure.

3.2.1.9 Netham Right Bank

The habitats identified at the Netham Right Bank site are described in Table 14 and displayed on Figure 7F.

Table 14. Description of UKHab Classification types present at Netham Right Bank.

UKHab type (code)	Description
Other neutral grassland (g3c)	Narrow strips of neutral grassland were located along the riverbank. Species included false-oat grass, cock's-foot, perennial ryegrass, Yorkshire fog, ribwort plantain, ragwort, yarrow, meadow-grass (*Poa* sp.), a Brassica sp., wild fennel (*Nigella arvensis*), white clover, oxeye daisy, common hogweed, spear thistle, common couch (*Elymus repens*), common nettle, and willowherb. Closer to the river margin were species including common reed, curled dock, bindweed, cleavers, bramble, knotweed (*Persicaria* sp.), water figwort (*Scrophularia umbrosa*), INNS Japanese knotweed and scattered hawthorn, hazel and alder.
Modified grassland (g4)	A small discrete area of modified grassland was located in the centre of the Netham Right Bank site, with a similar species composition to the surrounding gardens, including red fescue, Yorkshire fog, bristly oxtongue and bramble.
Hedgerow (priority habitat) (h2a)	Priority hedgerows were located along the riverbanks to the south of the site, comprising dogwood, rowan, holly, bramble, hazel, sycamore, holly, blackthorn, hawthorn, ash, a barberry (*Berberis* sp.) and INNS cotoneaster.
Bramble scrub (h3d)	Small patches of bramble-dominant scrub were located amongst the hardstanding areas and within the mixed scrub area to the south, along with perennial ryegrass, common bent, cock's-foot, bindweed, false-oat grass.
Mixed scrub (h3h)	Parcels of mixed scrub were located throughout the site, in narrow strips along the riverbanks (Figure 7F, Photograph 8) and on top of the retaining wall. Species included buddleia, bramble, goat willow, ivy, dogwood, hawthorn, ash, elder, hazel, sycamore, willow, With common nettle, cleavers, common mallow (*Malva sylvestris*), common hogweed, herb-Robert, cock's-foot, cow parsley, docks, bindweed, common bent, wood avens, clovers, false-oat grass, crane's-bill, dandelion, goldenrod (*Solidago* sp.), spear thistle, hemp-agrimony (*Eupatorium cannabinum*), ribwort plantain, red fescue, rough meadow-grass, garlic mustard, willowherb, vetch (*Vicia* sp.), staghorn sumac (*Rhus* sp.) and INNS Himalayan balsam.
Other rivers and streams (r2b)	The River Avon runs along the southern edge of the Netham Right Bank site. As with the Netham Left Bank site, the banks are dominated by scrub and trees, with some limited tall herb growth and larger areas of hardstanding. The river is less tidally influenced than at the downstream sites and the water is deeper and slow flowing, and the banks are steep and high.
Developed land; sealed surface (u1b)	Tarmac and concrete hardstanding areas were present within car parks in the centre and on the footpath along the riverbank.
Buildings (u1b5)	Some industrial and commercial buildings were located off Crews Hole Road, and residential buildings were recorded towards the south of the site.
Artificial unvegetated, unsealed surface (u1c)	Gravel areas were recorded around the centre of the site.

UKHab type (code)	Description
Suburban/ mosaic of developed/ natural surface (u1d)	Several gardens were recorded associated with the residential buildings, as well as a small mosaic of hardstanding, grass and a tree to the south. Within the gardens, species recorded included New Zealand flax (*Phormium tenax*), laurel and spotted medick (*Medicago arabica*).
Built linear features (u1e)	A wall at the western end of the site had some common species colonising the cracks, including ivy-leaved toadflax, common mallow, common nettle, bramble, wall barley, pellitory-of-the-wall and matrimony vine (*Lycium barbarum*). An adjacent wall with a fence on top also supported buddleia, hemp-agrimony, bindweed and bramble.
Line of trees (w1g6)	Lines of trees were present in the centre and eastern end of the site, along the riverbanks. Species included buddleia, sycamore, hawthorn, hazel, oak, elder, field maple, willow, ash, apple and dogwood.

3.2.1.10 St Annes

The habitats identified at the St Annes site are described in Table 15 and displayed on Figure 7F.

Table 15. Description of UKHab Classification types present at St Annes.

UKHab type (code)	Description
Other neutral grassland (g3c)	Neutral grassland ran alongside the watercourse in St Annes, dominated by tall herb including broad-leaved dock, common nettle, hemlock water-dropwort (*Oenanthe crocata*) and flag-iris (*Iris pseudacorus*). Other species included creeping buttercup, rough meadow-grass, perennial ryegrass, marsh foxtail, white clover, greater plantain and INNS Himalayan balsam.
Arrhenatherum (oatgrass) neutral grassland (g3c5)	An area of slightly more diverse unmanaged grassland comprised predominantly false-oat grass with cock's-foot, Yorkshire fog, soft brome, perennial ryegrass, white clover, rough meadow-grass, ribwort plantain, black medick, ragwort and hawkbit (*Leontodon* sp.).
Modified grassland (g4)	Areas of nutrient enrichment were present along the paths with lower diversity, dominated by perennial ryegrass, white clover and Yorkshire fog.
Bramble scrub (h3d)	Several patches of dense bramble scrub were present, forming a margin around the woodland and grassland, with scattered young oaks and sycamore, and INNS Himalayan balsam. Tall herbs around the edge of the scrub included false-oat grass, Yorkshire fog, cock's-foot and willowherbs.
Other rivers and streams (r2b)	A small, shallow stream flowing northwards is present within the valley in St Annes (Photograph 9). There is some limited marginal aquatic growth, though the stream appears quite shaded by trees and scrub overhead which is likely to limit the amount of bankside vegetation. The banks have been reinforced in some areas.
Developed land; sealed surface (u1b)	Tarmac and concrete hardstanding (car park and roads) is present around the residential buildings to north-west of the site.
Buildings (u1b5)	Several brick residential buildings are present to the north-west of the site.
Other lowland mixed deciduous woodland (w1f7)	Deciduous woodland is present in a mosaic with scrub and grassland across St Annes, including a steep-sided woodland valley leading down to the stream. Species included field elm (*Ulmus minor*), elder, holly, sycamore, hazel, ash, hawthorn, sweet chestnut (*Castanea sativa*), ivy, elm, lime, willow and goat willow. The understorey and ground flora comprised herb-Robert, creeping buttercup, cleavers, common nettle, common hogweed, wild garlic, wood avens, bluebell (*Hyacinthoides non-scripta*), pendulous sedge, lords-and-ladies, enchanter's nightshade (*Circaea lutetiana*), bramble, wood speedwell (*Veronica montana*), wild garlic, hedge mustard, wood melick (*Melica uniflora*), and INNS Himalayan balsam.

3.2.1.11 Revised Area 10 (Pump House)

The habitats identified at the Revised Area 10 site are described in Table 16 and displayed on Figure 7F.

Table 16. Description of UKHab Classification types present at Revised Area 10 (Pump House).

UKHab type (code)	Description
Other hedgerows (h2b)	Introduced shrub hedgerows border the car park and access road to the north of the site, comprising scattered alder, oak, rowan, St. John's wort (*Hypericum* sp.), white dogwood (*Cornus alba*), common mock orange (*Philadelphus coronarius*), multiflora rose (*Rosa multiflora*) and INNS Japanese rose (*Rosa rugosa*).
Bramble scrub (h3d)	Bramble-dominant scrub is located along the riverbank to the east of the residential buildings and gardens, with false-oat grass, rushes (*Juncus sp*.) and curled dock.
Other rivers and streams (r2b)	The River Avon runs along the southern edge of the Revised Area 10 site. The banks are again dominated by scrub and trees, with some tall herb growth which has was limited in extent due to shading from other vegetation. The river is less tidally influenced than at the downstream sites and the water is deeper and slow flowing, and the banks are steep and high.
Developed land; sealed surface (u1b)	A garden patio is located in the garden of the residential building (Photograph 10), as well as an access road to the north.
Buildings (u1b5)	A large residential property borders the Strategy site boundary to the north.
Suburban/ mosaic of developed/ natural surface (u1d)	An intensively mown residential garden (Photograph 10) with an introduced shrub hedgerow along the border forms the majority of the site, dominated by perennial ryegrass.
Built linear features (u1e)	A retaining wall forms part of the southern border of the site, reinforcing the riverbank.
Line of trees (w1g6)	A line of mature planted trees was recorded along the riverbank, including ash, willow, oak, cherry, hazel, hawthorn, goat willow, dogwood and a *Viburnum* sp., with a ground flora and understorey of common nettle and common hogweed.

3.2.1.12 Upstream Left Bank (BEESES)

The habitats identified at the Upstream Left Bank site are described in Table 17 and displayed on Figure 7G.

Table 17. Description of UKHab Classification types present at Upstream Left Bank (BEESES).

UKHab type (code)	Description
Holcus-Juncus neutral grassland (g3c8)	Neutral grassland was located in the centre of the site adjacent to the woodland, transitioning into bramble scrub and ash saplings (Photograph 11). Species included Yorkshire fog, false-oat grass, common bent, common hogweed, figwort (*Scrophularia* sp.), creeping buttercup, curled dock, herb-Robert, common couch, common nettle and purple loosestrife (*Lythrum salicaria*).
Other hedgerows (h2b)	A planted hedgerow was recorded along the edge of the river, with gaps in places. Species included box, privet, dogwood, hazel, elder and field maple.
Other eutrophic standing waters (r1a6)	Three ponds were recorded within the Upstream Left Bank site. Species included watercress (*Nasturtium* sp.), duckweed (*Lemna* sp.), water lily (*Nymphaeaceae* sp.), marsh marigold (*Caltha palustris*), purple loosestrife, pendulous sedge, hard rush (*Juncus inflexus*) and algae.
Other rivers and streams (r2b)	The River Avon runs along the northern edge of the Upstream Left Bank site. Similar to the Revised Area 10 site and other upstream sites, the banks are dominated by scrub and woodland, with some tall herb margins. The river is less tidally influenced than at the downstream sites and is deeper and slow flowing, and the banks are steep and high.
Developed land; sealed surface (u1b)	Hardstanding and bare ground was present within the Upstream Left Bank site.
Buildings (u1b5)	Several structures were present across the site, including sheds, a decking area and gazebos. The presence of the gazebos meant that it was not possible to survey the structures in that area in detail.
Suburban/ mosaic of developed/ natural surface (u1d)	A pub garden and residential gardens (overgrown and abandoned in areas) were recorded within the site, comprising planted species: globe thistle (*Echinops* sp.), lady's mantle (*Alchemilla* sp.), phlox (*Phlox* sp.), rose, poppy (*Papaver* sp.), yarrow, red bistort (*Bistorta amplexicaulis*), meadowsweets (*Spiraea*

UKHab type (code)	Description
	sp.), common nettle, hedge mustard, laurel, male fern, pendulous sedge, docks, *Choisya sp.*, laurel, ragwort, willowherb, common hogweed, bellflower (*Campanula* sp.), dandelion, huckleberry (*Vaccinium* sp.), oxeye daisy, fringed willowherb (*Epilobium ciliatum*), redcurrant (*Ribes rubrum*), creeping buttercup, false-oat grass, spear thistle, clematis, spiny sow thistle (*Sonchus asper*), selfheal (*Prunella vulgaris*), Yorkshire fog, fuchsia (*Fuchsia* sp.), hart's-tongue fern, New Zealand flax, marsh valerian (*Valeriana dioica*), hydrangea (*Hydrangea* sp.), cotoneaster sp. (*Cotoneaster sp.*) and INNS montbretia (*Crocosmia x crocosmiiflora*). Tree species included cherry, coniferous species, ash, holly, cypress (*Cupressus* sp.) and sycamore. A network of footpaths provided access to and from the structures and through the gardens.
Other lowland mixed deciduous woodland (w1f7)	Woodland was present to the west of the site and surrounding the site, comprising lime, sycamore, ash, elder, bramble, hawthorn, hazel, ivy, holly and apple with a ground flora of wild garlic, dog's mercury, pendulous sedge, common nettle and broad-leaved enchanter's nightshade, and INNSs Himalayan balsam and yellow variegated archangel (*Lamium galeobdolon argentatum*).
Line of trees (w1g6)	A line of trees formed the boundary from the footpath to the structures below, transitioning into the garden habitat. Species included holly, cypress, ash and hawthorn and an understorey of predominantly sedge (*Carex* sp.), willowherb, spurge (*Euphorbia* sp.) with bare ground and wood clippings.

3.2.1.13 Upstream Right Bank (Riverside Cottages)

The habitats identified at the Upstream Right Bank site are described in Table 18 and displayed on Figure 7G.

Table 18. Description of UKHab Classification types present at Upstream Right Bank (Riverside Cottages).

UKHab type (code)	Description
Other neutral grassland (g3c)	An area of unmanaged, more diverse neutral grassland was located along the riverbank, comprising cock's-foot, Yorkshire fog, meadow-grass, perennial ryegrass, white clover, crane's-bill, spear thistle, common hogweed, common bent, false-oat grass, black mustard (*Brassica nigra*), greater plantain and ribwort plantain, with scattered sycamore and ash (potentially diseased) (TN G1).
Modified grassland (g4)	Mown grass was recorded along the footpath and riverbank, including an area used for residential parking with some discrete unmown areas. Species included white clover, creeping buttercup, ribwort plantain, dandelion, yarrow, ragwort, common knotgrass (*Polygonum aviculare*), perennial ryegrass, meadow-grass, bristly oxtongue, cock's-foot, common daisy and INNS cotoneaster.
Mixed scrub (h3h)	Dense scrub was recorded along the riverbank (Figure 7G) and around the gardens forming a mosaic with grassland and treelines, with scattered tall herbs throughout. Species included bramble, buddleia, willowherb, common nettle, cleavers, common hogweed, docks, bindweed, white clover, garlic mustard, plumeless thistles (*Carduus* sp.), nipplewort (*Lapsana* sp.), hairy willowherb (*Epilobium hirsutum*), curled dock, comfrey, red campion (*Silene dioica*), creeping cinquefoil (*Potentilla reptans*), hedgerow crane's-bill, elder, hedge mustard, herb-robert, cock's-foot, common mugwort (*Artemisia vulgaris*), a Brassica sp., hemp-agrimony, pendulous sedge, common mallow, false spirea (*Sorbaria* sp.), willowherb and INNS Himalayan balsam.
Other rivers and streams (r2b)	The River Avon runs along the southern edge of the Upstream Right Bank site. The banks comprise a mix of dense tall herb and scrub, with some scattered trees across the length of the bank. Similar to the other upstream sites the banks are dominated by scrub and some woodland, with some tall herb margins. The river is less tidally influenced than at the downstream sites and is deeper and slow flowing, and the banks are steep and high.
Developed land; sealed surface (u1b)	An access road runs through the site to the residential properties and ProW.
Buildings (u1b5)	A terrace of brick residential buildings is present within the centre of the site, with further detached residential properties scattered to the north.
Suburban/ mosaic of developed/ natural surface (u1d)	Several private residential gardens were present across the Upstream Right Bank site, generally dominated by perennial ryegrass. Species included white clover, creeping buttercup, dandelion, cock's-foot, common daisy, mallow (*Malva* sp.), privet, box, hibiscus (*Hibiscus* sp.), St. John's wort, rose, Japanese meadowsweet (*Spiraea japonica*), a *Viburnum* sp., common nettle, cow parsley, greater plantain, cotoneaster sp. and INNS montbretia.

UKHab type (code)	Description
	Some mature scattered trees, including cherry laurel (*Prunus laurocerasus*), horse chestnut, sycamore and weeping willow. Piles of waste material were present within the western garden.
Built linear features (u1e)	A stone wall was recorded bordering the garden to the west.
Line of trees (w1g6)	A line of young trees was located between the eastern garden and riverbank, comprising silver birch, rowan, apple, alder, sycamore and willow. A line of mature trees bordering the gardens to the west, comprising a cypress, holly, sycamore, ash, hawthorn, blackthorn, sycamore and a plum (*Prunus* sp.).

3.2.2 Protected/Notable Species

The habitats present on site provide suitable habitat for a variety of species and species groups. The suitability for certain species relates to the general habitat types identified across the Strategy. As such, descriptions are provided generally within Table 19 below for all 13 Strategy sites (rather than being described separately for each site). Where something particularly notable was identified at a specific Strategy site, this has been highlighted within the description. Locations of INNSs and TNs are displayed on Figure 7A to Figure 7G. Details of TNs are provided in Table 22 in Appendix B.

Table 19. Potential for protected/notable species on or adjacent to the Strategy sites.

Species/Group	Description of Potential
Bats	Potential for roosting bats was identified across the Strategy sites within more mature trees, and built structures including buildings, bridges and walls. Some trees were too young to have developed any potential roost features (PRFs). Detailed preliminary roost assessments (PRAs) were not conducted at this stage, but these should be conducted for all trees (including those within woodland, tree lines and individual scattered trees) and built structures that are likely to be impacted by the Strategy. Built structures and trees across Pill were identified as having potential to support bat roosts. A large mature oak within the Sea Mills site was also thought to have potential (TN B2); no PRFs were visible but foliage may have been obscuring features. Trees within a tree line along the grassland in the centre of Bower Ashton were also thought to be suitable for roosting bats (TN C1). Several bat boxes were recorded on the trees within the park area to the south of Bower Ashton (TN C2). A willow in the centre of Netham Left Bank was identified as having roosting potential (TN D1), as well as some trees within the Netham, Netham Right Bank and St Annes Strategy sites and a large mature ash in the centre of Upstream Left Bank (TN F1). Several crevices and cavities within built structures were thought to be suitable for roosting bats, including the small holes and infilled cavities within the wall at Netham Right Bank (TN D2) and crevices in the stone bridge abutments at Bower Ashton (TN C3 and TN C4). Residential buildings at Sea Mills, and structures within the Upstream Left Bank were not possible to survey thoroughly but were thought to potentially be suitable for roosting bats. In addition, a disused railway and bridge by Cumberland Road (TN H1), and arches within the retaining wall on the north side of the River Avon just west of Redcliffe Roundabout (TN H2) could not be accessed but were thought to potentially be suitable for roosting bats. Bat surveys undertaken between 2014 and 2018, and data review undertaken, as part of the MetroWest planning application identified two underground sites with bat roosts in close proximity to Bower Ashton. The caves and adits within the Avon Gorge Woodlands are cited as an important roost resource for bats locally, with lesser horseshoe bats regularly using these resources in winter. Two tunnels at the western edge of Leigh Woods, one of which is within 500m of the Strategy, support low numbers of roosting bats over winter. There is an abundance of suitable foraging and commuting habitat present across the Strategy sites and surrounding areas, including hedgerows, scrub, woodland edge habitat and the river corridor. However, artificial light at night (ALAN) may reduce the suitability, particularly for species that are more sensitive to artificial light such as Natterer's bat.
Badger	No field signs of badger, including setts, were recorded during the survey. Badger potential was identified in some discrete areas across the Strategy sites, including within the grassland, scrub and woodland in St Annes, Pill, Shirehampton, Bower Ashton, Upstream Left Bank, Upstream Right Bank, and limited areas within City Centre. However, many of these areas are quite heavily disturbed, including by dog walkers, which may reduce suitability for badger.

Species/Group	Description of Potential
Beaver	No field signs of beaver were recorded during the survey. Suitable habitat is present in areas of slow-moving watercourses surrounded by woody plants, trees and woodland, including the stream at St Annes. Beavers are known to inhabit brackish waters, and therefore areas along the River Avon may also be utilised.
Hazel dormouse	Hedgerow, woodland and scrub habitat provide suitable habitat for foraging dormice and for nest-building, including the presence of hazel. Discrete patches of scrub and defunct hedgerows that are not connected into the wider landscape have limited to no suitability for dormice. However, despite the City Centre nature of the sites, many of the woodland strips appear well connected into suitable habitats in the wider landscape. This was particularly the case at Pill, Bower Ashton, Netham Left Bank, Netham Right Bank, St Annes, Revised Area 10, Upstream Left Bank and Upstream Right Bank. Dormice are known to be present within Leigh Woods[25] which overlaps with the Bower Ashton site, and it is possible that they are present throughout suitable habitat elsewhere across the Strategy sites.
Otter	No evidence of otter was found during the survey. Otter are likely passing through the majority of the Strategy sites, and they are known to forage, commute and breed along the River Avon through Bristol, with woodland areas both within the Strategy sites and within the wider landscape providing suitable resting/breeding habitat. However, as with badger, many of these areas are quite heavily disturbed, including by dog walkers, which may reduce suitability for otter.
Water vole	Water vole tend to not be as common within estuarine and saltmarsh habitats[26], especially with a strong tidal influence, so they are considered less likely to be present across the intertidal Strategy sites (Pill, Shirehampton, Sea Mills, Bower Ashton and Entrance Lock). However, there are historical records of water vole near Shirehampton, Netham and Bower Ashton. The amount of suitable aquatic foraging plants along the River Avon itself was limited in areas of heavy modification and dense scrub around Netham. The presence of suitable marginal aquatic plants increases across the Strategy sites further east, though the shading from dense scrub and woodland along the banks is likely to limit this growth. The River Avon within the City Centre section of the Strategy was generally considered unsuitable for water vole, considering the prevalence of coastal saltmarsh and mudflats along the river, with very limited suitable burrowing sites and suitable marginal aquatic plants for foraging. The stream within St Annes was identified as being particularly suitable for water vole, with some marginal aquatic foraging plants present.
White-clawed crayfish	White-clawed crayfish require clean and well oxygenated watercourses, preferably with shallow waters and overhanging vegetation[27]. No habitats suitable for white-clawed crayfish were identified across the Strategy. The River Avon that falls within the Strategy Sites is generally considered non-optimal for white-clawed crayfish, given the relatively polluted and deep nature of the river The stream at St Annes offers some limited potential, given whilst it is shallow and slow moving in parts, however given the lack of records provided by BRERC, it is considered likely that white-clawed crayfish are absent from the Strategy. It should be noted that no records of signal crayfish were returned by the data search, indicating that competition is not necessarily a significant barrier to white clawed crayfish inhabiting the watercourses.
Birds	Several bird species were identified foraging across the intertidal mudflat habitats, including black-headed gulls (*Chroicocephalus ridibundus*), lesser black-backed gulls (*Larus fuscus*) including juveniles, herring gulls (*Larus argentatus*), mallards, carrion crows, and a grey heron. Suitable nesting habitats were identified for breeding birds across the Strategy sites, including woodland, hedgerows, scrub and built structures. Several birds with the potential to breed were heard and/or seen on site during the surveys, including: • Blackcap (*Sylvia atricapilla*), dunnock (*Prunella modularis*) and robin (*Erithacus rubecula*) in scrub at Shirehampton, as well as an anecdotal record of a nightingale (*Luscinia megarhynchos*) in 2021; • House martins (*Delichon urbicum*) nest on the residential properties in Sea Mills (at least a dozen in flight around structures) (TN B3); • Blue tit flying out of a bat box (TN C2) and other common passerine species carrying nesting material at Bower Ashton (TN C5);

[25] https://avongorge.org.uk/wildlife-and-geology/wildlife-of-the-avon-gorge-the-downs-and-leigh-woods/the-wildlife-of-the-north-somerset-side-of-the-avon-gorge-and-leigh-woods/ [Accessed May 2023].

[26] Wildlife Trusts. (n.d.). Water for Wildlife: A guide to water vole ecology and field signs. Available at: http://www.essexwtrecords.org.uk/ [Accessed July 2023].

[27] Buglife. (2013). White-clawed Crayfish. Available at: https://www.buglife.org.uk/resources/invasive-species-hub/crayfish/.

Species/Group	Description of Potential
	• Jackdaws (*Corvus monedula*) nesting in a nest box adjacent to the garden centre (TN C6), and flying over carrying food into scrub habitat at Bower Ashton (TN C7); • A song thrush (*Turdus philomelos*) defending territory from a crow at Bower Ashton (therefore assumed nesting nearby) (TN C8); • Wood pigeons (*Columba palumbus*) resting and likely nesting along the bridge at Bower Ashton; • Treecreepers (*Certhia familiaris*) in trees within woodland at Netham Left Bank (TN E1); • Wren (*Troglodytes troglodytes*), jay (*Garrulus glandarius*), blackbird (*Turdus merula*), blue tit, great tit (*Parus major*) and long-tailed tit (*Aegithalos caudatus*) identified at St Annes; • An owl box on an old boat house structure at Upstream Left Bank (TN F2); and • Sand martin (*Riparia riparia*) along the river at Upstream Right Bank. Although not observed on site, Schedule 1 species may be present, such as kingfisher which may nest in the banks of the River Avon, and forage on fish and aquatic insects. Peregrine are also known to routinely nest within the centre of Bristol and in the Avon Gorge. Species for which the Severn Estuary SPA and Ramsar site are designated may also use suitable supporting habitats across the Strategy sites, particularly the intertidal mudflats, notably during the winter months. Consideration will be required following any wintering bird surveys, for any species present at this site which are qualifying species for the Severn Estuary SPA.
Reptiles	Good reptile habitat was identified across several of the Strategy sites, comprising mosaics of long, tussocky grasslands, suitable refuge habitats (scrub, hedgerows and woodland) and wetland habitats. In particular (but not limited to), an area of south-facing longer grassland with scrub habitat, adjacent to the railway line and allotments at Bower Ashton, mosaic habitats in St Annes, grassland habitats north of Pill, the scrub mosaic to the north of Shirehampton. Suitable reptile habitat was considered limited within the City Centre site, given its highly urban and disturbed nature, and limited and fragmented potential refuge habitats.
Amphibians	Three ponds were recorded at the Upstream Left Bank site. One small garden pond was considered not suitable for great crested newt and appeared to be modified with pipes. The other two ponds appeared to be marginally more suitable but only likely to score as poor to moderate suitability. All three ponds should be subject to a full Habitat Suitability Index (HSI) assessment[28]. A review of 1:25k OS mapping and aerial imagery reveals several standing waterbodies with suitable connecting habitat within 500m of both sites, which may also be suitable for great crested newt. Woodland, hedgerows and scrub within and adjacent to all Strategy sites provide suitable terrestrial habitats for hibernation and refuge of any great crested newt using ponds within 500m, including those within Upstream Left Bank site. All ponds may provide suitable habitat for other common amphibian species, including common frog (*Rana temporaria*), common toad (*Bufo bufo*), palmate newt and smooth newt.
Invertebrates	The mosaic of different terrestrial and aquatic habitats across the sites offer diverse micro-habitats which can be exploited by a variety of invertebrate species, including those associated with saltmarsh and mudflat habitat and the River Avon itself. Several species incidentally recorded during the surveys included a greater bulb fly (*Merodon equestris*), red admiral (*Vanessa atalanta*), speckled wood (*Pararge aegeria*), meadow brown and dark marbled carpet (*Dysstroma citrata*) in St Annes, a flower crab spider (TN A3) (*Misumena vatia*) in Pill, common blue (*Polyommatus icarus*), small white (*Pieris rapae*) and brimstone (*Gonepteryx rhamni*) in scrub in Shirehampton. A particularly good diversity of invertebrates was noted in the scrub mosaic north of Shirehampton.
Fish	The River Avon is likely to support common fish species, and fish species were observed throughout the surveys, though due to the turbidity of the water most of these could not be identified to species level. Bleak (*Alburnus alburnus*) was the only species observed immediately upstream of Netham Weir. Species for which the Severn Estuary SAC is designated may be present within the River Avon across the Strategy sites, particularly those further west. The presence of artificial structures, such as locks and weirs (including Netham weir and Cumberland Lock) may present a significant barrier to fish movement.
Other SPIs	Hedgerow and woodland habitats across the Strategy sites provide suitable habitat for other SPIs such as hedgehog (*Erinaceus europaeus*) and harvest mouse (*Micromys minutus*). During the UK Habs survey, the need for a National Vegetation Classification (NVC) survey (a more detailed botanical survey) was

[28] Herpetological Journal (2000) Evaluating the suitability of habitat for the Great Crested Newt (*Triturus cristatus*).

Species/Group	Description of Potential
	identified for the neutral grassland at Pill/Shirehampton, and there is a possibility that this may support notable plant species that could not be identified at the time of the survey.
INNS	Several INNS were identified across the Strategy sites, locations of which are displayed across on Figure 7A to Figure 7G. This included: • Montbretia in the northern grassland and wall cotoneaster (*Cotoneaster horizontalis*) on the river wall at Pill; • A large stand of Japanese knotweed at Shirehampton; • Japanese knotweed within the bankside woodland and within the woodland to the north at Bower Ashton; • Himalayan balsam within a line of trees at Netham; • Himalayan balsam along the river edge at the west of Netham Left Bank; • Virginia creeper intertwined within a scrub path to the west of Netham Left Bank; • Large patches of Himalayan balsam along the river at Netham Left Bank; • Japanese knotweed within scrub (possibly treated) at Netham Right Bank; • Himalayan balsam and Japanese knotweed along the river and footpath of Netham Right Bank; • Japanese knotweed within scrub to the west of Netham Right Bank; • Virginia creeper to the centre of Netham Right Bank; • Cotoneaster and Japanese rose growing under a hedge along the pathway to the east of Netham Right Bank; • Variegated yellow archangel (*Lamium galeobdolon argentatum*) at the eastern end of Upstream Left Bank; • Wall cotoneaster and Himalayan balsam towards the centre of Upstream Left Bank; • Himalayan balsam along the river to the east of Upstream Left Bank; • Himalayan balsam along a stretch of riverbank at Upstream Right Bank; • Wall cotoneaster and small-leaved cotoneaster (*Cotoneaster microphyllus*) within the garden on the bank top at Upstream Right Bank; • Montbretia and Virginia creeper within the garden at the centre of Upstream Right Bank; • Spanish bluebell along the river through City Centre; • Japanese knotweed within scrub adjacent to the chocolate path by Sparke Evans Pocket Path; and • Cotoneaster within woodland adjacent to the river and Cumberland Road.

4. Recommendations and Enhancements

4.1 Recommendations for Further Work

This PEA has identified the potential presence of several ecological receptors within/surrounding the survey boundaries, including notable habitats, INNS and protected/notable species: bats, badger, hazel dormouse, otter, water vole, breeding and wintering birds, reptiles, amphibians (including great crested newt), invertebrates, fish, hedgehog, harvest mouse and potential presence of rare/notable or localised botanical species.

Recommendations for further consultation, further field surveys or general best practice avoidance and mitigation measures to minimise impacts of the proposed works on habitat and species are stated within Table 20 below, in line with PEA guidance[29].

Several of the further recommended surveys would only be required if the works (either during construction or operation) are likely to impact upon that particular species or the habitats potentially supporting those species. A suitably experienced ecologist should therefore be consulted as the Strategy design progresses to establish exactly which further surveys are necessary.

Table 20: Recommendations for further consultation, surveys, or avoidance, mitigation and enhancement measures

Ecological Receptor	Comments	Further Work Required
Designated Sites	There are numerous statutory and non-statutory designated sites within the various search areas, which may be directly or indirectly impacted by the works during both construction and operation. A Stage 1 Screening Habitats Regulations Assessment (HRA) would be required to assess any likely significant effects to International Sites (with consideration for whether Stage 2 Appropriate Assessment is required), and impacts to other statutory and non-statutory sites would be assessed within an Ecological Impact Assessment (EcIA). Consultation with the appropriate statutory bodies would potentially be required to inform the HRA and EcIA. This includes consultation with North Somerset County Council and Natural England, regarding the North Somerset and Mendip Bats SAC, due to the Bower Ashton and Entrance Lock sites being located within Band B of the consultation zone.	Consultation with Natural England and BCC Consultation with North Somerset County Council and Natural England regarding the North Somerset and Mendip Bats SAC[18] HRA and EcIA
Habitats	Several HPIs and AWI sites overlap with the Strategy sites, and impacts to these would be assessed within an EcIA. A NVC survey is recommended for the neutral grassland/coastal saltmarsh at Pill, and there is a possibility that this may support notable plant species that could not be identified at the time of the survey. An NVC survey should also be undertaken in the section of Avon Gorge Woodlands SAC, which intersects with the Strategy boundary to define the presence of any Annex I habitats. Throughout the design process, measures should be taken to avoid impacts to the SAC habitat. Hedgerow surveys may be required for priority hedgerows identified at Pill, Shirehampton, Netham and Netham Right Bank if these are likely to be impacted by the works. Any clearance should be minimised where possible. Retained trees on Site should be protected in line with BS 5837:2012[30]. Standard pollution control measures should be implemented during construction to protect all habitats, particularly the river itself.	NVC (April to September) Hedgerow survey (April to October, ideally June and July) EcIA HRA

[29] Chartered Institute of Ecology and Environmental Management (CIEEM) (2017). Guidelines for Preliminary Ecological Appraisal. Second Edition. Available online at: https://cieem.net/resource/guidance-on-preliminary-ecological-appraisal-gpea/ (accessed 05/05/22).

[30] British Standards Institute BS 5837:2012. Trees in relation to design, demolition and construction.

Ecological Receptor	Comments	Further Work Required
Bats	Any construction works may have the potential to destroy roosts or disturb bats if they are roosting within any trees or built structures within or adjacent to the Strategy sites. Once likely impacts are known, it is recommended that a PRA of relevant built structures and a Ground Level Tree Assessment (GLTA) is conducted of relevant trees within and adjacent to the Strategy should be undertaken, to identify the presence of bat roosting features and or signs of bat roosting, in accordance with best practice guidance[31], to inform the need for further surveys and any licensing requirements and associated mitigation.	Preliminary roost assessments of trees and built structures (anytime of year but GLTAs are easier in winter when foliage is absent)
Badger	No badger field signs were encountered during the UKHab survey; however this species is widespread and suitable habitat was present. It is recommended that a full badger survey of the suitable habitats on site is undertaken to identify the presence of any badger setts and to inform the need for further surveys and any licensing requirements and associated mitigation. Any badger setts and foraging areas identified should be retained and enhanced alongside the development where possible, with appropriate buffer zones (usually 30m) implemented between the setts and construction.	Badger survey (any time of year, but ideally November to April when vegetation has died back)
Beaver	Given that as a result of The Beavers (England) Order 2022, it is an offence to deliberately capture, kill, injure, or disturb beavers, or damage and destroy their breeding sites or resting places, a basic beaver survey is recommended within suitable habitat to avoid disturbance of beaver breeding or resting sites. Where such sites are found, mitigation should be put in place to prevent impacting potential beaver breeding sites or resting places. Any of these sites identified should be retained alongside the development where possible, with buffer zones put in place between sites and construction to prevent disturbance.	Beaver survey (any time of year but avoiding periods of prolonged heavy rainfall and/or high-water levels).
Hazel dormouse	As dormouse presence is likely, particularly within the overlapping Leigh Woods within Bower Ashton, a dormouse presence/likely absence survey should be conducted within suitable habitat (connected woodland, hedgerow and scrub) if relevant areas of vegetation is likely to be impacted by the works.	Dormouse presence/likely absence survey if vegetation clearance required (April to October)
Otter	Due to the presence of suitable habitat on site, targeted surveys should be undertaken to confirm the presence/likely absence of otter if these habitats are likely to be impacted, to inform any licensing requirements and associated mitigation. This may comprise both walkover bank-based surveys, as well as boat-based surveys to cover areas not safely or easily accessible by foot.	Otter survey (any time of year)
Water vole	Water vole surveys should be undertaken to confirm the presence/likely absence of water vole where there are historical records of water vole (north of Shirehampton) and where suitable habitat was identified at some of the upstream sites. This may comprise both walkover bank-based surveys, as well as boat-based surveys to cover areas not safely or easily accessible by foot. Targeted water vole surveys can be combined with otter surveys.	One early season survey visit (mid-April, May or June) and one late season survey visit (July, August or September), totalling two survey visits
Birds	Walkover transect surveys to cover suitable breeding and wintering habitat that may be impacted by the works, with the aim of recording the presence of migratory and wintering bird species (including those associated with the Severn Estuary SPA and Ramsar site) [32] and breeding bird species within the Strategy sites (including potential Schedule 1 species, such as kingfisher). For breeding birds, at least three survey visits may be required (but potentially up to six survey visits) at all Strategy sites except for the central urban sites (Entrance Lock, Netham, Netham Left Bank and Netham Right Bank, Bristol City Centre) due to the location and extent of suitable breeding habitat. The	Breeding birds survey (three (minimum) to six (maximum) survey visits, evenly spread across March to June)

[31] Collins, J. (2016). Bat Surveys: Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn.). The Bat Conservation Trust, London.

[32] Cutts, N. et al. (2013) The Waterbird Disturbance Mitigation Toolkit

Ecological Receptor	Comments	Further Work Required
	need for this should be reviewed by a suitably experienced ecologist as the project design progresses. For wintering birds, monthly visits may be required between October and March to cover the intertidal Strategy sites (Pill, Shirehampton, Sea Mills and Bower Ashton). The nature of and need for these survey visits (i.e. high/low tide, diurnal/nocturnal), should be reviewed by a suitably experienced ecologist as the project design progresses. Bioacoustic monitoring is suggested in discrete locations as well, in line with recent guidance[33], to detect rarer species and any nocturnal or cryptic species. If any vegetation pruning or removal is required there is the potential for the destruction of nesting bird habitat, and harm to nesting birds. Any vegetation clearance should be undertaken outside of the breeding bird season (generally taken as March to August inclusive, for most species), where possible. If clearance is required within the breeding bird season, a pre-works check for bird nests by a suitably experienced ecologist no more than 24 hours prior to clearance. If active nests are found, a suitable exclusion zone should be set up and no work should continue in the area until the young have fledged and left the vicinity. Larger exclusion zones would be required if nests of Schedule 1 species (such as kingfisher or peregrine) are found, to ensure no disturbance occurs. Netting of vegetation or buildings to prevent nesting is not appropriate. Any cleared vegetation should be reinstated with appropriate native species where possible.	Wintering birds survey (monthly visits October to March)
Reptiles	Given the presence of suitable reptile habitats in the forms of tussocky grassland and hedgerow, woodland and scrub edges, a reptile survey of these habitats is recommended if they are likely to be impacted significantly, to determine reptile presence/likely absence across the sites. Surveys should ideally be conducted using artificial reptile refugia, although the placement of these should be carefully selected, considering potential for vandalism.	Reptile survey (April to September - optimum months April, May and September)
Amphibians	HSI assessments should be conducted on the three ponds within the Upstream Left Bank site, as well as any ponds within 500m of, and suitably connected to, the 13 Strategy sites, including those north of City Centre. Ponds would potentially require further survey depending on the outcome of the HSI assessments. This may comprise an initial eDNA sampling survey to initially establish presence/absence. If a positive result is obtained then a full presence/absence survey would be required comprising 4-6 visits, to inform any licensing requirements and associated mitigation.	HSI assessment eDNA sampling (mid-April to June) Presence/absence survey (March to June)
Invertebrates	Some grassland areas and habitat mosaics across the Strategy sites appeared sufficiently species-rich and complex that they may support more rare or notable terrestrial invertebrate species/populations, such as the scrub mosaic at Shirehampton or the woodland within Bower Ashton that overlaps with the Leigh Woods NNR (designated for a high number of nationally rare and scarce insect species). The River Avon itself may support significant aquatic invertebrate populations, particular the more tidally influenced areas to the west which overlap with the Severn Estuary SSSI (one feature of which is invertebrate populations of considerable interest). Depending on the scale of impact, targeted terrestrial and aquatic invertebrate surveys should be conducted by invertebrate specialists within suitable habitats that may be affected by the works.	Targeted terrestrial invertebrate survey potentially required if suitable habitat to be impacted (spring to early autumn) Targeted aquatic invertebrate survey potentially required if suitable habitat to be impacted (March to May and September / October)
Fish	The scope of works should be kept under review and impacts on fish assessed accordingly. Further fish surveys may not be needed but an aquatic ecologist should keep this requirement under review as the project evolves.	No further work required at this stage
Other SPIs	No species surveys would be required for other SPIs such as hedgehog or harvest mouse. However, their potential presence should be considered as the Strategy design progress and when any avoidance or mitigation measures are	No further work required at this stage

[33] https://birdsurveyguidelines.org/methods/ [Accessed online July 2023]

Ecological Receptor	Comments	Further Work Required
	specified, such as replacement of suitable habitats on an at least like-for-like basis as well as staged vegetation clearance, if required.	
INNS	Several INNS were identified across the Strategy sites, though this does not rule out the presence of additional species that may not have been in flower at the time of the surveys. A full detailed INNS should therefore be conducted at a suitable time of year (to capture all flowering periods) to map the locations of all INNS that may be impacted by the Strategy works. The INNS should also include the intertidal mudflat areas if access can be safely obtained, to be conducted by an intertidal specialist. An INNS Management Plan should be produced by the contractor detailing suitable exclusion zones and any safe removal/eradication measures.	INNS survey (May to September)

4.2 Enhancement Measures

General enhancement measures which could be implemented include:

- Creation of marginal backwaters within the River Avon and the stream within St Annes to create suitable fish spawning areas.
- Thinning of dense riverbank woodlands and scrub to reduce shading and allow more aquatic vegetation growth.
- Re-profiling of riverbanks and planting of aquatic vegetation suitable for foraging water vole and other species.
- Restoration of HPI coastal and floodplain grazing marsh habitat within Pill.
- Introduction of artificial habitat features, such as:
  - Kingfisher perches and nest holes
  - Otter holt (in a suitable low-disturbance location to provide resting and breeding opportunities)
  - Log piles/areas of brash and deadwood to provide hibernacula habitat for invertebrates, reptiles and amphibians
  - Bird nest boxes and bat boxes on retained buildings and trees (specification to be confirmed based on species present)
  - Hedgehog houses within suitable hedgehog habitat (specification to be advised by a suitably experienced ecologist)
- Safe removal and eradication of INNSs and replacement with appropriate native species.
- The replacement of any removed vegetation with fruiting species to provide a food source for invertebrates, birds and mammals.
- Creation of additional ponds to enhance the biodiversity of the sites.
- Creation of connected wildflower-rich areas to create habitat corridors and stepping stones for pollinators, for instance within urban parks such as Sparke Evans Pocket Park.
- Creation of strategic dark corridors for ALAN-sensitive species.
- Altered management of currently intensively managed hedgerows within urban areas to provide greater biodiversity benefits. This may include less frequent trimming and planting of additional native species to increase diversity. An improved network of hedgerows, linking larger areas of semi-natural habitat (e.g. the Gorge and Downs SNA) would encourage the movement of wildlife throughout the Strategy.
- Support of works being undertaken within the wider catchment to reduce pollution into watercourses and improve water quality of the River Avon. This would in turn improve the Water Framework Directive

status of the river, and the condition of adjacent habitats such as the mudflats along the Avon. This should include introduction of a stronger natural riparian margin on the banks of the river to protect it from run-off and improve water quality. The nature of this buffer (i.e. woodland, grassland and/or scrub) would depend on the objectives of the surrounding design, but it is recommended that any intensive management activities (such as application of fertiliser) are offset from the banks by at least 10m. The potential benefits of encouraging wild beaver populations as a measure of improving water quality is elaborated on below.

- As detailed within Section 3.1.3, Eurasian beavers are known to be present within the wider catchment. Intervention to support expansion of the current range and population size of beaver within the catchment should be considered as a natural solution for the improvement of water quality, reduction of flood risk and the creation of wetland habitats that support a range of other important species. Previous studies[34] into the natural flood management (NFM) opportunities throughout the catchment, including potential utilisation of beavers, should be consulted in considering the most appropriate locations for targeted intervention, and consideration given to maintaining genetic diversity of wild beaver within the catchment.
- Consideration for integration with further NFM measures across the catchment in strategic locations to deliver a wide range of benefits across disciplines, e.g. water quality and biodiversity.
- Installation of green roofs or living walls to increase foraging habitat for pollinators and reduce the impact of the urban heat island effect.
- Inclusion of native, locally sourced, appropriate and diverse plants in any landscaping proposals (in line with BNG requirements). Creation of priority habitats appropriate to the local area should be the focus of habitat design using predominantly native species of local provenance. However, non-native species may be considered with regards to climate change resilience.
- Protection, conservation and enhancement of flora that are locally significant or notable as features of designated sites, such as whitebeams, spiked speedwell (*Veronica spicata*) and Bristol rock-cress. Consultation with local groups, such as the Avon Wildlife Trust, may be beneficial. Areas of the Strategy within the Gorge and Downs SNA may be particularly suitable for intervention given the known presence of several significant plant species and ongoing conservation work.
- Adaptation of built structures on site to be suitable for roosting bats if not already optimal (to be identified during PRAs) or a confirmed roost.
- Removal of litter currently within the mudflats, particularly notable where the Avon runs through Bristol City Centre. Prevention of physical pollution may also be implemented through measures including public campaigns, such as that implemented by the Port of London Authority to reduce litter in the Thames[35]. The use of litter collecting technologies, such as Passive Debris Collectors (PDCs) may be considered in aiding the removal of rubbish and debris from the Avon, thereby reducing debris becoming embedded in the mudflat and saltmarsh habitats. Removal of litter within the mudflats would contribute to improving the mudflats SNA.
- Interpretation boards along PRoWs, which highlight the biodiversity value of the river and surrounding area, along with strategic habitat design to ensure disturbance-free areas are maintained for wildlife.

[34] Arup. (2023). Bristol Avon Flood Strategy. Natural Flood Management Assessment.

[35] https://www.pla.co.uk/assets/litterstrategy.pdf

5. Summary and Conclusions

There are two SACs, one SPA and one Ramsar site within 10km, seven SSSIs, one NNR and nine LNRs within 2km of the Strategy.48 SNCIs, four SNAs, three AWTRs, and 88 AWTRs within 1km of the Strategy, several of which overlap with one of the Strategy site boundaries. Two of the Strategy sites (Bower Ashton and Entrance Lock) also fall within Band B of the North Somerset and Mendip Bats SAC consultation zone, and City Centre falls within Band C. There are eight AWI Ancient and Semi-natural Woodland sites and nine HPI types within 500m of the Strategy sites, several of which also overlap with one of the Strategy site boundaries. There are also several ancient, veteran or notable trees within 500m of the Strategy, though none fall within any of the Strategy site boundaries. A variety of UKHab types were identified during the field survey which have the potential to support a range of protected and notable species, including bats, badger, hazel dormouse, otter, water vole, breeding and wintering birds, reptiles, amphibians (including great crested newt), invertebrates (both terrestrial and aquatic), fish, hedgehog, harvest mouse and potential presence of rare/notable or localised botanical species.

Further work has been recommended to provide additional information on the presence/likely absence of protected species within the Strategy sites, as well as an NVC and hedgerow survey in some discrete locations. On completion of these further surveys, it may also be necessary to provide additional recommendations for avoidance/mitigation measures with regard to these species and habitats. In addition to this, a BNG Assessment report will be produced, providing a calculation of the baseline biodiversity units on site. Throughout the design process, the mitigation hierarchy should be adopted[36], and measures sought to mitigate and enhance biodiversity.

This report is the result of survey work undertaken across spring and summer 2022 and spring 2023. This report refers, within the limitations stated, to the condition or proposed development of the site at the time of the inspections. Changes in legislation, guidance, best practice, etc. may necessitate a re-assessment/survey. It is also advised that if there is a delay of over two years in undertaking the works, an updated walkover survey is undertaken to ensure the baseline conditions have not changed. No warranty is given as to the possibility of future changes in the condition of the site.

This report is produced solely for the benefit of the BCC, EA and associated stakeholders, and no liability is accepted for any reliance placed on it by any other party. This report is prepared for the proposed uses stated in the report and should not be used in a different context.

[36] CIEEM, 2019. Biodiversity Net Gain: Good Practice Principles for Development.

Figures

Figure 1. Location of Strategy Sites.

A3

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Pill
Shirehampton
Sea Mills
Bower Ashton
Entrance Lock
City Centre
Netham
Netham Left Bank
St Annes
Netham Right Bank
Revised Area 10
Upstream Left Bank
Upstream Right Bank

Esri UK, Esri, HERE, Garmin, INCREMENT P, Intermap, USGS, METI/NASA

Red line boundary

Kilometers
0 0.5 1 1.5

Coordinate System: British National Grid

Rev	Date	By	Chkd	Appd	Authd
P01	26/06/2023	EOS	AC	PC	PC

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Client
Bristol City Council

Project Name
Bristol Avon Flood Strategy

Drawing Title
Strategy Site Locations

Scale at A3
1:35,000

Role
Ecology

Suitability
Issue

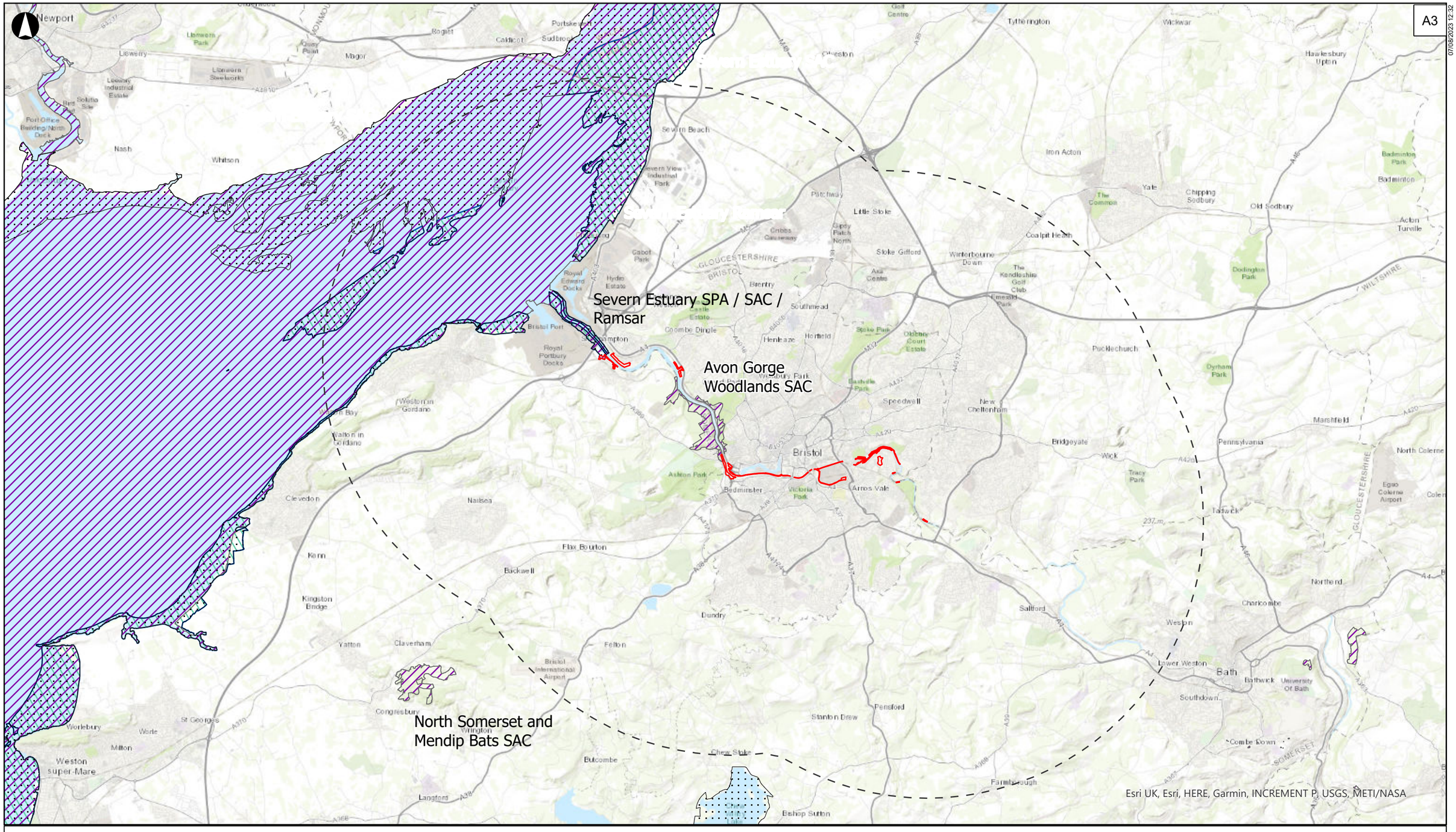
Project Number
28598200

Rev
P02

Drawing Name
Figure 1

\\global\gis\UK\285000\285982-00_BristolAvonFlood\Workspaces\285982_BAFS_Ecology\285982_BAFS_ECOLOGY_PEA\285982_BAFS_ECOLOGY_PEA.aprx

Figure 2. Statutory (international) designated sites within 10km of the Strategy.



A3

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Red line boundary

Red line boundary 10km buffer

Special Protection Area (SPA)

Special Area of Conservation (SAC)

Ramsar Site

Kilometers

0 2.25 4.5 9

Coordinate System: British National Grid

Rev	Date	By	Chkd	Appd	Authd
P01	07/08/2023	EH	AC	PC	PC

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Bristol City Council

Project Name

Bristol Avon Flood Strategy

Drawing Title

International designated sites within a 10km buffer from red line boundary

Scale at A3

1:134,000

Role

Ecology

Suitability

Issue

Project Number

28598200

Rev

P01

Drawing Name

Figure 2

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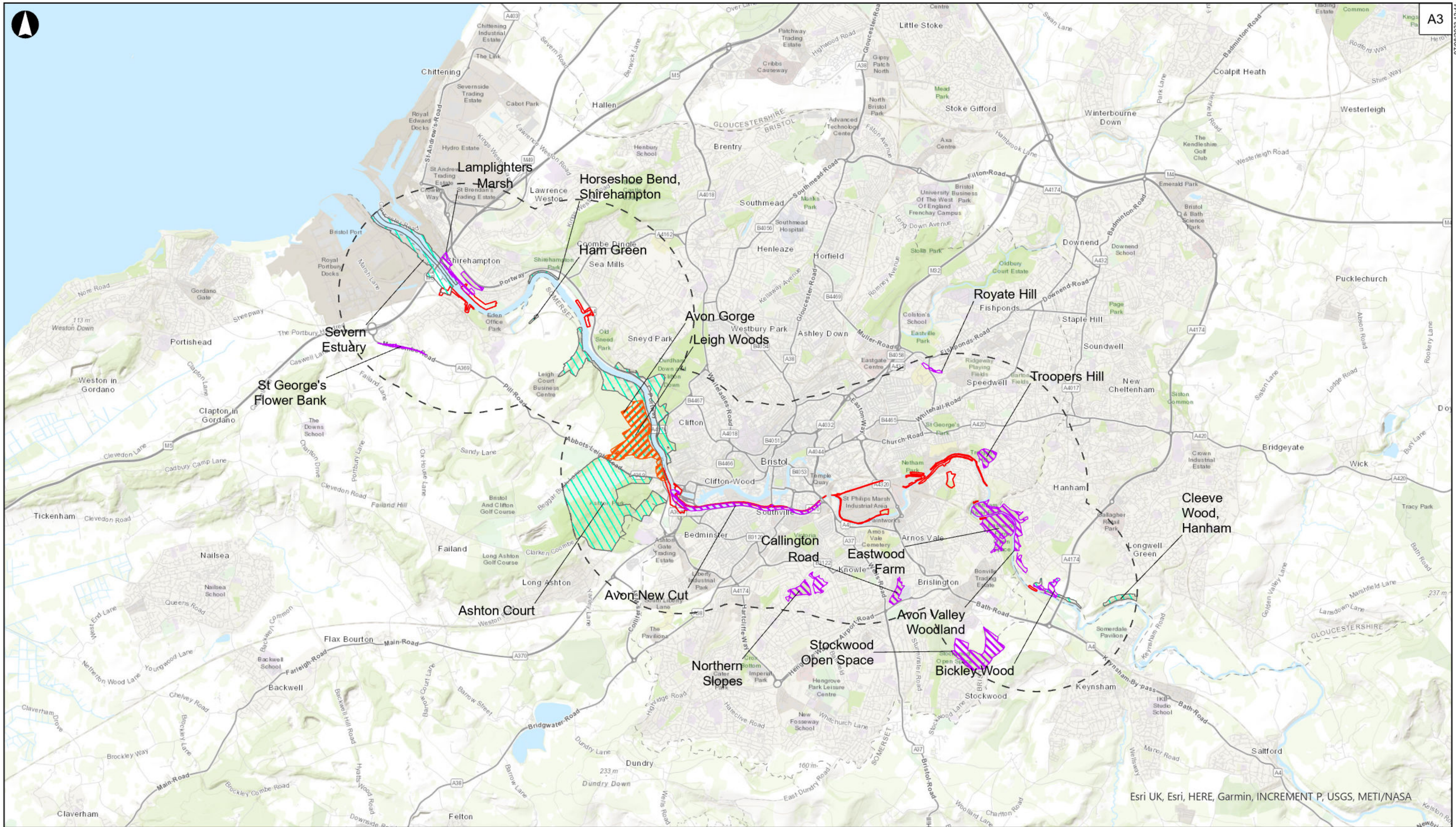
Figure 3. Statutory national designated sites within 2km of the Strategy.



Red line boundary

Red line boundary 2km buffer

Local Nature Reserve (LNR)

National Nature Reserve (NNR)

Site of Special Scientific Interest (SSSI)

Kilometers

0 1 2 4

Coordinate System: British National Grid

© Natural England

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Project Name
Bristol Avon Flood Strategy

Drawing Title
National designated sites within a 2km buffer from red line boundary

Scale at A3
1:74,000

Role
Ecology

Suitability
Issue

Project Number
28598200

Rev
P01

Drawing Name
Figure 3

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Figure 4. Sites of Nature Conservation Importance (SNCIs) within 1km of the Strategy.

A3

07/08/2023 14:12

Red line boundary

Red line boundary 1km buffer

Sites of Nature Conservation Interest (SNCI)

Kilometers
0 0.5 1 1.5 2

Coordinate System: British National Grid

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Drawing Title
Sites of Nature Conservation Interest (SNCI) within a 1km buffer from red line boundary

Scale at A3
1:40,000

Role
Ecology

Suitability
Issue

Project Number
28598200

Rev
P01

Drawing Name
Figure 4

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Figure 5. Ancient woodland within 500m of the Strategy.

A3

Leigh Wood/Markham Bottom

Rownham Wood/Leigh Woods

unnamed wood at Conham Vale

Birch Wood

Hencliff Wood

Birch Wood

Fox's Wood

Bickely Wood

Esri UK, Esri, HERE, Garmin, INCREMENT P, Intermap, USGS, METI/NASA

Red line boundary

Red line boundary 500m buffer

Ancient Woodland

Kilometers

0 0.5 1 2

Coordinate System: British National Grid

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Drawing Title
Ancient Woodland within a 500m buffer from red line boundary

Scale at A3
1:35,000

Role
Ecology

Suitability
Issue

Project Number
28598200

Rev
P01

Drawing Name
Figure 5

\\global\gis\UK\285000\285982-00_Bristol\AvonFlood\Workspaces\285982_BAFS_Ecology\285982_BAFS_ECOLOGY_PEA\285982_BAFS_ECOLOGY_PEA.aprx

Figure 6. Wildlife Sites and Strategic Nature Sites within 1km of the Strategy.

A3

07/08/2023 14:18

Railway adjacent to Gloucester Road Sidings

Covered Reservoir South of Penpole Lane

Portway Community School Fields

Railway from Crabtree Slipwood to Lamplighters Layfield Allotments

Cricket Ground South of Penpole Lane

Portway Allotments

River Trym Confluence with River Avon

Land between Trym Valley and Sea Mills Wood

Lamplighters Open Space

Tynings Field Allotments

Mrtyle Hall Allotments

Nibley Road Open Space

Manor Farm Sports Ground & Playing Fields

City & Port of Bristol Sports Ground

Gorge & Downs SNA

Land between Sneyd Park & the Portway

Land between Windsor Place and The Paragon

Land between Hotwell Road and

Esri UK, Esri, HERE, Garmin, INCREMENT P, [illegible]

- Red line boundary
- Red line boundary 1km buffer
- Avon Wildlife Trust Reserves
- Bristol Wildlife Network Sites

Strategic Nature Areas

- Mudflats
- Woodland

Kilometers 0 0.5 1

Coordinate System: British National Grid

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Project Name
Bristol Avon Flood Strategy

Drawing Title
Avon Wildlife Trust Reserves, Bristol Wildlife Network Sites and Strategic Nature Areas within a 1km buffer from red line boundary (west)

Scale at A3
1:23,000

Role
Ecology

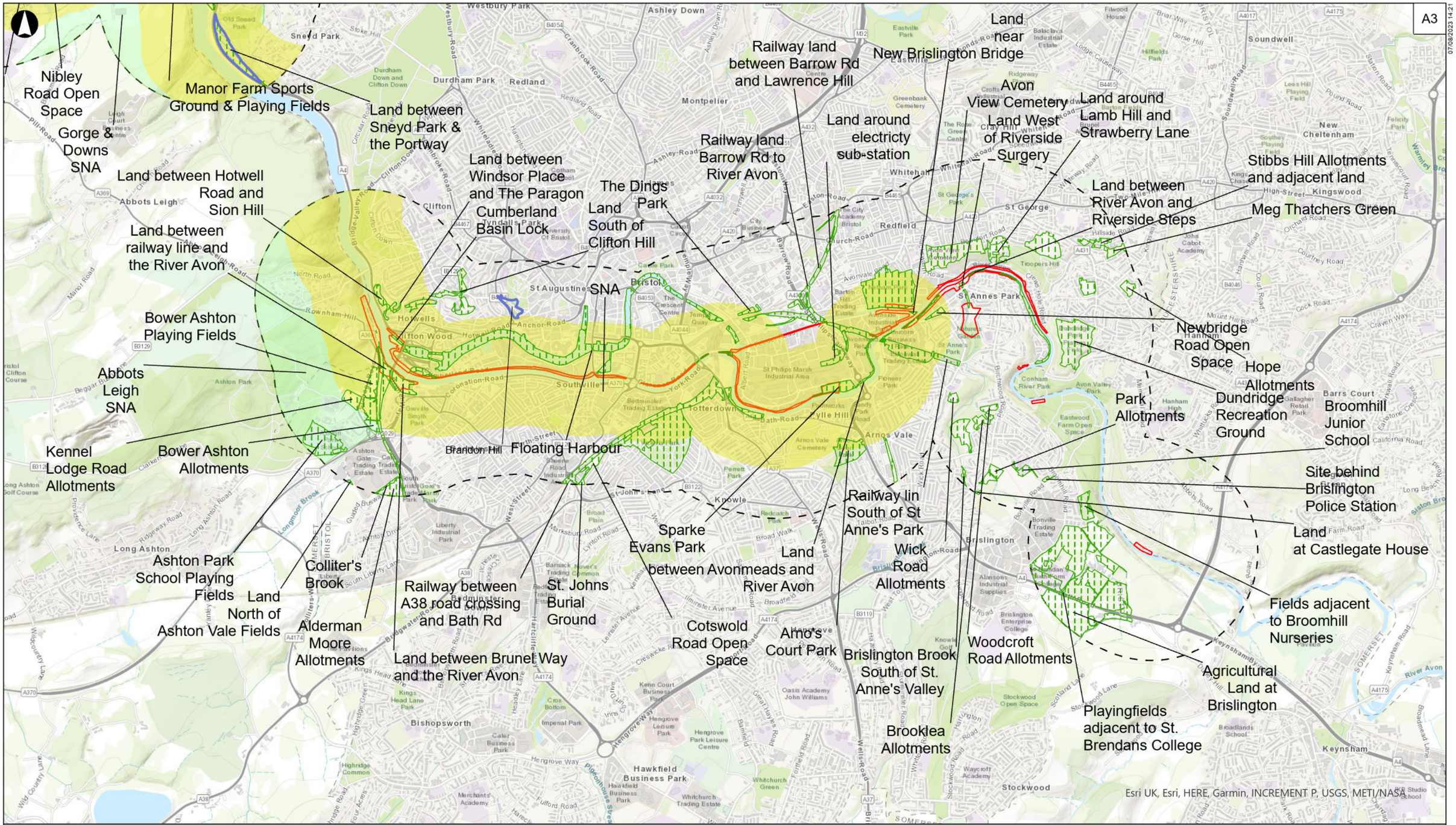
Suitability
Issue

Project Number
28598200

Rev
P01

Drawing Name
Figure 6a

\\global\gis\UK\285000\285982-00_BristolAvonFlood\Workspaces\285982_BAFS_Ecology\285982_BAFS_ECOLOGY_PEA\285982_BAFS_ECOLOGY_PEA.aprx



Red line boundary
Red line boundary 1km buffer
Avon Wildlife Trust Reserves
Bristol Wildlife Network Sites
Strategic Nature Areas
Mudflats
Woodland

Kilometers
0 0.5 1 1.5

Coordinate System: British National Grid

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Project Name
Bristol Avon Flood Strategy

Drawing Title
Avon Wildlife Trust Reserves, Bristol Wildlife Network Sites and Strategic Nature Areas within a 1km buffer from red line boundary (east)

Scale at A3
1:35,000
Role
Ecology
Suitability
Issue
Project Number
28598200
Rev
P01
Drawing Name
Figure 6b

\\global\gis\UK\285000\285982-00_BristolAvonFlood\Workspaces\285982_BAFS_Ecology\285982_BAFS_ECOLOGY_PEA\285982_BAFS_ECOLOGY_PEA.aprx

Figure 7. UK Habitat Classification Map.

A3

07/09/2023 20:00

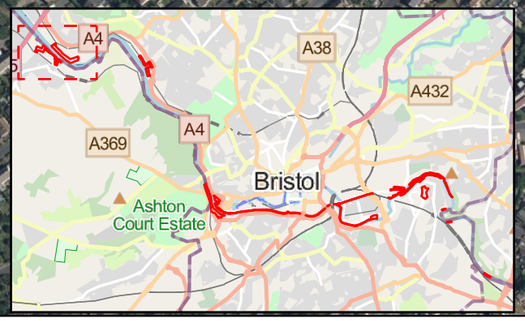
TN A3

TN A1

TN A2

Pill

Shirehampton



- Red Line Boundary
- g3c - other neutral grassland
- g4 - modified grassland
- h3 - dense scrub
- t2a - coastal saltmarsh
- t2d - intertidal mudflats
- u1b - developed land, sealed surface
- u1d - suburban mosaic of developed/natural surfaces
- w1f - lowland mixed deciduous woodland
- w1g - other woodland, broadleaved
- w1h - other woodland, mixed
- w1g6 - line of trees
- h2a - hedgerow (priority habitat)
- h2b - other hedgerow
- u1e - built linear feature

Invasive Non-Native Species:

- Cotoneaster sp.
- Japanese knotweed
- Montbretia
- Target Notes (TN)

Metres: 125, 250

Coordinate System: British National Grid

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Project Name

Bristol Avon Flood Strategy

Drawing Title

UK Habitat Classification Map - Pill and Shirehampton

Scale at A3

1:5,000

Role

--

Suitability

Issue

Project Number

28598200

Rev

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Drawing Name

Figure 7A

\\global\gis\UK\260000\260498-00 BAFS\BNG_BS2\BNG_BS2.aprx

A3

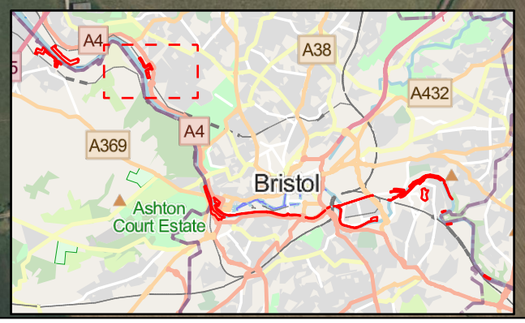
07/09/2023 18:11

Sea Mills

TN B1

TN B3

TN B2



- Red Line Boundary
- g3c - other neutral grassland
- g4 - modified grassland
- h3 - dense scrub
- t2a - coastal saltmarsh
- t2d - intertidal mudflats
- u1b - developed land, sealed surface
- u1c - artificial unvegetated unsealed surface
- u1d - suburban mosaic of developed/natural surfaces
- w1g - other woodland, broadleaved
- w1g6 - line of trees
- u1e - built linear feature
- Target Notes (TN)

Metres

0 125 250

Coordinate System: British National Grid

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Project Name

Bristol Avon Flood Strategy

Drawing Title

UK Habitat Classification Map - Sea Mills

Scale at A3

1:5,000

Role

--

Suitability

Issue

Project Number

28598200

Rev

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Drawing Name

Figure 7B

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A3

07/09/2023 17:53

Entrance Lock

TNC4

TN C7

TN C1

TN C3

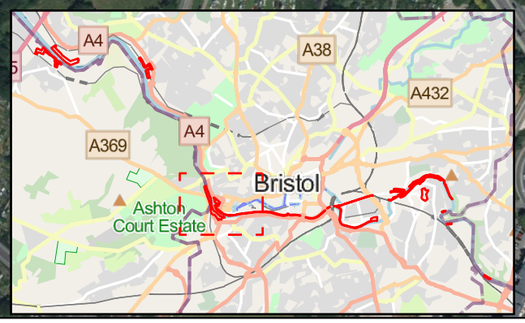
TN C5

TN C2

TN C8

TN C6

TN H1



- Red Line Boundary
- g3c - other neutral grassland
- g4 - modified grassland
- h3 - dense scrub
- r2 - rivers and lakes
- t2a - coastal saltmarsh
- t2d - intertidal mudflats
- u1b - developed land, sealed surface
- u1d - suburban mosaic of developed/natural surfaces
- w1f - lowland mixed deciduous woodland
- w1g - other woodland, broadleaved
- w1h - other woodland, mixed
- w1g6 - line of trees
- u1e - built linear feature

Invasive Non-Native Species:

- Cotoneaster sp.
- Spanish bluebell
- Cotoneaster sp. and Spanish bluebell
- Japanese knotweed
- Himalayan knotweed
- Target Notes (TN)

Metres: 0 125 250

Coordinate System: British National Grid

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Project Name

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Drawing Title

UK Habitat Classification Map - Bower Ashton and Entrance Lock

Scale at A3: **1:5,000**

Role: **--**

Suitability: **Issue**

Project Number: **28598200**

Rev: **--**

Drawing Name: **Figure 7C**

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A3

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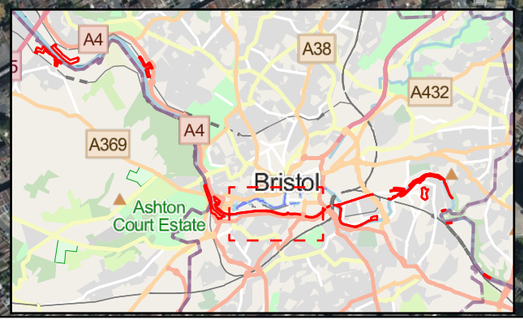
TN H1

TN H2



- Red Line Boundary
- g3c - other neutral grassland
- g4 - modified grassland
- h3 - dense scrub
- t2a - coastal saltmarsh
- t2d - intertidal mudflats
- u1b - developed land, sealed surface
- u1d - suburban mosaic of developed/natural surfaces
- w1d - wet woodland
- w1g - other woodland, broadleaved
- w1h - other woodland, mixed
- w1g6 - line of trees

Invasive Non-Native Species:

- Cotoneaster sp. and Spanish bluebell
- Target Notes (TN)

Metres

0 125 250

Coordinate System: British National Grid

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Project Name

Bristol Avon Flood Strategy

Drawing Title

UK Habitat Classification Map - Bristol City Centre (1)

Scale at A3

1:5,000

Role

--

Suitability

Issue

Project Number

28598200

Rev

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Drawing Name

Figure 7D

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A3

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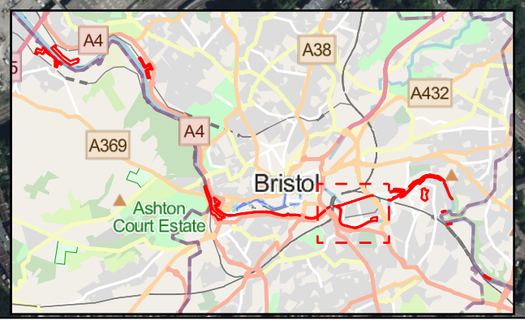
TN H3



- Red Line Boundary
- g3c - other neutral grassland
- g4 - modified grassland
- h3 - dense scrub
- r1e - canals
- r2 - rivers and lakes
- t2a - coastal saltmarsh
- t2d - intertidal mudflats
- u1b - developed land, sealed surface
- u1c - artificial unvegetated unsealed surface
- w1d - wet woodland
- w1g - other woodland, broadleaved
- w1g6 - line of trees
- h2a - hedgerow (priority habitat)
- h2b - other hedgerow
- u1e - built linear feature

Invasive Non-Native Species:
- Japanese knotweed
- Target Notes (TN)

Metres
0 125 250

Coordinate System: British National Grid

--

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Project Name
Bristol Avon Flood Strategy

Drawing Title
UK Habitat Classification Map - Bristol City Centre (2)

Scale at A3
1:5,000

Role
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Suitability
Issue

Project Number
28598200

Rev
--

Drawing Name
Figure 7E

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A3

07/09/2023 15:42

Netham

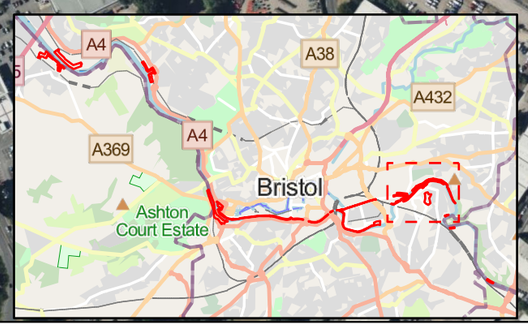
St Anne's

TN D1

TN D2

TN E1

Revised Area 10



- Red Line Boundary
- g3c - other neutral grassland
- g4 - modified grassland
- h3 - dense scrub
- r1e - canals
- r2 - rivers and lakes
- t2a - coastal saltmarsh
- u1b - developed land, sealed surface
- u1c - artificial unvegetated unsealed surface
- u1d - suburban mosaic of developed/natural surfaces
- w1f - lowland mixed deciduous woodland
- w1g - other woodland, broadleaved
- w1h - other woodland, mixed
- w2c - other coniferous woodland
- w1g6 - line of trees
- h2a - hedgerow (priority habitat)
- h2b - other hedgerow
- u1e - built linear feature
- r2b - other rivers and streams

Invasive Non-Native Species:

- Japanese rose
- Cotoneaster sp. and Japanese rose
- Spanish bluebell
- Himalayan balsam
- Japanese knotweed
- Himalayan balsam and Japanese knotweed
- Variegated yellow archangel
- Virginia creeper
- Target Notes (TN)

Coordinate System: British National Grid

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Metres

0 125 250

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Project Name

Bristol Avon Flood Strategy

Drawing Title

UK Habitat Classification Map - Netham, St Anne's and Revised Area 10

Scale at A3

1:5,000

Role

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Suitability

Issue

Project Number

28598200

Rev

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Drawing Name

Figure 7F

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A3

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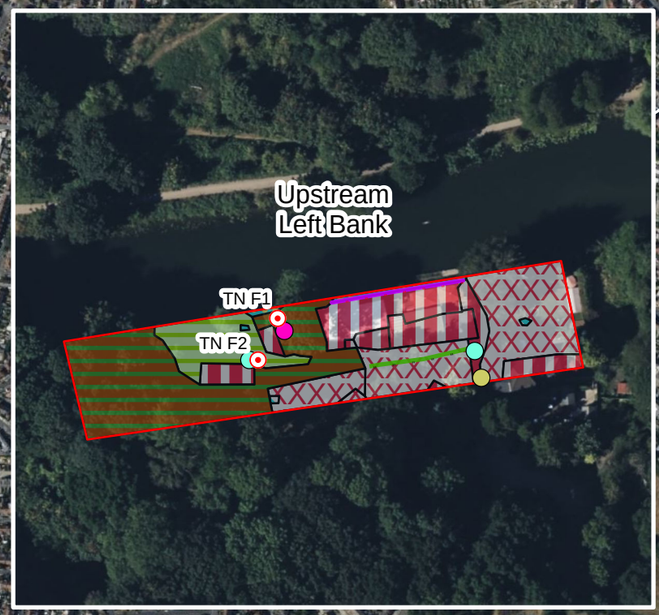

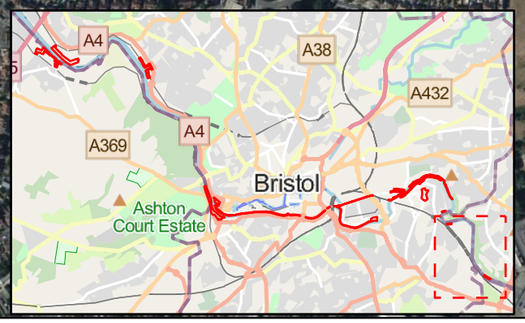

- Red Line Boundary
- g3c - other neutral grassland
- g4 - modified grassland
- h3 - dense scrub
- r2 - rivers and lakes
- u1b - developed land, sealed surface
- u1d - suburban mosaic of developed/natural surfaces
- w1g6 - line of trees
- u1e - built linear feature

Invasive Non-Native Species:
- Cotoneaster sp.
- Himalayan balsam
- Montbretia
- Virginia creeper
- Target Notes (TN)

Metres
0 125 250

Coordinate System: British National Grid

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Project Name
Bristol Avon Flood Strategy

Drawing Title
UK Habitat Classification Map - Upstream Left and Right Bank

Scale at A3
1:7,500

Role
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Suitability
Issue

Project Number
28598200

Rev
--

Drawing Name
Figure 7G

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Photographs

Photograph 1. Coastal saltmarsh field at Pill.

Photograph 2. Scrub mosaic area in Shirehampton.

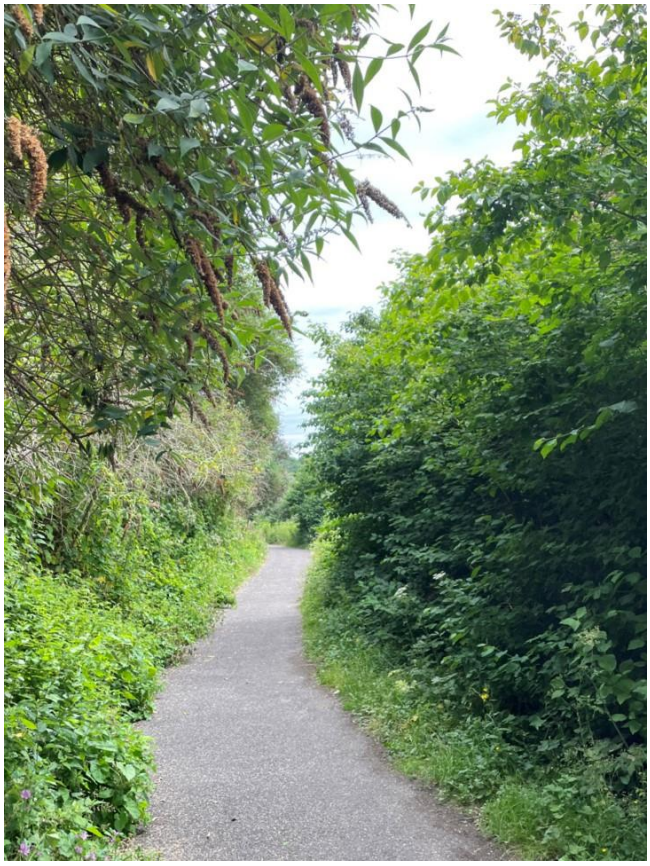
Photograph 3. Saltmarsh, scrub and grassland habitat at Sea Mills.

Photograph 4. Neutral grassland at Bower Ashton.

Photograph 5. Modified grassland at Entrance Lock.

Photograph 6. Industrial estate at Netham.

Photograph 7. Riverbank woodland at Netham Left Bank.



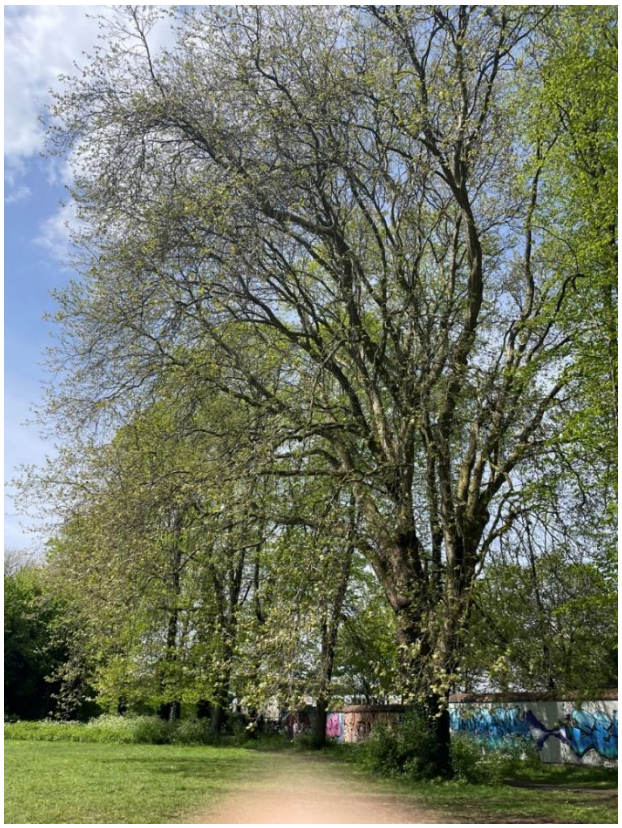
Photograph 8. Scrub along riverbank and footpath at Netham Right Bank.

Photograph 9. Stream within St Annes.

Photograph 10. Gardens and patio at Revised Area 10.

Photograph 11. Neutral grassland transition area at Upstream Left Bank.

Photograph 12. Scrub along footpath and riverbank at Upstream Right Bank.



Photograph 13. Line of trees in Sparke Evans Pocket Park.

Photograph 14. Other neutral grassland adjacent to Feeder Canal.

Photograph 15. Littoral sediment below Redcliffe Roundabout.

Appendix A

Non-Statutory Designated Sites

A.1 Non-Statutory Designated Sites

Table 21: Non-statutory designated sites within 1km of the Strategy (excluding those that overlap or lie immediately adjacent). Distances are approximate and are measured from the edge of the closest Strategy site to the closest edge of the designated site

Site Name	Features	Closest Strategy site	Distance and orientation
Blackswarth Road Wood	Grassland, scrub, woodland and ancient semi-natural woodland that may include some HPI lowland mixed deciduous woodland. The grassland, mainly restricted to the north-west, has a varied flora.	Netham Right Bank	18m north
Trym Valley	River, semi-natural broadleaved woodland with ancient woodland indicator species, saltmarsh and amenity grassland. Part of proposed Regionally Important Geological Site (RIGS). In Gorge and Downs SNA, with sea club-rush (*Bolboschoenus maritimus*), common saltmarsh-grass, sea couch, sea plantain (*Plantago maritima*), hard-grass (*Parapholis incurva*), wood melick and ramsons (*Allium ursinum*).	Sea Mills	19m north
Avon Valley, Hencliff Wood	Ancient woodland, flowing open water and bankside vegetation.	Upstream Right Bank	22m north
Bower Ashton Mineral Railway (disused)	Scrub, ruderal communities and grassland. Most of site lies in an SNA.	Bower Ashton	27m south
East Wood and Keynsham Humpy Tumps complex	Ancient woodland, planted broadleaved woodland, semi-improved neutral grassland. Many notable species: prickly sedge (*Carex muricata*), wavy hair-grass (*Deschampsia flexuosa*), early hair-grass (*Aira praecox*) and silver hair-grass (*Aira caryophyllea*), changing forget-me-not (*Myosotis discolor*), green-winged orchid (*Anacamptis morio*), upright chickweed (*Moenchia erecta*), bird's-foot trefoil, sand spurrey (*Spergularia rubra*) etc.	Upstream Right Bank	28m south
Avon Valley, Conham River Park	Ancient woodland, flowing open water and bankside vegetation.	Upstream Left Bank	51m north
River Avon (North Somerset)	Running water (river) and associated marginal habitats including areas of HPI coastal and floodplain grazing marsh. Most of eastern section lies within Gorge and Downs SNA.	Pill	53m east
Ashton Court Estate (North Somerset)	Protected fauna. Includes most of Ashton Court SSSI, large parts of Ashton Court Estate (Part) (North Somerset section) RIGS and all of Avon Wildlife Trust Reserve Ashton Court Meadow. Lies within Abbots Leigh SNA.	Bower Ashton	71m west
Ashton Court Estate (Bristol)	Deer park established in the 14th Century. Broad-leaved woodland with many ancient trees, especially in Clarkencombe Wood with a very specialised saproxylic invertebrate fauna. Semi-improved grassland and ponds. Part of site SSSI. Proposed RIGS site.	Bower Ashton	85m west
Troopers Hill	Acidic grassland and lowland heathland of HPI types lowland dry acidic grassland and lowland heathland. Locally rare plants and grayling (*Hipparchia semele*). Local Nature Reserve and	Netham Right Bank	86m north-east

Site Name	Features	Closest Strategy site	Distance and orientation
	Proposed RIGS early hair-grass, sheep's sorrel (*Rumex acetosella*)		
Avon Gorge	SSSI with HPI upland mixed ashwood, lowland mixed deciduous woodland and lowland calcareous grassland, endemic *Sorbus bristoliensis* and *wilmottiana*, Bristol rock-cress and many rare plants and invertebrates. SSSI and RIGS geology site. In SNA.	Bower Ashton	90m north
Sneyd Park	Floor of valley comprises several grazed fields: predominantly damp semi-improved neutral grassland, areas of unimproved neutral grassland. Areas of woodland, scrub, ruderal vegetation, hedgerows and a man-made lake in the north-eastern corner. In SNA.	Sea Mills	139m south
Field east of M5 Motorway, Lodway	Marshy grassland and semi-improved neutral grassland, some of which qualifies as HPI coastal and floodplain grazing marsh.	Pill	179m west
East Wood and Fox's Wood	Ancient Semi-natural broadleaved woodland on steep, East facing slopes. The north section (most of East Wood) consists of semi-natural broadleaved woodland with a mixed canopy. The south section (part East Wood and part Fox's Wood) is secondary woodland.	Upstream Right Bank	205m west
St Anne's Valley	Semi-natural broadleaved woodland including HPI lowland mixed deciduous woodland. In the southern half of the site there are areas of semi-improved neutral grassland, but the majority of the grassland is managed as amenity grassland. Stream.	Revised Area 11	229m west
Three Acre Covert and Portway Gardens	Portway Gardens is amenity grassland with a mosaic of types including species-rich calcareous. Three Acre Covert is semi-natural broadleaved woodland with good ground flora, possibly HPI lowland mixed deciduous woodland. In SNA.	Sea Mills	233m north
Avon Valley, Water Lane Field	Protected fauna. Neutral grassland, with ancient woodland on edges.	Upstream Right Bank	253m north
Ox House Bottom and Markham Brook	Ancient semi-natural/semi-natural broad-leaved woodland (small-leaved lime coppice) including HPI upland mixed ashwoods, possible wet woodland and lowland mixed deciduous woodland; calcareous, marshy and semi-improved neutral grassland.	Pill	330m south
Sea Mills Wood	Semi-natural broadleaved woodland possibly HPI lowland mixed deciduous woodland). English elm, ash, small-leaved lime, holly, bluebell, wood anemone (*Anemone nemorosa*), dog's mercury, ivy broomrape (*Orobanche hederae*).	Sea Mills	385m east
Avon Valley, Two tracks to River Bank	Potential ancient woodland. Appears to be two lanes on each side of a poplar plantation.	Upstream Right Bank	402m north
Crabtree Slip Wood	Semi-natural broad-leaved woodland, unimproved calcareous and semi-improved neutral grassland including HPI lowland calcareous grassland, saltmarsh fringe and mudflat. True service tree (*Sorbus domestica*), rare whitebeams *Sorbus eminems* and *anglica*. SSSI and RIGS site.	Sea Mills	445m north
Shirehampton Golf Course and Park	Semi-natural broadleaved woodland including areas of HPI lowland mixed deciduous woodland. Unimproved grassland,	Sea Mills	469m north

Site Name	Features	Closest Strategy site	Distance and orientation
	including HPI lowland calcareous grassland. Amenity grassland, parkland trees and scrub. Includes RIGS. In SNA.		
Clifton Wood	Broadleaved woodland including ivy broomrape. Important as a feeding ground for bats. English oak, ash, ivy broomrape.	Entrance Lock	501m east
Brislington Meadows	Semi-improved neutral grasslands that may include areas of HPI lowland meadow, stream, marshland and scrub woodland containing a wasteland area. Black knapweed (*Centaurea nigra*), rushes, brooklime (*Veronica beccabunga*).	Upstream Left Bank	562m south
Field east of Court House	Unimproved neutral grassland. some (or all) of which qualifies as HPI coastal and floodplain grazing marsh.	Pill	567m west
Avon Valley, Hanham Colliery Tip	Remnant acid grassland over colliery tip. Bare soil, acid grassland remnants	Upstream Left Bank	604m east
River Avon (BANES)	Otter, greater dodder (*Cuscuta europaea*), Loddon pondweed (*Potamogeton nodosus*), perfoliate pondweed (*Potamogeton perfoliatus*), common club-rush (*Schoenoplectus lacustris*), arrowhead (*Syngonium podophyllum*), small teasel (*Dipsacus pilosus*), red-eyed damselfly (*Erythromma najas*), brown hawker (*Aeshna grandis*), emerald damselfly (*Lestes sponsa*), four spotted chaser (*Libellula quadrimaculata*) etc.	Upstream Right Bank	740m east
Great Haynes Field	Unimproved and semi-improved neutral grassland.	Upstream Right Bank	791m north-east
Arno's Vale Cemetery	One of few wildlife sites in an ecologically impoverished area the cemetery has wooded slopes, with neutral grassland near the old chapels and semi-improved neutral grassland on the southern plateau. Arno's Court Wood lies to the south-east of the cemetery.	City Centre	90m south
Easton-Staple Hill Disused Railway	The variety of habitats at this site include grassland, scrub, secondary woodland, tall ruderal vegetation, planted trees and flower beds. Many of the habitats are characteristic of former railway land.	Netham	944m north
Penpole Wood and Quarry	Mainly semi-natural broadleaved woodland, parts on the AWI. Several limestone quarries to west; amenity grassland and scrub to east. Bristol Rock-cress. Proposed RIGS site. Part in Gorge and Downs SNA.	Shirehampton	958m north
Hanham Hills Fields	Calcareous grassland, wetland, woodland.	Upstream Right Bank	958m north-east
Avon Valley, Hanham Fields	Ancient woodland, orchard, semi-improved calcareous grassland, flowing open water and bankside vegetation.	Upstream Right Bank	962m east
Magpie Bottom (Bristol)	Scrub, ruderal vegetation and brook. Important for breeding birds.	Netham Right Bank	962m north-east
Brandon Hill	Public park with semi-natural and planted broadleaved woodland, ponds, grassland and recreated wildflower meadow. Grasslands around the summit lie on sandstone and support some acid-loving species. AWT reserve and RIGS site.	City Centre	505m north
Blaise	SNA, with main habitat woodland. Additional habitats calcareous and neutral grassland.	Sea Mills	1.2km north-west

Site Name	Features	Closest Strategy site	Distance and orientation
Pill Paddock	AWTR, comprised of wildflower meadow, pond, and planted woodland.	Pill	812m south-west
Bennett's Patch and White's Paddock	AWTR, a former sports ground subject to brownfield regeneration.	Sea Mills	360m south
WNS_BCC_75	Bristol Wildlife Network Site.	City Centre	34m south
Agricultural Land at Brislington	Bristol Wildlife Network Site.	Upstream Right Bank	611m south
Alderman Moore Allotments	Bristol Wildlife Network Site.	Bower Ashton	875m south
Arno's Court Park	Bristol Wildlife Network Site.	City Centre	420m south
Ashton Park School Playing Fields	Bristol Wildlife Network Site.	Bower Ashton	758m south-west
Avon Riverside Open Space	Bristol Wildlife Network Site.	Netham Left Bank	26m west
Avon View Cemetery	Bristol Wildlife Network Site.	Netham Right Bank	134m north
Beaufort Road Allotments	Bristol Wildlife Network Site.	Netham Right Bank	141m north
Bower Ashton Allotments	Bristol Wildlife Network Site.	Bower Ashton	504m north
Brislington Brook South of St. Anne's Valley	Bristol Wildlife Network Site.	St Annes	1.2km south
Brooklea Allotments	Bristol Wildlife Network Site.	Upstream Left Bank	381m east
Broomhill Junior School	Bristol Wildlife Network Site.	Upstream Left Bank	566m south
Chalet Garden Allotments	Bristol Wildlife Network Site.	Upstream Left Bank	782m south-west
Colliter's Brook	Bristol Wildlife Network Site.	Bower Ashton	888m south

Site Name	Features	Closest Strategy site	Distance and orientation
Cornwallis Gardens	Bristol Wildlife Network Site.	Entrance Lock	244m north-east
Cotswold Road Open Space	Bristol Wildlife Network Site.	City Centre	791m south
Covered Reservoir South of Penpole Lane	Bristol Wildlife Network Site.	Shirehampton	1km north-east
Cricket Ground South of Penpole Lane	Bristol Wildlife Network Site.	Shirehampton	868m south-west
Cumberland Basin	Bristol Wildlife Network Site.	Entrance Lock	24m east
Dismantled Railway near Tramway Road	Bristol Wildlife Network Site.	City Centre	585m south-east
Dundridge Recreation Ground	Bristol Wildlife Network Site.	Usptream Right Bank	84m east
Fields adjacent to Broomhill Nurseries	Bristol Wildlife Network Site.	Upstream Right Bank	448m north-west
Floating Harbour	Bristol Wildlife Network Site.	City Centre	66m north
Floating Harbour - Upper Reaches	Bristol Wildlife Network Site.	City Centre	69m north
Grounds of Goldney House	Bristol Wildlife Network Site.	City Centre	528m north
Hope Allotments	Bristol Wildlife Network Site.	Upstream Right Bank	541m east
Kennel Lodge Road Allotments	Bristol Wildlife Network Site.	Bower Ashton	415m south-west
Land around electricity sub-station	Bristol Wildlife Network Site.	City Centre	243m north
Land around Lamb Hill and Strawberry Lane	Bristol Wildlife Network Site.	Upstream Right Bank	41m north

Site Name	Features	Closest Strategy site	Distance and orientation
Land at Castlegate House	Bristol Wildlife Network Site.	Upstream Left Bank	947m south-west
Land between Avonmeads and River Avon	Bristol Wildlife Network Site.	St Annes	20m west
Land between Hotwell Road and Sion Hill	Bristol Wildlife Network Site.	Entrance Lock	74m north
Land between Sneyd Park & the Portway	Bristol Wildlife Network Site.	Sea Mills	378m north
Land between Trym Valley and Sea Mills Wood	Bristol Wildlife Network Site.	Sea Mills	372m east
Land between Windsor Place and The Paragon	Bristol Wildlife Network Site.	Entrance Lock	150 north-east
Land North of Ashton Vale Fields	Bristol Wildlife Network Site.	Bower Ashton	1km south
Land North of Goldney Avenue	Bristol Wildlife Network Site.	Entrance Lock	481m north-east
Land South of Clifton Hill	Bristol Wildlife Network Site.	Entrance Lock	673m north-east
Layfield Allotments	Bristol Wildlife Network Site.	Shirehampton	602m north-east
Meg Thatchers Green	Bristol Wildlife Network Site.	Netham Right Bank	816m east
Mrtyle Hall Allotments	Bristol Wildlife Network Site.	Shirehampton	78m east
Newbridge Road Open Space	Bristol Wildlife Network Site.	St Annes	54m south-east
Nibley Road Open Space	Bristol Wildlife Network Site.	Shirehampton	152m east
Park Allotments	Bristol Wildlife Network Site.	Upstream Left Bank	679m south
Playing fields adjacent to St. Brendans College	Bristol Wildlife Network Site.	Upstream Right Bank	215m west

Site Name	Features	Closest Strategy site	Distance and orientation
Portway Allotments	Bristol Wildlife Network Site.	Shirehampton	232m north
Portway Community School Fields	Bristol Wildlife Network Site.	Entrance Lock	832m north-east
Railway adjacent to Gloucester Road Sidings	Bristol Wildlife Network Site.	Shirehampton	694m south-east
Railway between A38 road crossing and Bath Rd	Bristol Wildlife Network Site.	City Centre	209m south
Railway from Crabtree Slipwood to Lamplighters	Bristol Wildlife Network Site.	Shirehampton	171m north
Railway land around Gas Lane/Silverthorne Lane	Bristol Wildlife Network Site.	City Centre	88m north
Railway land between Lawrence Hill and Easton Rd	Bristol Wildlife Network Site.	City Centre	774m north
Railway land South of Unicorn Business Park	Bristol Wildlife Network Site.	St Annes	176m south
Railway line South of St Anne's Park	Bristol Wildlife Network Site.	St Annes	253m north-west
Site behind Brislington Police Station	Bristol Wildlife Network Site.	Upstream Left Bank	692m south
St Aidens Allotments	Bristol Wildlife Network Site.	Upstream Right Bank	487m east
St. Andrews Walk	Bristol Wildlife Network Site.	Entrance Lock	750m north-east
St. Johns Burial Ground	Bristol Wildlife Network Site.	City Centre	919m south
Stibbs Hill Allotments and adjacent land	Bristol Wildlife Network Site.	Upstream Right Bank	654m north-east
The Dings Park	Bristol Wildlife Network Site.	City Centre	283m north

Site Name	Features	Closest Strategy site	Distance and orientation
The Rock Allotments	Bristol Wildlife Network Site.	Upstream Left Bank	587m west
Troopers Hill Allotments	Bristol Wildlife Network Site.	Netham Right Bank	280m north
Tynings Field Allotments	Bristol Wildlife Network Site.	Shirehampton	489m north-east
Victoria Park	Bristol Wildlife Network Site.	City Centre	278m south
Wick Road Allotments	Bristol Wildlife Network Site.	Revised Area 10	632m west
Woodcroft Road Allotments	Bristol Wildlife Network Site.	Upstream Left Bank	324m west
Woodwell Road Allotments & Padock	Bristol Wildlife Network Site.	Shirehampton	230m north

Appendix B

Target Notes

B.1 Target Notes

Table 22. Target notes from the Strategy Sites. Locations are shown in Figures 7A to 7G.

Label	Target note
TN A1	Rubble pile
TN A2	Start of reedbed area
TN A3	Flower crab spider
TN B1	Green roof on residential building
TN B2	Large mature oak
TN B3	House martins nesting on residential property - at least a dozen flying around
TN C1	Potential for roosting bats
TN C2	Bat boxes on several trees in park. Blue tit flew out of bat box on tree closest to foot bridge
TN C3	Crevices in stone bridge abutments may be suitable for roosting bats. Pigeons resting and likely nesting along bridge
TN C4	Potential for nesting birds and roosting bats (depending on whether crevice extends)
TN C5	Potential for nesting birds in scrub and tree habitat. Common passerine species seen carrying nesting material.
TN C6	Jackdaws nesting in nest box
TN C7	Jackdaw flying over carrying food into scrub habitat
TN C8	Song thrush observed defending territory against crow (assumed nesting nearby)
TN D1	Willow species with bird nesting and bat roosting potential
TN D2	Potential bat feature in wall
TN E1	Treecreepers in trees
TN F1	Large mature ash with bat roosting features
TN F2	Owl box on old boat house structure
TN G1	Ash (appears diseased) and sycamore trees
TN H1	Disused railway with bridge that has the potential to support roosting bats. Access not possible at time of survey to fully assess.
TN H2	Potential bat roosting feature in the wall of the river.
TN H3	Large mature London plane within a woodland patch.