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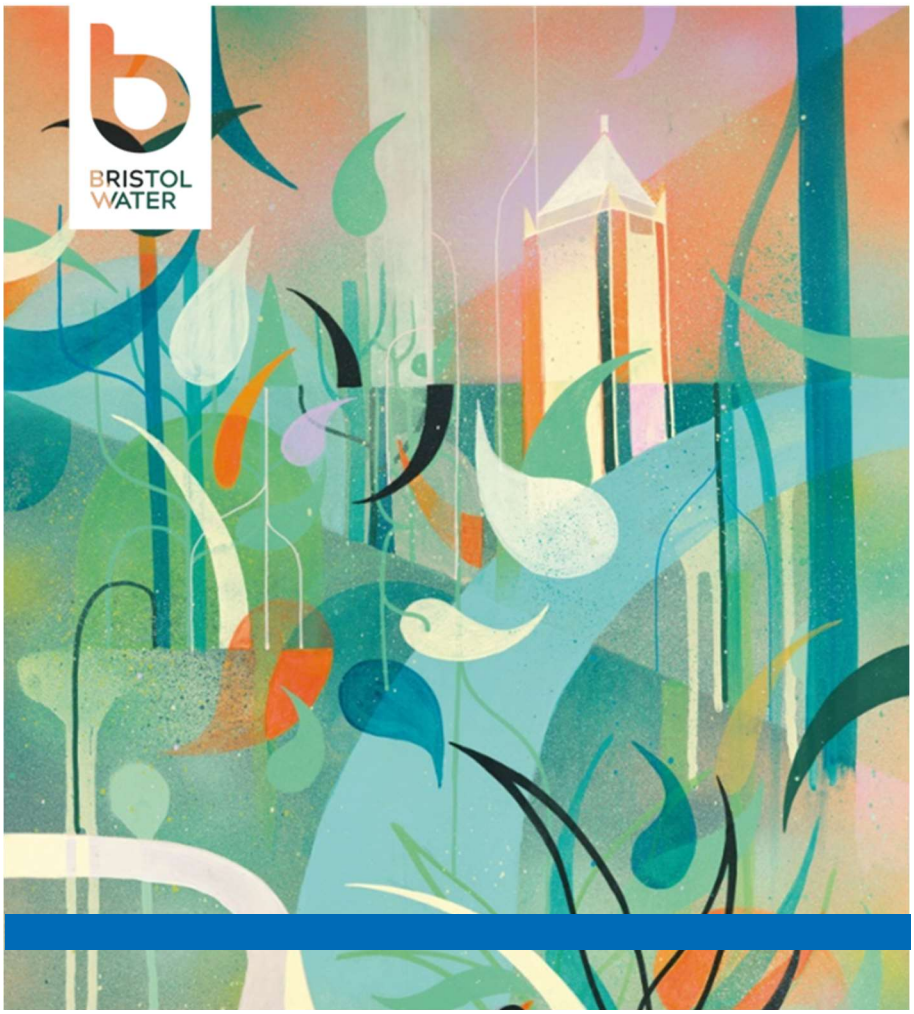

Bristol Water Drought Plan 2022

HRA Stage 1 Screening Report and Stage 2 (Appropriate Assessment)

Final report for Bristol Water

Report for Bristol Water - 3500071535

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Non-Technical Summary

Water companies are required to prepare and maintain statutory Drought Plans every five years, and as part of this process, must ensure the Drought Plan meets the requirements of the Conservation of Habitats and Species Regulations 2017 ("the Habitats Regulations").

Under Regulations 63 and 105, any plan or project which is likely to have a significant effect on a European site (either alone or in-combination with other plans or projects) and is not directly connected with, or necessary for the management of the site, must be subject to a Habitats Regulations Assessment (HRA) to determine the implications for the site in view of its conservation objectives. For the purposes of the HRA, a European site includes Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Ramsar sites, as well as any candidate or proposed sites.

Bristol Water has completed the first stage (Screening) and second stage (Appropriate Assessment) of the HRA process on its Drought Plan 2022. The HRA Screening stage identifies whether any measures included within the plan may have "Likely Significant Effects" on the integrity of any European site, either "alone" or "in combination" with other measures or other plans or projects.

A summary of the conclusions of HRA Stage 1 Screening is presented in **Table A**. This shows that Likely Significant Effects of the Drought Plan could not be ruled out upon the following European sites:

- North Somerset and Mendips Bats SAC
- Severn Estuary SAC
- Severn Estuary Ramsar site
- Mendip Limestone Grasslands SAC
- Somerset Levels and Moors SPA.

These likely significant effects relate to some of the water supply measures in the Drought Plan. The demand management measures in the Drought Plan will not have any Likely Significant Effects on any European sites.

In accordance with the Habitats Regulations, where Likely Significant Effects are identified, the HRA Stage 2 Appropriate Assessment process is required to assess in more detail whether the plan may adversely affect the integrity of any European site. Appropriate Assessment has been completed for each of the supply measures where Likely Significant Effects to these European sites could not be ruled out at the Screening stage.

Table A: Summary of HRA Stage 1 Screening Conclusions

Drought Plan Option	Likely significant effects (LSE) on European Site(s) alone?	If no LSE alone: Residual low-level effect requiring in-combination assessment with existing consents?	If no LSE alone: Residual low-level effect requiring in-combination assessment with other drought options?	Appropriate Assessment Required?
Demand Management Measures				
Appeals for restraint	No	No	No	No
Temporary Use Bans	No	No	No	No
Non-Essential Use Ban	No	No	No	No
Supply Augmentation Measures				
R24R Well	Yes	N/A	N/A	Yes
Drought Permits				

Drought Plan Option	Likely significant effects (LSE) on European Site(s) alone?	If no LSE alone: Residual low-level effect requiring in-combination assessment with existing consents?	If no LSE alone: Residual low-level effect requiring in-combination assessment with other drought options?	Appropriate Assessment Required?
Blagdon Reservoir Reduced Compensation Flow	Yes	N/A	N/A	Yes
Cheddar Reservoir Reduced Prescribed Flow	Yes	N/A	N/A	Yes
Chew Valley Reservoir Reduced Compensation Flow	Yes	N/A	N/A	Yes

A summary of the conclusions of HRA Stage 2 Appropriate Assessment is presented in Table B. The Stage 2 Appropriate Assessment concluded that, with mitigation, there will be no adverse effects on the integrity of the European sites (either alone or in-combination).

Table B Summary of HRA Appropriate Assessment Conclusions

Drought option	European sites included in Appropriate Assessment	Adverse effect on European site (alone)	Adverse effect in-combination
Blagdon Reservoir Reduced Compensation Flow	North Somerset and Mendip Bats SAC	No	No
Cheddar Reservoir Reduced Prescribed Flow	Severn Estuary SAC & Ramsar	No	No
Chew Valley Reservoir Reduced Compensation Flow	Severn Estuary SAC & Ramsar	No	No
Blagdon Reservoir Reduced Compensation Flow	Severn Estuary SAC & Ramsar	No	No
R24R Well	North Somerset and Mendip Bats SAC	No	No
	Mendip Limestone Grasslands SAC	No	No
	Somerset Levels and Moors SPA and Ramsar	No	No
	Severn Estuary SAC & Ramsar	No	No

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1 INTRODUCTION

1.1 Background and Purpose of Report

Bristol Water published its last statutory Drought Plan (DP) in June 2018. Bristol Water is now in the process of developing an updated DP, in line with the requirements of the Drought Plan (England) Direction 2020 and to align with updated guidance including that provided in the Environment Agency's Drought Plan Guideline (DPG)[1]. The updated guidance specifies that a water company must ensure that its DP meets the requirements of the Conservation of Habitats and Species Regulations 2017. The DPG also includes an updated draft of the supplementary guidance on the environmental assessment for water company drought planning (published in July 2020).

The legislation transposing the European Union (EU) Habitats Directive (Council Directive 92/43/EEC) and Wild Bird Directive (Directive 2009/147/EC) has been changed as a consequence of the UK's departure from the European Union. This includes the Conservation of Habitat and Species Regulations 2017 (as amended) in England and Wales and the Conservation of Offshore Marine Habitats and Species Regulation 2017 (as amended). The changes have been made by the Conservation of the Habitat and Species (Amended) (EU Exit) Regulations 2019.

The requirement for a Habitats Regulations Assessment (HRA) is set out in the Conservation of Habitats and Species Regulations 2017 (hereafter referenced as "the Habitats Regulations"). Under Regulations 63 and 105, any plan or project which is likely to have a significant effect on a European site (either alone or in-combination with other plans or projects) and is not directly connected with, or necessary for the management of the site, must be subject to a HRA to determine the implications for the site in view of its conservation objectives.

1.1 Requirement for Habitats Regulations Assessment

The responsibility for undertaking the HRA lies with Bristol Water as the Plan making authority. HRA guidance for the appraisal of Plans[2] summarises the requirements for HRA under the Habitats Regulations:

- Regulation 63 states that the Plan making authority (in this case Bristol Water) shall adopt, or otherwise give effect to, the Plan only after having ascertained that it will not adversely affect the integrity of a European site, subject to Regulation 64 or 105 of the Habitats Regulations.

- Regulation 64 of the Habitats Regulations states:

1) *If the competent authority is satisfied that, there being no alternative solutions, the plan or project must be carried out for imperative reasons of overriding public interest (which, subject to paragraph (2), may be of a social or economic nature), it may agree to the plan or project notwithstanding a negative assessment of the implications for the European site or the European offshore marine site (as the case may be).*
2) *Where the site concerned hosts a priority natural habitat type or a priority species, the reasons referred to in paragraph (1) must be either—*
   a) *reasons relating to human health, public safety or beneficial consequences of primary importance to the environment; or*
   b) *any other reasons which the competent authority, having due regard to the opinion of the European Commission, considers to be imperative reasons of overriding public interest.*

- Regulation 105 of the Habitats Regulations states:

(1) Where a land use plan—

[1] Environment Agency (2020) Water Company Drought Plan Guideline, December 2020.
[2] Tyldesley, D. & Chapman, C. (2013) The Habitats Regulations Assessment Handbook, January 2021 edition UK. DTA Publications Limited.

(a) is likely to have a significant effect on a European site or a European offshore marine site (either alone or in-combination with other plans or projects), and

(b) is not directly connected with or necessary to the management of the site,

The plan-making authority for that plan must, before the plan is given effect, make an appropriate assessment of the implications for the site in view of that site's conservation objectives.

(2) The plan-making authority must for the purposes of the assessment consult the appropriate nature conservation body and have regard to any representations made by that body within such reasonable time as the authority specifies.

(3) The plan-making authority must also, if it considers it appropriate, take the opinion of the general public, and if it does so, it must take such steps for that purpose as it considers appropriate.

(4) In the light of the conclusions of the assessment, and subject to regulation 107, the plan-making authority must give effect to the land use plan only after having ascertained that it will not adversely affect the integrity of the European site or the European offshore marine site (as the case may be).

(5) A plan-making authority must provide such information as the appropriate authority may reasonably require for the purposes of the discharge by the appropriate authority of its obligations under this Chapter.

(6) This regulation does not apply in relation to a site which is—

(a) A European site by reason of regulation 8(1)(c), or

(b) A European offshore marine site by reason of regulation 18(c) of the Offshore Marine Conservation Regulations (site protected in accordance with Article 5(4) of the Habitats Directive).

Article 6 of the Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna) states:

6(3). Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in-combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.

6(4). If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted.

If there are no alternative solutions and if, in exceptional circumstances, it is proposed that a Plan be adopted despite the fact that it may adversely affect the integrity of a European site, the HRA will need to address and explain the imperative reasons of Overriding Public Interest which the Plan making authority considers to be sufficient to outweigh the potentially adverse effects on the European site(s).

1.2 Approach to HRA

There are four stages of the HRA process:

1. Firstly, a screening process is undertaken to identify whether each drought management measure in Bristol Water's DP (either alone or in-combination with other plans or projects) is likely to have significant effects on European sites. This screening assessment does not consider any mitigation measures.
2. Where a significant effect is likely (noting the precautionary principle), an Appropriate Assessment will then need to be undertaken of the drought management measure to determine

whether it would adversely affect the integrity of any European site(s), either alone or in-combination with other plans and projects, including taking into account available mitigation measures.

3. Where adverse effects on site integrity are identified at the Appropriate Assessment stage, reasonable alternative options would be examined to avoid any adverse effects on the integrity of the European site.
4. This final stage only applies if no reasonable alternative options can be identified and comprises an assessment of compensatory measures where, having first demonstrated "Imperative Reasons of Overriding Public Interest", it is deemed that the Plan should proceed.

The HRA has been undertaken in accordance with currently available guidance[3][4][5][6][7] and has been based on a precautionary approach as required under the Habitats Regulations. It has followed the staged HRA approach, commencing with the Stage 1 screening of all the drought management measures contained within the DP and then Appropriate Assessment undertaken where Likely Significant Effects have been identified at the screening stage.

The HRA Stage 1 assessment refers to the Likely Significant Effects of an option on one or more European sites, including Special Protection Areas (SPAs), Special Areas of Conservation (SACs) (also known as Natura 2000 sites) and Ramsar sites:

- SPAs are classified under the European Council Directive 'on the conservation of wild birds' (2009/147/EC; 'Birds Directive') for the protection of **wild birds and their habitats** (including particularly rare and vulnerable species listed in Annex 1 of the Birds Directive, and migratory species).
- SACs are designated under the Habitats Directive (92/43/EEC) and target particular **habitats** (Annex 1) **and/or species** (Annex II) identified as being of European importance.
- The Government also expects potential SPAs (pSPAs), candidate SACs (cSACs), compensation habitat and Ramsar sites to be included within the assessment.
- Ramsar sites support **internationally important wetland habitats** and are listed under the Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention, 1971).

For ease of reference through the HRA process, these designations are collectively referred to as European sites, despite Ramsar designations being made at the international level. This terminology and references to Annexes of European Directives remain despite the UK's exit from the European Union.

The purpose of the HRA Stage 1 screening stage is to determine whether the Bristol Water DP is likely to have a significant effect on any European site. This is judged in terms of the implications of the plan for a site's conservation objectives, which relate to its 'qualifying features' (i.e. those Annex I habitats, Annex II species, and Annex I bird populations[8], or Ramsar criterion, for which it has been designated). Significantly, HRA is based on a rigorous application of the precautionary principle. Where uncertainty or doubt remains, an impact should be assumed, triggering the requirement for Appropriate Assessment.

The screening stage also has to conclude whether any in-combination effects would result from the concurrent implementation of two or more measures within the plan itself, or from implementation of any of the plan's measures in-combination with other plans and projects, for example neighbouring water companies' DPs or Water Resource Management Plans (WRMPs), and whether these would, in-combination, adversely affect the integrity of a European site.

[3] Tyldesley, D. & Chapman, C. (2013). The Habitats Regulations Assessment Handbook, January 2021 edition UK. DTA Publications Limited.
[4] Court of Justice for the European Union's ruling on People Over Wind and Sweetman ('Sweetman II') vs Coillte Teoranta, Case C-323/17.
[5] UK Government (2019). Guidance on the use of Habitats Regulations Assessment.
[6] UK Government (2019). Conservation of Habitats and Species Regulations (Amendment) (EU Exit).
[7] Natural England (2020). Guidance on how to use Natural England's Conservation Advice Packages in Environmental Assessments.
[8] Annexes are contained within the relevant EC Directive.

In April 2018[9] there was an important judgment in the Court of Justice of the European Union (CJEU) which ruled that Article 6(3) of the Habitats Directive (and therefore equivalent requirements in the national Habitats Regulations) must be interpreted as meaning that mitigation measures should be assessed within the framework of an Appropriate Assessment and that it is not permissible to take account of mitigation measures at the screening stage. Considering this judgement, mitigation measures are **not considered** as part of the HRA Stage 1 screening of the DP.

1.2 Bristol Water Supply Area and Drought Planning

In the event of severe drought, Bristol Water will need to implement a range of management measures to ensure the continued provision of essential water supplies to all of its customers. The Bristol Water DP 2022 sets out the measures that the company will consider implementing in dealing with drought conditions, taking account of statutory legislation and regulatory requirements. The DP is prepared in line with the requirements of the Drought Plan (England) Direction 2020 and in compliance with the Water Industry Act 1991, as amended by the Water Act 2003 and the Flood and Water Management Act 2010. The updated DP takes account of the latest regulatory guidance for drought planning, industry best practice guidance and experiences across the water industry from recent drought events.

The Drought Plan (England) Direction 2020 contains the timeframe for submission of updated draft Drought Plans to the Secretary of State. For Bristol Water, this meant that it had to have submitted an updated draft DP before 1st April 2021 for consultation. Water companies must then publish their Drought Plan as directed by Defra. A revised (final) Drought Plan must be published at least every 5 years from the date the previous Drought Plan was published. Following preparation and consultation Bristol Water have now prepared their Drought Plan 2022, which is anticipated to be published in 2022, encompassing the period 2022-2027 and replacing the Drought Plan published in June 2018.

1.2.1 Bristol Water Supply System

Bristol Water is a water only company that provides water supplies to 1.19 million people plus business customers in an area of approximately 2,400 square kilometres, centred on Bristol and the towns and villages within a 20-mile radius of the city. The water supply area stretches from Thornbury and Tetbury in the north, to Street and Glastonbury in the south, and from Weston-Super-Mare in the west to Frome in the east. Bristol Water relies on 68 water sources, including reservoirs, rivers, springs, wells and boreholes. Of the company's 14 raw water reservoirs, the largest is Chew Valley Reservoir, holding up to 20,460 million litres and providing around 40% of the water required to meet demand[10].

Water resources within the Bristol Water supply area alone are not sufficient to meet customer demand for water and therefore water supplies are also imported from neighbouring areas, in particular from the River Severn. This water is sourced via the Gloucester and Sharpness Canal to supply the largest northern treatment works. This source accounts for approximately 46% of Bristol Water's reliable water resources. Bristol Water has an agreement with the Canal & Rivers Trust (the owners of the abstraction licence) to receive water supplies from the Gloucester and Sharpness Canal, which is supplied by the River Severn and other local rivers, the Cam and the Frome. The volume of water available for abstraction from the River Severn is controlled by the Environment Agency according to the River Severn Regulation System operating rules. The Mendip Reservoirs and associated surface water abstractions account for approximately 42% of the available reliable water resource. The remaining 12% of reliable water resources for Bristol Water are derived from groundwater[11].

There is a significant degree of resilience and connectivity in both the raw water network and the treated water bulk transfer systems. This flexibility permits the sharing of resources and allows optimum use according to seasonable availability. As a result, the Bristol Water supply area is operated as a single water resource zone in which all sources are used conjunctively. Bristol Water's supply area is bounded

[9] Court of Justice for the European Union's ruling on People Over Wind and Sweetman ('Sweetman II') vs Coillte Teoranta, Case C-323/17.
[10] Bristol Water (2019). Bristol Water Final Water Resources Management Plan 2019. Bristol Water, 1-215.
[11] Bristol Water (2019). Bristol Water Final Water Resources Management Plan 2019. Bristol Water, 1-215.

by three other water companies (Thames Water, Wessex Water and Severn Trent Water). A number of water supply transfers are made between Bristol Water and these adjacent water companies.

The geographical area under consideration for the DP is shown in Error! Reference source not found., this spatial scope is defined by the Bristol Water supply area.

1.3 Bristol Water's Drought Planning Process

1.3.1 Overview and timetable

Under sections 39B and 39C of the Water Industry Act 1991 (as amended by the Water Act 2003 and the Flood and Water Management Act 2010), water companies are required to prepare and maintain statutory DPs. The DP sets out the operational steps a water company will take before, during and after a drought to maintain essential water supplies to customers. A DP is defined by the Water Industry Act 1991 (as amended) as '*a plan for how the water undertaker will continue, during a period of drought, to discharge its duties to supply adequate quantities of wholesome water, with as little recourse as reasonably possible to drought orders*[12] *or drought permits*[13]'.

Bristol Water was required to submit its draft DP 2021 to the Secretary of State in early 2021. The draft DP was issued for public consultation along with the SEA Environmental Report, HRA report and a WFD compliance assessment summary. Following feedback from the public consultation process, a Statement of Response was published by Bristol Water setting out its responses to consultation feedback and any changes it proposes to make to the draft DP. The DP (and associated SEA, HRA and WFD compliance assessment reports) have been updated as appropriate and re-submitted to the Secretary of State. The updated plan will guide Bristol Water's response to any drought events that may arise in the period between 2022 and 2027.

Only those drought management measures which are relevant to the period encompassed by the DP are considered. In this regard, environmental effects of the potential DP measures are considered within the context of the company's existing abstraction licence conditions and operating arrangements. Additionally, only those relevant plans, projects and programmes that are likely to be effective in the period from 2022 to 2027 that may lead to in-combination effects with the DP will be considered. The DP is closely linked and integrated with the separate statutory process of developing a long-term WRMP (last published by Bristol Water in 2019).

1.3.2 Bristol Water's Drought Plan Measures

Bristol Water has identified DP triggers (Drought Management Zones) based on the combined storage in its major reservoirs. These triggers act as decision-points for implementation of defined drought management measures as reservoir storage is depleted in a drought event.

There are two broad categories of drought management measures:

- demand management measures; and
- supply augmentation measures.

1.3.2.1 Demand management measures

Demand management measures are designed to reduce the demand for water in a drought and are not site-specific but are invariably implemented across the entire water supply area (**Table 1-1**).

[12] An authorisation granted by the Secretary of State under Section 73 of the Water Resources Act (199) when there are drought conditions, which impose restrictions upon the use of water, and/or allows for abstraction/impoundment outside the schedule of existing licences on a temporary basis. A drought order can be applied for by the EA for environmental reasons and by a Water Undertaker for Public Water Supply reasons. A drought order lasts for 6 months but can be extended for a total of one year.

[13] An authorisation granted by the EA under drought conditions which allows for abstraction/impoundment outside the schedule of existing licences on a temporary basis (generally for 6 months, but can be extended up to a total of one year) under Schedule 8 of the Water Resources Act (1991) (as amended).

Table 1.1: Demand management measures

Demand Management Measure	Description
Appeals for restraint	This measure would help encourage customers to reduce their water usage via publicity campaigns and the media. The measure would be expected to reduce total household demand by around 1%.
Temporary Use Ban (TUB)	This measure to restrict certain non-essential water uses would be expected to reduce peak summer household demand by up to 9.5%. The restrictions in water use can include: • Cleaning a private leisure boat using a hosepipe • Cleaning a private motor vehicle using a hosepipe • Filling or maintaining an ornamental fountain • Cleaning walls, or windows, of domestic premises using a hosepipe • Cleaning paths or patios using a hosepipe • Cleaning other artificial outdoor surfaces using a hosepipe • Drawing water using a hosepipe, for domestic recreational use • Filling or maintaining a domestic swimming or paddling pool • Watering a garden using a hosepipe • Watering plants on domestic or non-commercial premises using a hosepipe • Filling or maintaining a domestic pond using a hosepipe
Non Essential Use Ban (NEUB)	This measure requires an application to the Secretary of State for a drought order to prohibit certain non-essential water uses. The measure would be expected to reduce non-household demand by up to 2% across the year. The restrictions in water use include: • Watering outdoor plants on commercial premises • Filling or maintaining a non-domestic swimming or paddling pool • Filling or maintaining a pond • Operating cisterns (in unoccupied premises) • Cleaning industrial plant (except where required for health and hygiene) • Suppressing dust (except where controlled by health and safety regulations) • Operating a mechanical vehicle-washer • Cleaning a window of a non-domestic building • Cleaning any vehicle, boat, aircraft or railway rolling stock • Cleaning non-domestic premises

1.3.2.2 Supply augmentation measures

Supply augmentation measures considered by Bristol Water include bringing disused, licensed water sources back into supply and applying for drought permits to temporarily vary the conditions of abstraction licences for specific water sources.

R24R and R24Ra (Well Head)

Bristol Water's R24R and R24Ra (Well Head) source (referred to as R24R Well hereafter) is an existing licensed water source that has not been in operation for approximately 20 years. In the event of a drought, it would require recommissioning before it could be used to supply water. The measure is expected to provide an additional 2.4 Ml/d of water supplies.

Some construction activities are required in order to bring R24R Well into operation, including the replacement of the pumps at R24R Well and the construction of a new pipeline to link the source to an existing water treatment works.

1.3.2.3 Drought Permits

Drought permits are drought management measures available to water companies which, if granted by the Environment Agency, can temporarily allow more flexibility to manage water resources and the effects of drought on public water supply and the environment. drought permit measures considered by Bristol Water in its DP 2022 are identified in Error! Reference source not found..

Table 1.2: Drought permit measures included in the DP 2022

Drought Permit	Description
Reduction in compensation flow release from Blagdon Reservoir	This permit would allow the compensation flow release from Blagdon Reservoir to be reduced from 8.64 Ml/d to 4.6Ml/d between 15th May and 30th November only. This will help to conserve water resources within Blagdon Reservoir.
Reduction in compensation flow release from Chew Valley Reservoir	This permit would allow the compensation flow release from Chew Valley Reservoir to be reduced from 14.32Ml/d to 7Ml/d between 1st May and 30th November, or from 6.82Ml/d to 3.4Ml/d (between 1st December to 30th April). This will help to conserve water resources within or refill Chew Valley Reservoir.
Reduction of prescribed flow at Cheddar Reservoir	This permit would allow a reduction to the prescribed flow into the Cheddar Yeo from 6.8Ml/d to 3.4Ml/d (between 1st December to 14th May) only. This will help to refill Cheddar Reservoir.

Bristol Water is currently undertaking adaptive management trials under the Water Industry National Environment Programme (WINEP) at Blagdon Reservoir and Chew Valley Reservoir. This involves changes to compensation flow releases from the reservoirs aimed at improving ecological quality in the downstream waterbodies (River Yeo and River Chew, respectively). The implications of these changes have been considered in the development of the DP and as part of the environmental assessments.

1.3.2.4 Extreme drought management actions

As part of the review and update of the DP, Bristol Water has considered the actions that it could need to implement in the event of an extreme drought, after all the 'Level 3' (DMZ 5) restrictions have been put in place, in order to delay or remove the need for 'Level 4' (DMZ 6) emergency restrictions. The extreme drought management actions that could be available to Bristol Water are set out below in Table 1.3.

Table 1.3: Extreme drought management actions

Management Action	Description
Demand – media campaign	This would involve a significant media campaign focused on the 'day zero' concept that would aim to get customer water use down to 80 l/head/day or lower to prevent the requirement for an emergency drought order. This campaign could be coordinated with other water companies if they were in a similar position and with Water UK.
Demand – pressure reduction	Pressure reduction would be phased over the course of the drought. This action would be to reduce pressure at the customers tap to below the regulatory standards with the aim of reducing demand to 80l/head/day or lower, and to reduce leakage.
Supply – Drought permit to temporarily amend the Minimum Residual Flow conditions for the P08R abstraction licence	Relaxation of the Minimum Residual Flow conditions to allow abstraction to continue at a higher rate than allowed under the abstraction licence when flow in the Ozleworth Stream drops

Management Action	Description
	below 13Ml/d. Under the drought permit, abstraction of up to 4.25Ml/d would be permitted when flows drop below 13Ml/d.
Supply – Drought permit to temporarily amend the Minimum Residual Flow conditions for the P05R abstraction licence	Changes to the Minimum Residual Flow conditions set out in the P05R abstraction licence. Under the licence conditions a flow of 4.41Ml/d at the Kenn gauge must be maintained. Under the drought permit conditions, the minimum flow requirement at the Kenn gauge would be reduced to 2.21Ml/d.
Supply – Drought permit to temporarily amend the River Axe licence to allow abstraction for a longer period	Extension to the licensed abstraction period for the River Axe source by 2 months to include May and October to support the refill of Cheddar Reservoir (period of abstraction would be extended from November – April to October to May). The drought permit would also allow an increase to the annual abstraction volume from 4750Ml/year to 7145Ml/year (increase of 2395Ml/year).
Supply – Use of Emergency Storage and Drought permit to allow zero compensation flow releases	On breaching the emergency storage level in the Mendip reservoirs, the drought permit would allow Bristol Water to reduce the compensation flow volumes from the reservoirs to zero in order to keep as much water in the reservoirs as possible and/or use the Emergency Storage for public water supply.
Supply – lowering pumps in boreholes	If pump levels were the limiting factor in the groundwater source supply, and water was still available for abstraction below the normal pumping water level, then Bristol Water would consider lowering the borehole pumps to enable the remaining water to be abstracted. This may require a drought permit at some borehole sites depending on the specific abstraction licence conditions.
Supply – Re-instate source at Cold Bath Springs	Start abstracting from the Bristol Water source at Cold Bath Springs and pump into Barrow No 3.
Supply – Re-instate source at Gurney Slade	Start abstracting from the Bristol Water source at Gurney Slade and either pump into Line of Works, or installation of temporary treatment plant.

Further details are provided in the DP.

1.4 Purpose of this document

This document comprises the HRA Stage 1 Screening and Stage 2 Appropriate Assessment of the Bristol Water DP. The report consists of the following Sections:

Section 1 – Introduction (this Section)

Section 2 – Methodology

Section 3 – HRA Screening Findings for Drought Plan Options

Section 4 – Appropriate Assessment

Section 5 – Conclusions and Recommendations.

2 METHODOLOGY

2.1 Approach to HRA Screening

The objective of the HRA is to establish firstly whether any of the measures included in the DP are likely to have a significant effect on European sites (alone or in-combination with other supply schemes in the plan, or with other plans and projects), and secondly, where a significant effect is likely, to determine through Appropriate Assessment, whether the plan would adversely affect the integrity of the European site(s)..

2.2 HRA Stages

Whilst only HRA Stage 1 Screening and Stage 2 Appropriate Assessment are included within this report, four stages of the HRA have been identified within the guidance[14] as already summarised in Section 1.2 and set out in more detail below:

Stage 1 – Screening

The first stage in the HRA is screening to determine whether any DP measure is likely to have a significant effect on any European site (either alone or in-combination with other plans and projects) and thus if a full HRA Stage 2 'Appropriate Assessment' would be required prior to inclusion in the Final DP.

For each of the seven DP measures listed above in **Section 1.3**, all European sites which could be impacted, including all SAC, SPA and Ramsar sites, were identified together with their qualifying and supporting features. Each DP measure has been screened for Likely Significant Effects taking account of the qualifying designated habitats and species of conservation interest, and their supporting features, including hydrology, geomorphology, water quality, habitats etc.

In-combination assessments have also been carried out to establish the possibility of cumulative or synergistic impacts. The approach to in-combination assessments is described in **Section 2.5**.

The output of the screening stage is this HRA Stage 1 Screening Report which identifies if any of the DP measures require HRA Stage 2 Appropriate Assessment if it has been determined that they, either alone or in-combination with other plans or projects, are likely to have significant effects on European sites. This HRA Screening Report will be used as a basis for consultation with the regulatory authorities.

Stage 2 – Appropriate Assessment

Those DP measures identified during HRA Stage 1 Screening as being likely to have a significant effect on a European site (either alone or in-combination) were subject to Stage 2 Appropriate Assessment. The Appropriate Assessment considered the impacts of the DP measure against the Supplementary Advice on the Conservation Objectives of each relevant European Site to assess whether there will be any adverse effects on site integrity and site features, either alone or in combination with other plans and projects. This is judged in terms of the implications of the plan for a site's conservation objectives, which relate to its 'qualifying features' (i.e. those Annex I habitats, Annex II species, and Annex I bird populations for which it has been designated). The responsibility for undertaking the Appropriate Assessment lies with Bristol Water as the Plan making authority.

The output of the Appropriate Assessment is provided within the appendices of this report. Where no adverse effects are identified by the Appropriate Assessment (either alone, or in combination with other plans and projects), no further assessments are required in the HRA process. If adverse effects on European designated site integrity are identified, the assessment progresses to HRA Stage 3.

Further details about the methodology proposed for Appropriate Assessment is provided in **Section 4.2.**

[14] Tyldesley, D. & Chapman, C. (2013) The Habitats Regulations Assessment Handbook, December 2020 edition UK. DTA Publications Limited.

Stage 3 – Alternative Options Stage

Where significant adverse effects are identified at the Appropriate Assessment stage, reasonable alternative options must be examined to determine whether other measures could be adopted instead to achieve the DP objectives so as to avoid any potential damaging effects to the integrity of the European site. This could involve amending the DP measure to avoid adverse effects on a European site. If the review of reasonable alternative options concludes there are no other alternative options and the DP measure is still required to achieve the objectives of the DP, the assessment moves to Stage 4 of the HRA process.

Stage 4 – Assessment where adverse impacts remain

Stage 4 comprises an assessment of compensatory measures where, in the light of an assessment of Imperative Reasons of Overriding Public Interest (IROPI), it is deemed that the project or plan should proceed. IROPI will only be progressed if no alternative options are identified as part of HRA Stage 3.

HRA guidance[15] recommends that if there are no alternative options and if, in exceptional circumstances, it is proposed that a plan be adopted despite the fact that it may adversely affect the integrity of a European site, the HRA will need to address and explain the IROPI which the Plan making authority considers to be sufficient to outweigh the potentially adverse effects on the European site(s). The Secretary of State is responsible for determination of any Imperative Reasons of Overriding Public Interest case.

Where IROPI is confirmed, compensatory measures must be agreed and secured (including securing access to land to carry out the measures) in consultation with Natural England as the statutory advisor to the Secretary of State. The measures must meet a range of criteria set out in Habitats Regulations and in accompanying statutory guidance.

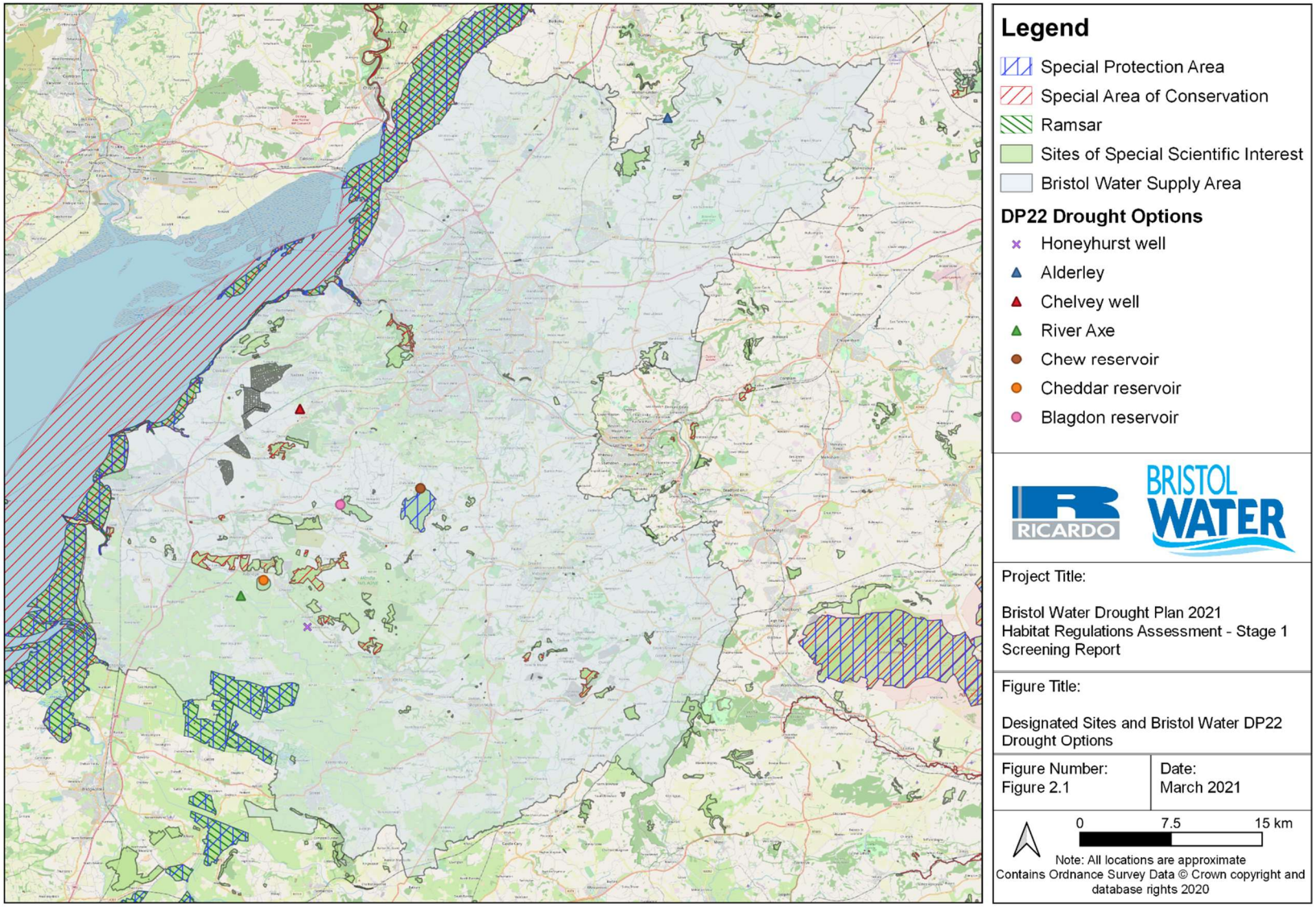
2.3 Identification of European Sites for Assessment

Geographic Information System (GIS) data were used to map the locations and boundaries of European sites within or adjacent to Bristol Water's water resource zone using publicly available data from Natural England. The European sites are shown in **Figure 2-1** along with the location of the R24R Well supply augmentation option and the three reservoir drought permit options (Blagdon, Chew and Cheddar Reservoirs) in the DP.

The attributes of European sites, which contribute to and define their integrity, were considered with reference to Standard Data forms for SACs and SPAs and Information Sheets for Ramsar sites. An analysis of these information sources enabled the identification of European site qualifying features. Conservation objectives (Supplementary Advice on the Conservation Objectives) and site vulnerability assessments have been provided by Natural England. This information allows identification of qualifying features of each site which determine site integrity and the specific sensitivities of the site, as well as an analysis of how potential impacts of the drought management measures may affect site integrity. The assessment included consideration of designated mobile species (e.g. migratory fish, bats and birds) that are not confined to European site boundaries as well as functional habitat associated with, but outside the boundaries of, European sites. As a consequence, a DP measure might be located at some distance from a European site but may still lead to an adverse effect on a European site due to the inclusion of mobile species in the designation which may be impacted by the DP measure. Adverse effects on physical processes (e.g. air quality, water quality, river flows, groundwater levels) outside of European sites but which can also impact a European site are also considered in the assessment.

[15] Tyldesley, D. & Chapman, C. (2013) The Habitats Regulations Assessment Handbook, January 2021 edition UK. DTA Publications Limited.

Figure 2-1: European Sites within the Bristol Water supply area and location of Bristol Water Drought Plan measures.



2.4 Potential Impacts of Drought Plan Measures

The qualifying habitats and species of European sites are vulnerable to a wide range of impacts such as physical loss or damage of habitat, disturbance from noise, light, human presence, changes in hydrology (e.g. changes in water levels/flow, flooding), changes in water or air quality and biological disturbance (e.g. direct mortality, introduction of disease or non-native species). However, the drought management measures considered for inclusion in the DP only have the potential to give rise to some of these impacts.

The demand management measures are unlikely to have any significant adverse effects on European sites as they relate to measures which will not result in any new development and will help to reduce the amount of water abstracted from the environment.

The supply augmentation measures, and drought permits have the potential to impact upon European sites that are in proximity to, or hydrologically connected to, the water sources, or may impact mobile designated species. In determining the likelihood of significant effects on European sites from these measures, particular consideration has been given to the possible source-receptor pathways through which effects may be transmitted to features contributing to the integrity of the European site(s) (for example, groundwater or surface water catchments, atmospheric transmission, etc.). **Table 2.1** shows the type of impacts that the DP measures could have on European site qualifying features.

Table 2.1: Potential impacts of Drought Plan measures on European Sites

Broad categories of potential impacts on European sites	Examples of operations responsible for impacts (distance assumptions shown in italics)
Physical loss - Removal (including offsite effects, e.g. foraging habitat) - Smothering	Development of built infrastructure associated with scheme, e.g. pipelines, transport infrastructure, temporary weirs. *Physical loss is only likely to be significant where the boundary of the scheme extends within the boundary of the European site, or within an offsite area of known foraging, roosting, breeding habitat (that supports species for which a European site is designated).*
Physical damage - Sedimentation / silting - Prevention of natural processes - Habitat degradation - Erosion - Fragmentation - Severance/barrier effect - Edge effects	Development of built infrastructure associated with scheme, e.g. temporary weirs. *Physical damage is only likely to be significant where the boundary of the scheme extends within or is directly adjacent to the boundary of the European site, or within/adjacent to an offsite area of known foraging, roosting, breeding habitat (that supports species for which a European site is designated).*
Non-physical disturbance - Noise - Visual presence - Human presence - Light pollution	Noise from vehicular traffic during construction of scheme. *Noise from construction traffic is only likely to be significant where the transport route to and from the scheme is within 3-5km of the boundary of the European site.* Plant and personnel involved in construction and operation of schemes e.g. for maintenance, plus non-operational activities such as recreation associated with scheme e.g. reservoirs *These effects (noise, visual/human presence) are only likely to be significant where the boundary of the scheme extends within or is directly adjacent to the boundary of the European site, or within/adjacent to an offsite area of known foraging, roosting,*

Broad categories of potential impacts on European sites	Examples of operations responsible for impacts (distance assumptions shown in italics)
	breeding habitat (that supports species for which a European site is designated). Development of built infrastructure associated with scheme, which includes artificial lighting. *Effects from light pollution are only likely to be significant where the boundary of the scheme is within 500 m of the boundary of the European site. From a review of Environment Agency internal guidance on HRA and various websites it is considered that effects of vibration and noise and light are more likely to be significant if development is within 500 metres of a European site.*
Water table/availability - Drying - Flooding / storm water - Changes to surface water levels and flows - Changes in groundwater levels and flows - Changes to coastal water movement	Changes to water levels and flows due to water abstraction and storage. *These effects are only likely to be significant where the boundary of the scheme extends within the same ground or surface water catchment as the European site. However, these effects are dependent on hydrological continuity between the scheme and the European site, and sometimes, whether the scheme is up or down stream from the European site.*
Toxic contamination - Water pollution - Soil contamination - Air Pollution	Reduced dilution in downstream or receiving waterbodies due to changes in abstraction or reduced compensation flow. Air emissions associated with vehicular traffic during construction/operation of schemes. *This effect is only likely to be significant where the transport route to and from the scheme is within 100m of the boundary of the European site.*
Non-toxic contamination - Nutrient enrichment (e.g. of soils and water) - Algal blooms - Changes in salinity - Changes in thermal regime - Changes in turbidity - Changes in sedimentation/silting	Changes to water salinity, nutrient levels, turbidity, thermal regime due to water abstraction, storage, or inter-catchment transfers. *These effects are only likely to be significant where the boundary of the scheme extends within the same ground or surface water catchment as the European site. However, these effects are dependent on hydrological continuity between the scheme and the European site, and sometimes, whether the scheme is up or down stream from the European site.*
Biological disturbance - Direct mortality - Changes to habitat availability - Out-competition by non-native species - Selective extraction of species	Potential for changes to habitat availability, for example reductions in wetted width of rivers leading to desiccation of macrophyte beds due to changes in abstraction or reduced compensation flow. *This effect is only likely to be significant where the receiving water for the scheme is the European site or a tributary of the European site.*

Broad categories of potential impacts on European sites	Examples of operations responsible for impacts (distance assumptions shown in italics)
- Introduction of disease - Rapid population fluctuations - Natural succession	

HRA Stage 1 screening for Likely Significant Effects has been determined on a proximity basis, as well as consideration of any hydrological connectivity, including to any SPA functional habitat. Consideration has therefore been given to the relative locations of each drought management option sites and the European sites within the same surface and groundwater catchments to ensure that any connectivity over a longer distance than the 10km screening distance that might affect water-dependent sites was taken into account. For the Blagdon, Chew and Cheddar reservoir drought permits, this included reference to the hydrological assessments undertaken as part of the Environmental Assessment Reports (EARs) that identify the hydrological zone of influence during drought permit implementation. The available information on the hydrological influence of each DP measure is summarised in the next section in **Table 3.3**.

The operational phase impacts of each of the DP measures were reviewed and assessed. For the R24R Well supply augmentation measure, the associated construction activities have also been assessed. No other measures involve construction activities.

2.5 Review of Potential In-combination Effects

An Appropriate Assessment is also required if '*Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plan or projects*'.

The potential for in-combination, effects has considered the following:

1. Potential in-combination effects of the DP measures with Bristol Water's existing abstraction licences that operate within the zone of influence of the DP measure, and other abstraction and discharge consents where applicable.

2. Potential cumulative impacts with other Bristol Water DP measures.

3. Potential in-combination effects with other Bristol Water activities, plans and programmes, including the Water Resource Management Plan 2019.

4. Potential in-combination effects with other neighbouring water company activities, Drought Plans and Water Resource Management Plans, as well as any relevant Environment Agency and Canal & River Trust drought plans.

5. Potential in-combination effects with other relevant third party activities, programmes and plans (where these are likely to arise and be implemented over the 5-year lifetime of the Bristol Water Drought Plan). HRA guidance states "*It should be possible to identify the other plans or projects in a targeted way; not trawling for every conceivable plan or project, whilst identifying all the relevant ones. To be relevant to the in-combination effect, the residual effects of other plans or projects will need to either make the unlikely effects of the subject plan likely, or insignificant effects of the plan significant, or both.*"

National Policy Statements for Water, Wastewater and Renewable Energy Infrastructure were also reviewed as part of the cumulative assessment.

Demand management measures serve to reduce pressure on water resources and will have a positive influence on the environment by reducing the demand for water and reducing abstraction from water

sources. Therefore, demand management measures have not been included in the in-combination assessment.

It is noted that there may be in-combination, site-specific issues which may not be foreseen, for example, other future development projects at, or in the vicinity of specific sites. Such future projects are difficult to define at the time of undertaking HRA Stage 1 Screening of the DP due to the uncertainty or timing of implementation. However, potential in-combination effects will be reviewed again at the time of implementing a DP measure which would identify any such projects.

3 HRA SCREENING FINDINGS

3.1 HRA Screening of Statutory Drought Plan

All of the DP measures have been screened and the assessment findings are presented in **Tables 3-1 - 3-6**. The tables show that all the supply augmentation and drought permit measures are assessed as being likely to have a significant effect on the qualifying features of at least one European site through indirect effects.

Additionally, **Appendix A1** provides summary environmental assessment information regarding the potential for any Likely Significant Effects on European sites each of the extreme drought management actions that would be used to inform a HRA screening assessment in the future if an extreme drought event was to develop out of a severe drought event. **Appendix A1** also sets out the triggers for carrying out more detailed assessment and data collation should an extreme drought arise and the possible need for any of these measures becomes evident.

Table 3.1: Screening of R24R Well supply augmentation measure for impacts on European Sites

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Likely significant effects (LSE) on European Site(s) alone?	If no LSE alone: Residual low-level effect requiring in-combination assessment with existing consents?	If no LSE alone: Residual low-level effect requiring in-combination assessment with other drought options?
R24R Well	Mendip Woodlands SAC (1.5km)	**9180 Tilio-Acerion forests of slopes, screes and ravines** Mendip Woodlands in south-west England is a relatively extensive example of Tilio-Acerion forests on limestone. It is a cluster of three ash-dominated woods on Carboniferous limestone. A rich variety of other trees and shrubs are present, including elm *Ulmus* spp. and, locally, small-leaved lime *Tilia cordata*. At Ebbor Gorge elm rather than lime is mixed with ash *Fraxinus excelsior* in a steep-sided gorge; at both R24Ra and Cheddar Wood lime and ash are found on rocky slopes with patches of deeper soil between the outcrops. Ferns characteristic of this woodland type, such as hart's-tongue *Phyllitis scolopendrium* and shield-ferns *Polystichum* spp., are common. The site is in the centre of the range of common dormouse *Muscardinus avellanarius* and holds a large population of this species.	Construction This measure would involve the construction of a new pumping station at the R24R Well site and the construction of a new 300mm diameter pipeline over a distance of 4.2km. The Mendip Woodlands SAC site is approximately 1.5km from the construction area. Direct or indirect construction effects are considered unlikely given the distance of the works to the site and intervening habitats. Operation The SAC qualifying features are not water dependent.	No	No	No
	North Somerset and Mendip Bats SAC (2.9km)	**6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates** The Cheddar complex and Wookey Hole areas support a wide range of semi-natural	Construction The SAC is approximately 2.9km from likely construction area but indirect construction effects are possible given the construction route lies within a Bat Consultation Zone for horseshoe bats, in	Yes	N/A	N/A

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Likely significant effects (LSE) on European Site(s) alone?	If no LSE alone: Residual low-level effect requiring in-combination assessment with existing consents?	If no LSE alone: Residual low-level effect requiring in-combination assessment with other drought options?
		habitats including semi-natural dry grasslands. **9180 Tilio-Acerion forests of slopes, screes and ravines** The main block of *Tilio-Acerion* forest at Kings and Urchin's Wood has developed over limestone which outcrops in parts of the site and forms a steep scarp to the south-east. **1303 Lesser horseshoe bat** *Rhinolophus hipposideros* The limestone caves of the Mendips provide a range of important hibernation sites for lesser horseshoe bat *Rhinolophus hipposideros* and 1,304 greater horseshoe bat *Rhinolophus ferrumequinum*. **1304 Greater horseshoe bat** *Rhinolophus ferrumequinum* This site in south-west England is selected on the basis of the size of population represented (3% of the UK greater horseshoe bat *Rhinolophus ferrumequinum* population) and its good conservation of structure and function, having both maternity and hibernation sites. This site contains an exceptionally	respect of impacts to key offsite foraging habitat[16]. The construction of the pipeline could result in direct, temporary loss of key offsite foraging habitat and potentially sever commuting routes. The horseshoe bat species are potentially vulnerable to construction impacts associated with the pipeline element of the option. This relates to habitat fragmentation resulting from the removal of sections of linear features (hedgerows, ditches or woodland edges, for example) that bats use for navigation and commuting between roosting and foraging areas, and also temporary loss of foraging habitat during construction. Linear features are typically hedgerows, woodland and woodland edges. <u>Operation</u> Wetland habitat provides suitable foraging habitat for bats. The abstraction point lies on the edge of Zone B of a Bat Consultation Zone for horseshoe bats[16] in respect of impacts to key foraging habitat. Alterations to groundwater regime in extent or duration could alter the extent and quality of foraging habitat and have a likely			

[16] North Somerset and Mendip Bats Special Area of Conservation (SAC) Guidance on Development: Supplementary Planning Document Adopted January 2018

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Likely significant effects (LSE) on European Site(s) alone?	If no LSE alone: Residual low-level effect requiring in-combination assessment with existing consents?	If no LSE alone: Residual low-level effect requiring in-combination assessment with other drought options?
		good range of the sites used by the population, comprising two maternity sites in lowland north Somerset and a variety of cave and mine hibernation sites in the Mendip Hills. **8310 Caves not open to the public** Natural caves which are not routinely exploited for tourism, and which host specialist or endemic cave species or support important populations of Annex II species.	significant effect on foraging success and survival. Further information is needed on whether the hydrological changes could affect the extent and quality of wetland habitats and the duration/time of year this would be effective in order to assess the potential effects on foraging success.			
	Mendip Limestone Grasslands SAC (6.8km)	**6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia)** **T**his site comprises coastal and inland sections of the Carboniferous Limestone outcrops of the Mendips. **4030 European dry heaths** Occurs on freely-draining, acidic to circumneutral soils with generally low nutrient content. Ericaceous dwarf-shrubs dominate the vegetation. Nearly all dry heath is semi-natural, being derived from woodland through a long history of grazing and burning. **8310 Caves not open to the public**	<u>Construction</u> The site is approximately 6.8km from the likely construction area. There will be no direct effects and indirect construction effects on the grassland are very unlikely. Greater horseshoe bat species are potentially vulnerable to construction impacts. This relates to habitat fragmentation resulting from the removal of sections of linear features that bats use for navigation and commuting between roosting and foraging areas, and also loss of foraging habitat during construction. The pipeline route lies within zones A, B and C of a Bat Consultation Zone for horseshoe bat. Construction within this zone has potential to result in direct, temporary loss of key foraging habitat and potentially	Yes	N/A	N/A

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Likely significant effects (LSE) on European Site(s) alone?	If no LSE alone: Residual low-level effect requiring in-combination assessment with existing consents?	If no LSE alone: Residual low-level effect requiring in-combination assessment with other drought options?
		Natural caves which are not routinely exploited for tourism, and which host specialist or endemic cave species or support important populations of Annex II species **9180 *Tilio-Acerion* forests of slopes, screes and ravines** Tilio-Acerion ravine forests are woods of ash *Fraxinus excelsior,* wych elm *Ulmus glabra* and lime (mainly small-leaved lime *Tilia cordata* but more rarely large-leaved lime *T. platyphyllos*). It is found on calcareous substrates associated with coarse scree, cliffs, steep rocky slopes and ravines, where inaccessibility has reduced human impact. **1304 Greater horseshoe bat** The greater horseshoe bat is one of the largest bats in the UK. During the summer, they form maternity colonies, generally in large old buildings, and forage in pasture, edges of mixed deciduous woodland and hedgerows. In winter they depend on caves, abandoned mines and other underground sites for undisturbed hibernation. A system or series of sites is required. Summer and winter roosts are usually less than 20-30 km apart. The bats are vulnerable to the loss of insect food supplies due to insecticide use, changing	sever commuting routes, such as hedgerows, ditches/rhynes and impact on foraging success. <u>Operation</u> Owing to the distance of the abstraction from the SAC and lack of hydrological connectivity, direct operational impacts on habitats are probably unlikely but this is currently uncertain. Wetland habitats provide foraging habitat for bats. The abstraction has potential to alter wetland habitats and the food resource they provide for bats within a Bat Consultation Zone Band C for horseshoe bats. Further information is required on the hydrological effects of the scheme, regarding likely alterations to wetland habitats from abstraction.			

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Likely significant effects (LSE) on European Site(s) alone?	If no LSE alone: Residual low-level effect requiring in-combination assessment with existing consents?	If no LSE alone: Residual low-level effect requiring in-combination assessment with other drought options?
		farming practices and the loss of broad-leaved tree-cover, and to the loss or disturbance of underground roost sites.				
	Somerset Levels and Moors SPA and Ramsar (12km)	**Article 4.1** **Over winter, the area supports:** Bewick's swan *Cygnus columbianus bewickii,* golden plover *Pluvialis apricaria.* **Article 4.2** **Over winter, the area supports:** shoveler *Anas clypeata,* seal *Anas crecca,* wigeon *Anas Penelope,* snipe *Gallinago gallinago*, lapwing *Vanellus vanellus*, pintail *Anas acuta*, gadwall *Anas strepera*, Bewick's swan *Cygnus columbianus bewickii*, and whimbrel *Numenius phaeopus*. **Ramsar Criterion 2** Supports 17 species of British Red Data Book invertebrates. **Ramsar Criterion 5** Assemblages of international importance – species with peak counts in winter: 97,155 waterfowl (5-year peak mean) **Ramsar Criterion 6**	Construction Distance from the site (12km) makes it unlikely that construction effects will have a significant direct effect on this site, although some of the interest features (including teal and shoveler) are known to roost on the Cheddar Reservoir but feed elsewhere on the Somerset Levels. Other migrant waders (e.g. golden plover, lapwing) are also known to use the reservoir as a feeding station when on passage. It is therefore possible that the construction of the new R24R Well pipeline may affect some of the SPA species when they are using the reservoir as the pipeline construction route is situated 600m from the Cheddar Reservoir at its nearest point. Further assessment is required on the potential disturbance impacts to offsite supporting habitat. Operation Site not hydrologically linked to the source or its tributaries / distributaries and	Yes	N/A	N/A

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Likely significant effects (LSE) on European Site(s) alone?	If no LSE alone: Residual low-level effect requiring in-combination assessment with existing consents?	If no LSE alone: Residual low-level effect requiring in-combination assessment with other drought options?
		Species/populations occurring at levels of international importance: tundra swan, *Cygnus columbianus bewickii* – 112 individuals, representing an average of 1.3% of the GB population (5-year peak mean)	therefore no Likely Significant Effects due to operation.			
	Severn Estuary SAC, SPA, Ramsar (52km)	**1130 Estuaries** Habitat occurrence description not yet available. Comprises an interdependent mosaic of subtidal and intertidal habitats, which are closely associated with surrounding terrestrial habitats. **1140 Mudflats and sandflats not covered by seawater at low tide.** Habitat occurrence description not yet available. A major component of 1130 Estuaries and 1160 Large shallow inlets and bays in the UK but also occur extensively along the open coast and in lagoonal inlets, comprising clean sands, muddy sands and muds. **1330 Atlantic salt meadows** (*Glauco-Puccinellietalia maritimae*) Habitat occurrence description not yet available. Forms the middle and upper reaches of saltmarshes, where tidal inundation still occurs but with decreasing	<u>Construction</u> Distance from the site (52km) makes it unlikely that construction effects will have a significant direct effect on this site. <u>Operation</u> Owing to the distance of the abstraction from the SAC direct operational impacts on habitats are probably unlikely but this is currently uncertain. The River Axe provides functionally link habitats for protected fish species. Further information is required on the hydrological effects of the scheme, regarding likely alterations to aquatic habitats from abstraction. Fisheries surveys reported the presence of migratory fish including Atlantic salmon, brown/sea trout and European eel. Atlantic salmon, sea trout and European eel are featured within the Severn Estuary SAC and/or Ramsar site designation. Therefore, there is a potential for hydrological impacts that could significantly affect the designated	Yes - SAC and Ramsar site No - SPA	N/A	N/A

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Likely significant effects (LSE) on European Site(s) alone?	If no LSE alone: Residual low-level effect requiring in-combination assessment with existing consents?	If no LSE alone: Residual low-level effect requiring in-combination assessment with other drought options?
		frequency and duration. A wide range of community types is represented. **1110 Sandbanks which are slightly covered by sea water all the time** consist of sandy sediments that are permanently covered by shallow sea water, typically at depths of less than 20 m below chart datum (but sometimes including channels or other areas greater than 20 m deep). **1170 Reefs** Rocky marine habitats or biological concretions that rise from the seabed. They are generally subtidal but may extend as an unbroken transition into the intertidal zone, where they are exposed to the air at low tide. **1095 Sea lamprey** *Petromyzon marinus* Species occurrence description not yet available. It occurs in estuaries and easily accessible rivers and is anadromous. Sea lampreys need clean gravel for spawning, and marginal silt or sand for the burrowing juvenile ammocoetes. **1099 River lamprey** *Lampetra fluviatilis* Species occurrence description not yet available. Found in coastal waters,	migratory fish species (i.e. quality of river habitat) affecting survival and spawning success. Further assessments and mitigation considerations are required.			

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Likely significant effects (LSE) on European Site(s) alone?	If no LSE alone: Residual low-level effect requiring in-combination assessment with existing consents?	If no LSE alone: Residual low-level effect requiring in-combination assessment with other drought options?
		estuaries and accessible rivers. The species is normally anadromous, and pollution or artificial obstacles such as weirs or dams impede migration. **1103 Twaite shad** *Alosa fallax* Species occurrence description not yet available. This species returns from the sea to spawn in spring, usually between April and June. The habitat requirements of twaite shad are not fully understood but it is known to spawn in rivers in the England/Wale border that flow into the Severn Estuary. **Article 4.1** **Over winter the area supports:** Bewick's Swan *Cygnus columbianus bewickii*, **Article 4.2** Over winter the area supports approximately 84,300 of birds with gadwall, greater white-fronted goose, dunlin, common shelduck and common redshank present. **Criterion 1** Due to immense tidal range affecting both the physical environment and biological communities.				

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Likely significant effects (LSE) on European Site(s) alone?	If no LSE alone: Residual low-level effect requiring in-combination assessment with existing consents?	If no LSE alone: Residual low-level effect requiring in-combination assessment with other drought options?
		Criterion 3 Due to unusual estuarine communities, reduced diversity and high productivity. **Criterion 4** Migratory fish Including salmon *Salmo salar*, sea trout *S. trutta*, sea lamprey *Petromyzon marinus*, river lamprey *Lampetra fluviatilis*, allis shad *Alosa alosa*, twaite shad *A. fallax*, and eel *Anguilla Anguilla*. **Criterion 5** Assemblages of international importance – Species with peak counts in winter: 70919 waterfowl (5 year peak mean) **Criterion 6** Species/populations occurring at levels of international importance as listed in Article 4.2. **Criterion 8** The fish assemblage of the whole estuarine and river system is one of the most diverse in Britain, with over 110 species recorded.				

Table 3.2: Screening of demand management measures for impacts on European Sites

Option	Description	Further HRA Assessment Required?
Appeals for restraint	None – appeals for constraint includes increased water efficiency messages via increased customer communications. No impacts on designated sites are anticipated, other than to acknowledge that decreased consumer demand will have a net positive effect in combination with existing abstraction and/or drought management measures that have the potential to impact European sites due to reduced pressure on water resources and reduced abstraction at source.	No
Temporary Use Bans	None – the restrictions on consumer water use are demand management measures and as such, are not anticipated to have impacts on European sites. It is acknowledged that decreased consumer demand will have a net positive effect in combination with existing abstraction and/or drought management measures that have the potential to impact European sites, due to reduced pressure on water resources and reduced abstraction at source.	No
Non-Essential Use	None – a non-essential use ban and its components are demand management measures and as such are not anticipated to have impacts on European sites. It is acknowledged that decreased consumer demand will have a net positive effect in combination with existing abstraction and/or drought management measures that have the potential to impact European sites due to reduced pressure on water resources and reduced abstraction at source.	No

Table 3.3: Screening of drought permits for impacts on European Sites

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Likely significant effects (LSE) on European Site(s) alone?	If no LSE alone: Residual low-level effect requiring in-combination assessment with existing consents?	If no LSE alone: Residual low-level effect requiring in-combination assessment with other drought options?
Blagdon Reservoir Reduced Compensation Flow	North Somerset and Mendip Bats SAC (6.2km)	**6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates** The Cheddar complex and Wookey Hole areas support a wide range of semi-natural habitats including semi-natural dry grasslands. **9180 Tilio-Acerion forests of slopes, screes and ravines** The main block of *Tilio-Acerion* forest at Kings and Urchin's Wood has developed over limestone which outcrops in parts of the site and forms a steep scarp to the south-east. **1303 Lesser horseshoe bat** *Rhinolophus hipposideros* The limestone caves of the Mendips provide a range of important hibernation sites for lesser horseshoe bat *Rhinolophus hipposideros* and 1,304 greater horseshoe bat *Rhinolophus ferrumequinum*. **1304 Greater horseshoe bat** *Rhinolophus ferrumequinum* This site in south-west England is selected on the basis of the size of population represented (3% of the UK greater horseshoe bat *Rhinolophus ferrumequinum* population) and its good conservation of structure and	<u>Construction</u> There is no construction phase associated with this drought permit. <u>Operation</u> Wetland habitat provides suitable foraging habitat for bats. The SAC lies within Zone C of the Bat Consultation Zone and therefore, impacts are possible due to the importance of these zones for foraging bats. Alterations to the hydrological regime in extent or duration could alter the extent and quality of foraging habitat and have a likely significant effect on foraging success and survival. The hydrological assessment identified three impacted reaches of the Congresbury Yeo, from the Blagdon Reservoir compensation release point to the tidal limit at Woodspring Bay. Impacts reduce with distance downstream of the reservoir as the reduction in the compensation flow is ameliorated by additional flow inputs from the intervening catchment area and tributary inflows. The assessment for the EARs concludes a minor negative impact on	Yes	No	No

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Likely significant effects (LSE) on European Site(s) alone?	If no LSE alone: Residual low-level effect requiring in-combination assessment with existing consents?	If no LSE alone: Residual low-level effect requiring in-combination assessment with other drought options?
		function, having both maternity and hibernation sites. This site contains an exceptionally good range of the sites used by the population, comprising two maternity sites in lowland north Somerset and a variety of cave and mine hibernation sites in the Mendip Hills. **8310 Caves not open to the public.** Natural caves which are not routinely exploited for tourism, and which host specialist or endemic cave species or support important populations of Annex II species.	wetland/rhyne/ditch habitat quality in the downstream reaches within the hydrological zone of Influence of the drought permit. Therefore, there are Likely Significant Effects on foraging habitat within the hydrological zone of Influence. Drought permits are 6 months duration, which is unlikely to alter the habitat and foraging resource and would only create an adverse effect if implemented in multiple years. Impacts of the drought permit on water levels in Blagdon Reservoir are assessed as minor beneficial, with water levels being held higher for longer. No Likely Significant Effects on the wetland habitats of Blagdon Reservoir are anticipated.			
	Chew Valley Lake SPA (8km)	**Article 4.2** **Over winter, the area supports:** Shoveler *Anas clypeata*, 503 individuals representing up to 1.3% of the wintering North-western/Central Europe population (5 year peak mean)	Construction There is no construction phase associated with this drought permit. Operation The drought permit involves a reduction in the compensation flow release from Blagdon Reservoir. The Chew Valley Lake SPA, although relatively close, is within a	No	No	No

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Likely significant effects (LSE) on European Site(s) alone?	If no LSE alone: Residual low-level effect requiring in-combination assessment with existing consents?	If no LSE alone: Residual low-level effect requiring in-combination assessment with other drought options?
			different catchment with no hydrological connectivity.			
	Severn Estuary SAC, SPA, Ramsar (22km)	**1130 Estuaries** Habitat occurrence description not yet available. Comprises an interdependent mosaic of subtidal and intertidal habitats, which are closely associated with surrounding terrestrial habitats. **1140 Mudflats and sandflats not covered by seawater at low tide.** Habitat occurrence description not yet available. A major component of 1130 Estuaries and 1160 Large shallow inlets and bays in the UK but also occur extensively along the open coast and in lagoonal inlets, comprising clean sands, muddy sands and muds. **1330 Atlantic salt meadows** (*Glauco-Puccinellietalia maritimae*) Habitat occurrence description not yet available. Forms the middle and upper	<u>Construction</u> There is no construction phase associated with this drought permit. <u>Operation</u> The drought permit involves a reduction in the compensation flow release from Blagdon Reservoir to the Congresbury Yeo. There would be an associated impact on the flow/level regime in the Congresbury Yeo downstream of the Reservoir. The zone of hydrological influence includes 6km of the Congresbury Yeo from Blagdon Reservoir outfall to Iwood gauging station. The hydrological assessment identified that at Iwood gauging station low flow (Q95) was recorded as 17.0Ml/d and that a 4Ml/d reduction would be a loss of 24% of flow (to a value similar to Q99). In moderate and high flow periods, the hydrology impacts would be negligible.	Yes - SAC and Ramsar site No - SPA	N/A	N/A

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Likely significant effects (LSE) on European Site(s) alone?	If no LSE alone: Residual low-level effect requiring in-combination assessment with existing consents?	If no LSE alone: Residual low-level effect requiring in-combination assessment with other drought options?
		reaches of saltmarshes, where tidal inundation still occurs but with decreasing frequency and duration. A wide range of community types is represented. **1110 Sandbanks which are slightly covered by sea water all the time** consist of sandy sediments that are permanently covered by shallow sea water, typically at depths of less than 20 m below chart datum (but sometimes including channels or other areas greater than 20 m deep). **1170 Reefs** Rocky marine habitats or biological concretions that rise from the seabed. They are generally subtidal but may extend as an unbroken transition into the intertidal zone, where they are exposed to the air at low tide. **1095 Sea lamprey** *Petromyzon marinus* Species occurrence description not yet available. It occurs in estuaries and easily accessible rivers and is anadromous. Sea lampreys need clean gravel for spawning, and marginal silt or sand for the burrowing juvenile ammocoetes.	Three hydrological impacted reaches have been identified within the River Yeo: • Reach 1: River Yeo from Blagdon Reservoir compensation release point to Rickford Stream. • Reach 2: River Yeo from Rickford Stream to EA gauging station at Iwood. • Reach 3: River Yeo from EA gauging station at Iwood to tidal limit at Woodspring Bay. Downstream of the Iwood gauging station, the Congresbury Yeo is level controlled and therefore any potential hydrology impacts during low flow periods would be restricted to potential minor changes in water velocity (wetted depth and wetted width are controlled by local in-river control structures), and this potential effect could extend downstream to the confluence with the Severn Estuary (12km downstream of Iwood gauging station). In the reach from Iwood to the Severn Estuary, the gradient is very low, the water level is managed, and the channel significantly modified by weirs, bridges and local bank engineering. Fisheries surveys completed in 2018[17] reported the presence of migratory fish			

[17] Bristol Water Plc (2019) Blagdon Reservoir Drought Permit Environmental Assessment. Report by Ricardo, October 2019.

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Likely significant effects (LSE) on European Site(s) alone?	If no LSE alone: Residual low-level effect requiring in-combination assessment with existing consents?	If no LSE alone: Residual low-level effect requiring in-combination assessment with other drought options?
		1099 River lamprey *Lampetra fluviatilis* Species occurrence description not yet available. Found in coastal waters, estuaries and accessible rivers. The species is normally anadromous, and pollution or artificial obstacles such as weirs or dams impede migration. **1103 Twaite shad** *Alosa fallax* Species occurrence description not yet available. This species returns from the sea to spawn in spring, usually between April and June. The habitat requirements of twaite shad are not fully understood but it is known to spawn in rivers in the England/Wale border that flow into the Severn Estuary. **Article 4.1** **Over winter the area supports:** Bewick's Swan *Cygnus columbianus bewickii*, **Article 4.2** Over winter the area supports approximately 84,300 of birds with gadwall, greater white-fronted goose, dunlin, common shelduck and common redshank present. **Criterion 1**	including brown/sea trout and European eel within reach 1, and brook/river lamprey within reach 2. Sea trout, eel and river lamprey are featured within the Severn Estuary SAC and/or Ramsar site designation. The 2019 EAR identified the significance of impact as major for brown/sea trout, and moderate for river/sea lamprey and European eel. Therefore, there is a potential for hydrological impacts that could significantly affect the designated migratory fish species (i.e. quality of river habitat) affecting survival and spawning success. Further assessments and mitigation considerations are required.			

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Likely significant effects (LSE) on European Site(s) alone?	If no LSE alone: Residual low-level effect requiring in-combination assessment with existing consents?	If no LSE alone: Residual low-level effect requiring in-combination assessment with other drought options?
		Due to immense tidal range affecting both the physical environment and biological communities. **Criterion 3** Due to unusual estuarine communities, reduced diversity and high productivity. **Criterion 4** Migratory fish Including salmon *Salmo salar*, sea trout *S. trutta*, sea lamprey *Petromyzon marinus*, river lamprey *Lampetra fluviatilis*, allis shad *Alosa alosa*, twaite shad *A. fallax*, and eel *Anguilla Anguilla*. **Criterion 5** Assemblages of international importance – Species with peak counts in winter: 70919 waterfowl (5 year peak mean) **Criterion 6** Species/populations occurring at levels of international importance as listed in Article 4.2. **Criterion 8** The fish assemblage of the whole estuarine and river system is one of the most diverse in Britain, with over 110 species recorded.				

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Likely significant effects (LSE) on European Site(s) alone?	If no LSE alone: Residual low-level effect requiring in-combination assessment with existing consents?	If no LSE alone: Residual low-level effect requiring in-combination assessment with other drought options?
Chew Valley Reservoir Reduced Compensation Flow	North Somerset and Mendip Bats SAC (9km)	**6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates** The Cheddar complex and Wookey Hole areas support a wide range of semi-natural habitats including semi-natural dry grasslands. **9180 Tilio-Acerion forests of slopes, screes and ravines** The main block of *Tilio-Acerion* forest at Kings and Urchin's Wood has developed over limestone which outcrops in parts of the site and forms a steep scarp to the south-east. **1303 Lesser horseshoe bat** *Rhinolophus hipposideros* The limestone caves of the Mendips provide a range of important hibernation sites for lesser horseshoe bat *Rhinolophus hipposideros* and 1,304 greater horseshoe bat *Rhinolophus ferrumequinum*. **1304 Greater horseshoe bat** *Rhinolophus ferrumequinum* This site in south-west England is selected on the basis of the size of population represented (3% of the UK greater horseshoe bat *Rhinolophus ferrumequinum* population) and	<u>Construction</u> There is no construction phase associated with this drought permit. <u>Operation</u> Wetland habitat provides suitable foraging habitat for bats. Alterations to the hydrological regime in extent or duration could alter the extent and quality of foraging habitat and have a likely significant effect on foraging success and survival. The drought permit hydrological effects lie outside of the Bat Consultation Zone[18] and therefore, impacts are highly unlikely. The drought permit will result in water levels in Chew Valley Reservoir being maintained for longer than would have been the case in drought conditions without the drought permit in place. In operation, any effects on the interest features resulting from the drought permit would be beneficial.	No	No	No

[18] North Somerset and Mendip Bats Special Area of Conservation (SAC) Guidance on Development: Supplementary Planning Document Adopted January 2018.

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Likely significant effects (LSE) on European Site(s) alone?	If no LSE alone: Residual low-level effect requiring in-combination assessment with existing consents?	If no LSE alone: Residual low-level effect requiring in-combination assessment with other drought options?
		its good conservation of structure and function, having both maternity and hibernation sites. This site contains an exceptionally good range of the sites used by the population, comprising two maternity sites in lowland north Somerset and a variety of cave and mine hibernation sites in the Mendip Hills. **8310 Caves not open to the public** Natural caves which are not routinely exploited for tourism, and which host specialist or endemic cave species or support important populations of Annex II species.				
	Chew Valley Lake SPA	**Article 4.2** **Over winter, the area supports:** shoveler *Anas clypeata*, 503 individuals representing up to 1.3% of the wintering North-western/Central Europe population (5 year peak mean)	Construction There is no construction phase associated with this drought permit. Operation The drought permit will result in water levels in Chew Valley Reservoir being maintained for longer than would have been the case in drought conditions without the drought permit in place. In operation, any effects on the interest features resulting from the drought permit would be beneficial.	No	No	No
	Severn Estuary	**1130 Estuaries** Habitat occurrence description not yet available. Comprises an interdependent	Construction	Yes – SAC and	N/A	N/A

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Likely significant effects (LSE) on European Site(s) alone?	If no LSE alone: Residual low-level effect requiring in-combination assessment with existing consents?	If no LSE alone: Residual low-level effect requiring in-combination assessment with other drought options?
	SAC, SPA, Ramsar (20.2km)	mosaic of subtidal and intertidal habitats, which are closely associated with surrounding terrestrial habitats. **1140 Mudflats and sandflats not covered by seawater at low tide.** Habitat occurrence description not yet available. A major component of 1130 Estuaries and 1160 Large shallow inlets and bays in the UK but also occur extensively along the open coast and in lagoonal inlets, comprising clean sands, muddy sands and muds. **1330 Atlantic salt meadows** (*Glauco-Puccinellietalia maritimae*) Habitat occurrence description not yet available. Forms the middle and upper reaches of saltmarshes, where tidal inundation still occurs but with decreasing frequency and duration. A wide range of community types is represented. **1110 Sandbanks which are slightly covered by sea water all the time** consist of sandy sediments that are permanently covered by shallow sea water, typically at depths of less than 20 m below	There is no construction phase associated with this drought permit. <u>Operation</u> The drought permit will result in water levels in Chew Valley Reservoir) being maintained for longer than would have been the case in drought conditions without the drought permit in place. The summer (May to November) and winter (December to April) the drought permit would result in a decrease in flow by approximately 50% in the River Chew, a tributary of the River Avon. Lower river flows could reduce habitat availability and migration connectivity. Lower river flows may increase the stranding of animals and increase the risk of predation in addition to impacting the water quality. Fish spawning sites can also be impacted from siltation and reduction in water quality, which could impact on future recruitment. As set out in the 2019 EAR[19], the hydrological zone of influence is delimited by the River Chew confluence with the River Avon (17km from Chew Valley Reservoir) at	Ramsar site No - SPA		

[19] Bristol Water Plc (2019) Chew Valley Reservoir Drought Permit Environmental Assessment – Appendix B. Report by Ricardo, October 2019.

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Likely significant effects (LSE) on European Site(s) alone?	If no LSE alone: Residual low-level effect requiring in-combination assessment with existing consents?	If no LSE alone: Residual low-level effect requiring in-combination assessment with other drought options?
		chart datum (but sometimes including channels or other areas greater than 20 m deep). **1170 Reefs** Rocky marine habitats or biological concretions that rise from the seabed. They are generally subtidal but may extend as an unbroken transition into the intertidal zone, where they are exposed to the air at low tide. **1095 Sea lamprey** *Petromyzon marinus* Species occurrence description not yet available. It occurs in estuaries and easily accessible rivers and is anadromous. Sea lampreys need clean gravel for spawning, and marginal silt or sand for the burrowing juvenile ammocoetes. **1099 River lamprey** *Lampetra fluviatilis* Species occurrence description not yet available. Found in coastal waters, estuaries and accessible rivers. The species is normally anadromous, and pollution or artificial obstacles such as weirs or dams impede migration. **1103 Twaite shad** *Alosa fallax*	which point the reduction in flow is negligible due to the overwhelmingly large catchment area of the River Avon at this point. The 2019 EAR[20] identified that implementation of the drought permit would result in a major-moderate impact on flows in the River Chew. Three hydrological impacted reaches have been identified within the River Chew: • Reach 1: River Chew from Chew Valley Reservoir compensation release point to Winford Brook confluence. • Reach 2: River Chew from Winford Brook confluence to EA gauging station at Compton Dando. • Reach 3: River Chew from EA gauging station at Compton Dando to River Avon confluence. Fisheries surveys completed in 2018 reported the presence of migratory fish including brown/sea trout, Atlantic salmon, river lamprey and European eel some of which are featured within the Severn Estuary SAC and/or Ramsar site designation. The 2019 EAR identified the significance of impact as major for and			

[20] Bristol Water Plc (2019). Chew Valley Reservoir Drought Permit Environmental Assessment. Report by Ricardo, October 2019.

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Likely significant effects (LSE) on European Site(s) alone?	If no LSE alone: Residual low-level effect requiring in-combination assessment with existing consents?	If no LSE alone: Residual low-level effect requiring in-combination assessment with other drought options?
		Species occurrence description not yet available. This species returns from the sea to spawn in spring, usually between April and June. The habitat requirements of twaite shad are not fully understood but it is known to spawn in rivers in the England/Wale border that flow into the Severn Estuary. **Article 4.1** **Over winter the area supports:** Bewick's Swan *Cygnus columbianus bewickii*, **Article 4.2** Over winter the area supports approximately 84,300 of birds with gadwall, greater white-fronted goose, dunlin, common shelduck and common redshank present. **Criterion 1** Due to immense tidal range affecting both the physical environment and biological communities. **Criterion 3** Due to unusual estuarine communities, reduced diversity and high productivity. **Criterion 4** Migratory fish Including salmon *Salmo salar*, sea trout *S. trutta*, sea lamprey *Petromyzon marinus*, river lamprey *Lampetra fluviatilis*,	Atlantic salmon, and moderate for brown/sea trout, river/sea lamprey and European eel. Therefore, there is a potential for hydrological impacts that could significantly affect designated migratory fish species (i.e. quality of river habitat) affecting survival and spawning success. Further assessments and mitigation considerations are required.			

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Likely significant effects (LSE) on European Site(s) alone?	If no LSE alone: Residual low-level effect requiring in-combination assessment with existing consents?	If no LSE alone: Residual low-level effect requiring in-combination assessment with other drought options?
		allis shad *Alosa alosa*, twaite shad *A. fallax*, and eel *Anguilla Anguilla*. **Criterion 5** Assemblages of international importance – Species with peak counts in winter: 70919 waterfowl (5 year peak mean) **Criterion 6** Species/populations occurring at levels of international importance as listed in Article 4.2. **Criterion 8** The fish assemblage of the whole estuarine and river system is one of the most diverse in Britain, with over 110 species recorded				
Cheddar Reservoir Reduced Prescribed Flow in Cheddar Yeo	Mendip Woodlands SAC (2km)	**9180 Tilio-Acerion forests of slopes, screes and ravines** Mendip Woodlands in south-west England is a relatively extensive example of Tilio-Acerion forests on limestone. It is a cluster of three ash-dominated woods on Carboniferous limestone. A rich variety of other trees and shrubs are present, including elm *Ulmus* spp. and, locally, small-leaved lime *Tilia cordata*. At Ebbor Gorge, elm rather than lime is mixed with ash *Fraxinus excelsior* in a steep-sided gorge; at both R24Ra and Cheddar Wood lime and ash are found on rocky slopes with	Construction There is no construction phase associated with this drought permit. Operation Features are not water dependant or water sensitive and the site will not be directly or indirectly affected by operation of the drought permit.	No	No	No

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Likely significant effects (LSE) on European Site(s) alone?	If no LSE alone: Residual low-level effect requiring in-combination assessment with existing consents?	If no LSE alone: Residual low-level effect requiring in-combination assessment with other drought options?
		patches of deeper soil between the outcrops. Ferns characteristic of this woodland type, such as hart's-tongue *Phyllitis scolopendrium* and shield-ferns *Polystichum* spp., are common. The site is in the centre of the range of common dormouse *Muscardinus avellanarius* and holds a large population of this species.				
	North Somerset and Mendip Bats SAC (2.5km)	**6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates** The Cheddar complex and Wookey Hole areas support a wide range of semi-natural habitats including semi-natural dry grasslands. **9180 Tilio-Acerion forests of slopes, screes and ravines** The main block of *Tilio-Acerion* forest at Kings and Urchin's Wood has developed over limestone which outcrops in parts of the site and forms a steep scarp to the south-east. **1303 Lesser horseshoe bat** *Rhinolophus hipposideros* The limestone caves of the Mendips provide a range of important hibernation sites for lesser horseshoe bat *Rhinolophus hipposideros* and 1,304 greater horseshoe bat *Rhinolophus ferrumequinum*.	<u>Construction</u> There is no construction phase associated with this drought permit. <u>Operation</u> Wetland habitat provides suitable foraging habitat for bats. Alterations to hydrological regime in extent or duration could alter the extent and quality of foraging habitat and have a likely significant effect on foraging success and survival The drought permit may impact river flows within Zone A and B of the Bat Consultation Zone and therefore, impacts are possible due to the importance of these zones for foraging bats. The drought permit would involve a 50% reduction in the prescribed flow discharged to the Cheddar Yeo (reduced to 3.4Ml/d) during the period 1 December to 14 May.	No	No	No

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Likely significant effects (LSE) on European Site(s) alone?	If no LSE alone: Residual low-level effect requiring in-combination assessment with existing consents?	If no LSE alone: Residual low-level effect requiring in-combination assessment with other drought options?
		1304 Greater horseshoe bat *Rhinolophus ferrumequinum* This site in south-west England is selected on the basis of the size of population represented (3% of the UK greater horseshoe bat *Rhinolophus ferrumequinum* population) and its good conservation of structure and function, having both maternity and hibernation sites. This site contains an exceptionally good range of the sites used by the population, comprising two maternity sites in lowland north Somerset and a variety of cave and mine hibernation sites in the Mendip Hills. **8310 Caves not open to the public.** Natural caves which are not routinely exploited for tourism, and which host specialist or endemic cave species or support important populations of Annex II species.	This is predominantly during the hibernation season for bats. There would be an associated impact on the flow/level regime in the Cheddar Yeo downstream. The zone of hydrological influence includes 3km of the Cheddar Yeo from Cheddar Reservoir intake, with reducing scale of impact downstream to around Hythe where the effects would be largely ameliorated. Much of the Cheddar Yeo and the wider catchment is water level controlled, which is likely to negate any effects on wetland habitats and availability of food. The impacts are therefore assessed as unlikely to be significant.			
	Mendip Limestone Grasslands SAC (3.5km)	**6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia)** **T**his site comprises coastal and inland sections of the Carboniferous Limestone outcrops of the Mendips. ***4030*** **European dry heaths**	<u>Construction</u> There is no construction phase associated with this drought permit. <u>Operation</u> The river flow impacts of the drought permit as described above for North Somerset and Mendips Bat SAC means there is no likely significant effect on this SAC.	No	No	No

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Likely significant effects (LSE) on European Site(s) alone?	If no LSE alone: Residual low-level effect requiring in-combination assessment with existing consents?	If no LSE alone: Residual low-level effect requiring in-combination assessment with other drought options?
		Occurs on freely-draining, acidic to circumneutral soils with generally low nutrient content. Ericaceous dwarf-shrubs dominate the vegetation. Nearly all dry heath is semi-natural, being derived from woodland through a long history of grazing and burning. ***8310* Caves not open to the public.** Natural caves which are not routinely exploited for tourism, and which host specialist or endemic cave species or support important populations of Annex II species ***9180 Tilio-Acerion* forests of slopes, screes and ravines** Tilio-Acerion ravine forests are woods of ash *Fraxinus excelsior,* wych elm *Ulmus glabra* and lime (mainly small-leaved lime *Tilia cordata* but more rarely large-leaved lime *T. platyphyllos*). It is found on calcareous substrates associated with coarse scree, cliffs, steep rocky slopes and ravines, where inaccessibility has reduced human impact. **1304 Greater horseshoe bat** The greater horseshoe bat is one of the largest bats in the UK. During the summer, they form maternity colonies, generally in large old buildings, and forage in pasture, edges of mixed deciduous woodland and hedgerows. In winter, they depend on caves,				

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Likely significant effects (LSE) on European Site(s) alone?	If no LSE alone: Residual low-level effect requiring in-combination assessment with existing consents?	If no LSE alone: Residual low-level effect requiring in-combination assessment with other drought options?
		abandoned mines and other underground sites for undisturbed hibernation. A system or series of sites is required. Summer and winter roosts are usually less than 20-30 km apart. The bats are vulnerable to the loss of insect food supplies due to insecticide use, changing farming practices and the loss of broad-leaved tree-cover, and to the loss or disturbance of underground roost sites.				
	Severn Estuary SAC, SPA, Ramsar (16.2km)	**1130 Estuaries** Habitat occurrence description not yet available. Comprises an interdependent mosaic of subtidal and intertidal habitats, which are closely associated with surrounding terrestrial habitats. **1140 Mudflats and sandflats not covered by seawater at low tide.** Habitat occurrence description not yet available. A major component of 1130 Estuaries and 1160 Large shallow inlets and bays in the UK but also occur extensively along the open coast and in lagoonal inlets, comprising clean sands, muddy sands and muds.	Construction There is no construction phase associated with this drought permit. Operation The drought permit would involve a 50% reduction in the prescribed flow discharged to the Cheddar Yeo (reduced to 3.4Ml/d) during the period 1 December to 14 May. There would be an associated impact on the flow regime in the Cheddar Yeo downstream. As set out in the 2019 EAR[21], the hydrological zone of influence is delimited by the downstream tidal limit at Brean Cross Sluice, where the influence of the drought permit becomes negligible, and includes the	Yes – Ramsar site No – SAC and SPA	N/A	N/A

[21] Bristol Water Plc (2019) Cheddar Ponds Drought Permit Environmental Assessment – Appendix B. Report by Ricardo, November 2019.

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Likely significant effects (LSE) on European Site(s) alone?	If no LSE alone: Residual low-level effect requiring in-combination assessment with existing consents?	If no LSE alone: Residual low-level effect requiring in-combination assessment with other drought options?
		1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) Habitat occurrence description not yet available. Forms the middle and upper reaches of saltmarshes, where tidal inundation still occurs but with decreasing frequency and duration. A wide range of community types is represented. **1110 Sandbanks which are slightly covered by sea water all the time** consist of sandy sediments that are permanently covered by shallow sea water, typically at depths of less than 20 m below chart datum (but sometimes including channels or other areas greater than 20 m deep). **1170 Reefs** Rocky marine habitats or biological concretions that rise from the seabed. They are generally subtidal but may extend as an unbroken transition into the intertidal zone, where they are exposed to the air at low tide. **1095 Sea lamprey** *Petromyzon marinus*	River Yeo and the River Axe for 19km from Cheddar Reservoir. Within the zone of influence, the magnitude of influence of the hydrological conditions of the downstream river diminishes with distance downstream, with a decreasing effect on the wetted width, wetted depth and flow velocity affecting in-channel habitat availability and quality. Downstream of Hythe, the river is level-controlled, although there may be the potential for some effects (water velocity) to extend downstream to the confluence of the Cheddar Yeo and the River Axe. The River Axe is a significantly larger, level-controlled river at its confluence with the Cheddar Yeo, where the hydrological zone of influence is considered to end. The Severn Estuary SAC, SPA and Ramsar is 14km downstream from this point. The 2019 EAR[22] identified that implementation of the drought permit would result in a major-moderate impact on flows in the River Yeo. Three impacted hydrological reaches have been identified within the zone of influence:			

[22] Bristol Water Plc (2019). Cheddar Ponds Drought Permit Environmental Assessment. Report by Ricardo, November 2019.

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Likely significant effects (LSE) on European Site(s) alone?	If no LSE alone: Residual low-level effect requiring in-combination assessment with existing consents?	If no LSE alone: Residual low-level effect requiring in-combination assessment with other drought options?
		Species occurrence description not yet available. It occurs in estuaries and easily accessible rivers and is anadromous. Sea lampreys need clean gravel for spawning, and marginal silt or sand for the burrowing juvenile ammocoetes. **1099 River lamprey** *Lampetra fluviatilis* Species occurrence description not yet available. Found in coastal waters, estuaries and accessible rivers. The species is normally anadromous, and pollution or artificial obstacles such as weirs or dams impede migration. **1103 Twaite shad** *Alosa fallax* Species occurrence description not yet available. This species returns from the sea to spawn in spring, usually between April and June. The habitat requirements of twaite shad are not fully understood but it is known to spawn in rivers in the England/Wale border that flow into the Severn Estuary. **Article 4.1** **Over winter the area supports:** Bewick's Swan *Cygnus columbianus bewickii*, **Article 4.2** Over winter the area supports approximately 84,300 of birds with gadwall, greater white-	• Reach 1: River Yeo from Cheddar Ponds intake to Hythe. • Reach 2: River Yeo from Hythe to the River Axe confluence. • Reach 3: River Axe from River Yeo confluence to tidal limit at Brean Cross Sluice (tidal lock). Fisheries surveys completed in 2018 reported the presence of migratory fish including brown/sea trout, Atlantic salmon and European eel, some of which are featured within the Severn Estuary Ramsar site designation. The 2019 EAR identified the significance of impact as major for brown/sea trout and Atlantic salmon (within reach 1), and minor for European eel. Therefore, there is a potential for hydrological impacts that could significantly affect some Ramsar designated migratory fish species (i.e. quality of river habitat) affecting survival and spawning success. Further assessments and mitigation considerations are required.			

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Likely significant effects (LSE) on European Site(s) alone?	If no LSE alone: Residual low-level effect requiring in-combination assessment with existing consents?	If no LSE alone: Residual low-level effect requiring in-combination assessment with other drought options?
		fronted goose, dunlin, common shelduck and common redshank present. **Criterion 1** Due to immense tidal range affecting both the physical environment and biological communities. **Criterion 3** Due to unusual estuarine communities, reduced diversity and high productivity. **Criterion 4** Migratory fish Including salmon *Salmo salar*, sea trout *S. trutta*, sea lamprey *Petromyzon marinus*, river lamprey *Lampetra fluviatilis*, allis shad *Alosa alosa*, twaite shad *A. fallax*, and eel *Anguilla Anguilla*. **Criterion 5** Assemblages of international importance – Species with peak counts in winter: 70919 waterfowl (5 year peak mean) **Criterion 6** Species/populations occurring at levels of international importance as listed in Article 4.2. **Criterion 8**				

Option	European Site	Qualifying features	Potential for effects on qualifying features?	Likely significant effects (LSE) on European Site(s) alone?	If no LSE alone: Residual low-level effect requiring in-combination assessment with existing consents?	If no LSE alone: Residual low-level effect requiring in-combination assessment with other drought options?
		The fish assemblage of the whole estuarine and river system is one of the most diverse in Britain, with over 110 species recorded				

4 APPROPRIATE ASSESSMENT

Section 4 provides the recommendations made following the Stage 1 assessment regarding the surveys, monitoring and mitigation measures (**Table 4.1**), which were taken into account and discussed with Natural England and the Environment Agency in order to undertake the Appropriate Assessments. As set out in the screening assessment in **Section 3**, the Appropriate Assessments focus on certain designated migratory fish species and/or horseshoe bats, as applicable. The methodology is provided in **Section 4.2** and the findings of the Appropriate Assessment are provided in **Appendix A2**.

Recommendations following Screening for Appropriate Assessment

Table 4.1: Summary of potential mitigation measures and monitoring to consider through Appropriate Assessment.

Drought Management Measure	European site	Qualifying feature (significant effect considered summarised in italic)	Potential Mitigation Measures	Potential Monitoring Measures
R24R Well	North Somerset and Mendip Bats SAC	Greater and lesser horseshoe bat. *Through construction and operation, the option has the potential to significantly effect foraging, commuting and roosting activity through direct and indirect impacts.*	Proportionate bat survey programme to identify bat roosting features, foraging and commuting habitat opportunities. Consultation with the Local Planning Authority and/or Natural England as per guidance[23]. Avoid / reduce / compensate for habitat loss and/or degradation. Develop and implement bat mitigation strategy to mitigate for disturbance (e.g. noise, light, dust).	Bat activity monitoring following construction and/or implementation of the drought option.
	Severn Estuary SAC and Ramsar site	European eel, Atlantic salmon and sea trout *Through operation, the option has the potential to significantly effect fish migration and quality of habitat necessary for their life cycle.*	Fish obstruction assessment, including a walkover if deemed necessary. Timing restriction on use of the drought plan to avoid migration activity. Use of temporary fish / eel passes. Temporary reduction or cessation of the terms of the drought permit where water	Fish distress monitoring with triggers and response plan: regular visual observations carried out on key stretches of rivers to detect signs of large-scale fish distress and agree appropriate mitigation with the Environment Agency specific to the conditions identified. This might include temporary oxygenation measures. Water quality monitoring: measures dissolved oxygen, pH, turbidity, conductivity and temperature using calibrated handheld equipment. Obstruction monitoring.

[23] North Somerset and Mendip Bats Special Area of Conservation (SAC) Guidance on Development: Supplementary Planning Document Adopted January 2018

Drought Management Measure	European site	Qualifying feature (significant effect considered summarised in italic)	Potential Mitigation Measures	Potential Monitoring Measures
			quality monitoring and/or fish distress monitoring indicate a sharp deterioration in aquatic conditions. Protection of 'spate flows'*	
	Mendip Limestone Grassland SAC	Greater horseshoe bat. *Through construction and operation, the option has the potential to significantly effect foraging, commuting and roosting activity through direct and indirect impacts.*	Proportionate bat survey programme to identify bat roosting features, foraging and commuting habitat opportunities. Consultation with the Local Planning Authority and/or Natural England as per guidance[24]. Avoid / reduce / compensate for habitat loss and/or degradation. Develop and implement bat mitigation strategy to mitigate for disturbance (e.g. noise, light, dust).	Bat activity monitoring following construction and/or implementation of the drought option.
	Somerset Levels and Moors SPA	Waterbird assemblage and habitat supporting: Bewick's swan (Non-breeding), Eurasian teal (Non-breeding), European golden plover (Non-breeding), Northern lapwing (Non-breeding) as well as shoveler, teal, wigeon, snipe, pintail, gadwall and whimbrel.	Assess the potential significant effect of the construction upon waterbird activity. Best practice construction methods to be implemented.	Unlikely to be required.

[24] North Somerset and Mendip Bats Special Area of Conservation (SAC) Guidance on Development: Supplementary Planning Document Adopted January 2018

Drought Management Measure	European site	Qualifying feature (significant effect considered summarised in italic)	Potential Mitigation Measures	Potential Monitoring Measures
		Through construction the option has the potential to significantly affect SPA features		
Blagdon Reservoir Reduced Compensation Flow	North Somerset and Mendip Bats SAC	Greater and lesser horseshoe bat *Through operation, the option has the potential to significantly effect foraging activity through indirect impacts upon wetland habitat.*	Assess the potential significant effect upon foraging habitat (wetland).	Bat activity monitoring following implementation of the drought option.
	Severn Estuary SAC and Ramsar site	River and sea lamprey, European eel and sea trout *Through operation, the option has the potential to significantly effect fish migration and quality of habitat necessary for their life cycle.*	Fish obstruction assessment, including a walkover if deemed necessary. Timing restriction on use of the drought plan to avoid migration activity. Use of temporary fish / eel passes. Temporary reduction or cessation of the terms of the drought permit where water quality monitoring and/or fish distress monitoring indicate a sharp deterioration in aquatic conditions. Protection of 'spate flows'*	Fish distress monitoring with triggers and response plan: regular visual observations carried out on key stretches of rivers to detect signs of large-scale fish distress and agree appropriate mitigation with the Environment Agency specific to the conditions identified. This might include temporary oxygenation measures. Water quality monitoring: measures dissolved oxygen, pH, turbidity, conductivity and temperature using calibrated handheld equipment. Obstruction monitoring.
Cheddar Reservoir Reduced Prescribed Flow	Severn Estuary Ramsar	European eel, Atlantic salmon and sea trout *Through operation, the option has the potential to significantly effect fish*	Fish obstruction assessment, including a walkover if deemed necessary.	Fish distress monitoring with triggers and response plan: regular visual observations carried out on key stretches of rivers to detect signs of large-scale fish distress and agree appropriate mitigation with the Environment Agency specific to

Drought Management Measure	European site	Qualifying feature (significant effect considered summarised in italic)	Potential Mitigation Measures	Potential Monitoring Measures
		migration and quality of habitat necessary for their life cycle.	Use of temporary fish / eel passes. Temporary reduction or cessation of the terms of the drought permit where water quality monitoring and/or fish distress monitoring indicate a sharp deterioration in aquatic conditions.	the conditions identified. This might include temporary oxygenation measures. Water quality monitoring: measures dissolved oxygen, pH, turbidity, conductivity and temperature using calibrated handheld equipment. Obstruction monitoring.
Chew Valley Reservoir Reduced Compensation Flow	Severn Estuary SAC and Ramsar site	River lamprey, Atlantic salmon, European eel and sea trout *Through operation, the option has the potential to significantly effect fish migration and quality of habitat necessary for their life cycle.*	Fish obstruction assessment, including a walkover if deemed necessary. Use of temporary fish / eel passes. Temporary reduction or cessation of the terms of the drought permit where water quality monitoring and/or fish distress monitoring indicate a sharp deterioration in aquatic conditions. Protection of 'spate flows'*	Fish distress monitoring with triggers and response plan: regular visual observations carried out on key stretches of rivers to detect signs of large-scale fish distress and agree appropriate mitigation with the Environment Agency specific to the conditions identified. This might include temporary oxygenation measures. Water quality monitoring: measures dissolved oxygen, pH, turbidity, conductivity and temperature using calibrated handheld equipment. Obstruction monitoring.

* Protection of 'spate flows'*: Temporary increases in river flows following periods of rain can be important to flush sediment/pollutants from the system or promote fish passage. Where possible, the terms of the drought order/permit could be temporarily reduced/suspended so that these spate flows are preferentially allowed to pass through the system. This decision would need to be taken in dialogue with the Environment Agency to take account of the prevailing conditions and considering the merits of encouraging fish migration during a drought.

4.1 Methodology for Appropriate Assessment

4.1.1 Guidance

The HRA Stage 2 Appropriate Assessment was undertaken taking account of regulatory and best practice guidance, including (but not limited to):

- UK Government (2019). Guidance on the use of Habitat Regulations Assessment.
- UK Government (2019). Conservation of Habitats and Species Regulations (Amendment) (EU Exit).
- UKWIR (2021). Environmental Assessment Guidance for Water Resources Management Plans and Drought Plans.
- Tyldesley, D. & Chapman, C. (2013) The Habitats Regulations Assessment Handbook, January 2021 edition UK. DTA Publications Limited.
- Environment Agency (2020). Water Company Drought Plan Guideline, December 2020.

Guidance[25] states that the Habitats Regulations require the assessment of effects on a European site to be 'appropriate'. The guidance states that this is taken to be 'fit for purpose' and proportional to the scale of effects (not the scale of the project) and the risk of harm to the European site and its designated features. An Appropriate Assessment is not intended to be an assessment of all the environmental effects or all the potential effects of the drought plan measure on biodiversity; rather it is confined to determination of potentially significant effects on the designated features of the European site (alone or in combination with other plans and projects), taking account of the site conservation objectives.

Guidance[25] recommends the competent authority (in this case Bristol Water), discusses and agrees the scope of the Appropriate Assessment with the nature conservation body (Natural England). The HRA Stage 1 Screening Assessment has highlighted those aspects of the drought plan measure that are considered likely to affect European site features and associated conservation objectives and these will be the focus of the further analysis in the Appropriate Assessment.

The Appropriate Assessment is confined to assessing the potential adverse effects on the European site qualifying features and site integrity. The scope and nature of Appropriate Assessment vary considerably from case to case. It was therefore important to agree with Natural England the scope of the Appropriate Assessment and the information and timescale required to undertake it.

4.1.2 Objectives

The objective of the Appropriate Assessment is to determine if there will be adverse effects on site integrity, and is dependent on the site-specific details, including the condition status and conservation objectives of the site. The potential for adverse effects on site integrity depends on the scale and magnitude of the impact on designated features taking into account:

- the distribution of the designated features across the site in relation to the predicted impact and the location, timing and duration of the proposed drought plan measure
- the level of understanding of the effect, such as whether it has been recorded before and, based on current ecological knowledge, whether it can be expected to operate at the site in question. Where this information is not available, professional judgement has been used, and it is noted that in some cases, there may not be sufficient information to undertake the assessment.

Assessment of significance is based on the available information, using professional judgement and regulatory and/or best practice guidelines where appropriate.

The Appropriate Assessment reports (**Appendix A2**) are set out in sufficient detail for it to be transparent and understandable. They set out what effects the DP measures are likely to cause on the

[25] Tyldesley, D. & Chapman, C. (2013) The Habitats Regulations Assessment Handbook, January 2021 edition UK. DTA Publications Limited

relevant interest features (alone and, where applicable, in-combination with other plans or projects), referring to relevant background evidence and other information on which ecological judgements rely. Guidance[26] states that the size or complexity of the Appropriate Assessment report do not necessarily reflect the scale of the plan or project, but rather the complexity of potential effects. The length of the Appropriate Assessment report may not reflect the complexity of ecological judgements made to arrive at the necessary conclusions. Very complex ecological analysis and judgements may be expressed succinctly, with detailed supporting analyses contained in Appendices or clearly referenced separate documents.

4.1.3 Mitigation Measures

The Appropriate Assessment also considers any potential mitigation measures to determine whether they can reduce the likelihood, nature, scale, and duration of the effect to a lower level. The Appropriate Assessment seeks mitigation measures that are capable of implementation and will reduce the impact to the lowest level possible. These measures can include both avoidance and reduction measures, with the former being the preferred option.

Mitigation measures to be considered for the Bristol Water DP relate to the relevant designated migratory fish species (European eel, sea trout and river lamprey) and horseshoe bats. **Table 4.1** provides further details regarding the qualifying features to consider and the potential mitigation measures required for each DP measure following the Stage 1 screening. It should be noted that not all potential mitigation/monitoring within Table **4.1** were taken forward following the full Appropriate Assessment. A general mitigation strategy may also be included with regards to each supply option in order to preclude likely significant effect. The strategy would include season and/or timing restrictions in relation to the qualifying feature life cycle.

4.1.4 In-combination Assessment

Further consideration of in-combination effects was undertaken for the Appropriate Assessment. For in-combination effects to occur there must be a discernible impact alone to act in-combination. The impact pathway of relevance to the Appropriate Assessment of the DP measures is firstly connectivity for migratory fish; however, the River Axe, Congresbury Yeo and River Chew all have impassable barriers to fish migration present under low flow conditions (without the implementation of the drought options). These barriers are likely to be impassable during the months of upstream migration (February-June) for European Eel which sever connectivity and therefore, habitats upstream are inaccessible and do not provide functionally-linked habitat. Similarly, salmonid migrations (both upstream and downstream) are limited due to the presence of impassable barriers under low flow conditions and therefore, habitats upstream are inaccessible and do not provide functionally-linked habitat. The implementation of the DP will not change the current status for fish migration along these river systems, they will remain impassable. Looking forward at future potential, there is no evidence of any plans/projects to rectify these barriers within the next regulatory 5-year water company planning cycle, coinciding with the five-year period of this DP. The map of the barriers assessment is included as part of the Appropriate Assessment reports (**Appendix A2)**.

There is the potential for in-combination and cumulative effects that may have an adverse effect on the integrity of the Severn Estuary SAC and Ramsar site. The potential for in combination effects relate to the migratory fish interests of the Severn Estuary SAC/Ramsar associated with the Bristol Water drought permits and existing abstractions, given that these options could be to be implemented together as they follow the same drought trigger. In response to the publication of Bristol Water's Revised Draft DP, Natural England identified the following risks:

- The River Severn drought order, which allows a continuous 300 Ml/d abstraction at Gloucester Dock when the rivers flow rate is below 1200 Ml/d.

[26] Tyldesley, D. & Chapman, C. (2013) The Habitats Regulations Assessment Handbook, January 2021 edition UK. DTA Publications Limited

- Four (4) Severn Trent Water drought options requiring drought permits for increased abstractions on the River Severn as well as one requiring a drought order allowing it to continue abstracting at low flows.
- United Utilities' drought permit option reducing compensation flow to the River Vyrnwy which is functionally linked to the Severn Estuary SAC as a spawning tributary and nursery for juvenile salmon.
- Possible in combination and cumulative effects associated with drought permit options, existing abstraction licences and the drought plans of neighbouring companies.

The potential for in combination effects with these drought permits/orders is considered in the Appropriate Assessment (**Appendix A2**).

4.1.5 Monitoring

Details of any potential monitoring/surveys required to address potential impacts are provided within the detailed Appropriate Assessments (**Appendix A2**). Pre-commencement surveys are proposed for the R24R well pipeline construction activity in relation to mitigation for bats of the North Somerset and Mendip Bat SAC to obtain sufficient information to determine the detail of the exact location for the mitigation measures for tree/hedgerow avoidance and direct drilling, prior to implementation of construction. The survey will involve a habitats-based approach of the pipeline route to ground-truth the grassland habitats, to confirm the locations for habitat re-instatement methods for species rich and species poor grasslands and identify the exact locations of features that require directional drilling for avoidance of sensitive species/habitat.

Monitoring is proposed in relation to the Severn Estuary SAC/Ramsar to identify any sharp deterioration in aquatic conditions, which would trigger a reduction or cessation of the use of one or more of the Drought Permits. Fish distress monitoring is proposed with triggers and an environmental response plan to involve regular visual observations carried out on key stretches of the impacted rivers to detect signs of large-scale fish distress and agree appropriate mitigation actions with the Environment Agency specific to the conditions identified. This might include temporary oxygenation measures. Water quality monitoring is also proposed to measure dissolved oxygen, pH, turbidity, conductivity and temperature using calibrated handheld equipment.

4.1.6 Appropriate Assessment Summary

From the evidence and assessments undertaken (**Appendix A2**), the following provides a summary of the main conclusions of the Appropriate Assessment.

The Appropriate Assessments for the R24R and R24Ra (Well Head) and Blagdon measures have been undertaken and identified possible adverse effects on the North Somerset and Mendips Bat Special Area of Conservation (SAC) and Mendip Limestone Grassland SAC. During operation of these measures, downstream effects on river flow have the potential to affect habitat quality for designated foraging horseshoe bats. The conclusions of the Appropriate Assessment are that the hydrological impacts will be for a 6 month duration, which is unlikely to alter the habitat and foraging resource and would only create an adverse effect if implemented in multiple years. These measures would not cause adverse effects on SAC site integrity taking account of the 6-month duration of their implementation and the scale of hydrological impact in the context of drought conditions.

The Appropriate Assessment for R24R and R24Ra (Well Head) has also identified possible adverse effects from construction activity for the pipeline route within a Bat Conservation Zone for the North Somerset and Mendip Bat SAC. Mitigation measures have developed in consultation with Natural England and with the technical guidance for the North Somerset and Mendips Bats SAC, including: avoidance of linear features through directional drilling, to avoid habitat fragmentation; habitat reinstatement (temporary habitat loss is very minor, 0.001ha of the habitat within the foraging zones); and measures to mitigate for potential disturbance and accidental pollution/dust. With the above mitigation in place, the impacts will not have an effect on integrity, nor will result in any long-term impacts.

The Bladgon, Cheddar, Chew and R24R Well Supply supply-side actions have possible adverse effects on the Severn Estuary Ramsar/SAC site. Regarding Blagdon, the operation of the drought permit has the potential to temporarily impact on the flow/level regime downstream of the Blagdon Reservoir within the Congresbury Yeo. The drought permit implementation period is largely outside the spawning periods of the designated migratory species associated with the Ramsar/SAC. A fish migration barrier assessment was completed in August 2021 within the hydrological zone of influence of the Blagdon drought permit. Significant in-river barriers have been identified within the downstream river reaches which significantly limits the upstream movement of migratory fish species during low flow and natural drought conditions. These barriers are considered non-passable to the migratory fish species in flow conditions not affected by the implementation of the drought permit. As such, the implementation of the drought permit will not have adverse effects on migration. Mitigation measures for the drought permit include the timing restrictions of the drought permit use, water quality monitoring with triggers for implementing an environmental response plan, as well as protection of 'spate' flows and fish passes. With the implementation of these mitigation measures, the Blagdon drought permit option is not considered to have adverse effects upon the Severn Estuary Ramsar/SAC either alone or in combination.

Regarding Cheddar, the drought permit will involve a 50% reduction in the prescribed flow discharged to the Cheddar Yeo. There would be an associated impact on the flow/level regime in the Cheddar Yeo downstream, with potential for impacts on brown/sea trout, Atlantic salmon and European eel. Migration within the hydrological Zone of Influence of the drought permit is closely linked to sluice management on the river system and is unlikely to be affected by the implementation of the drought permit. Mitigation measures for the drought permit include water quality monitoring with triggers for an environmental response plan, protection of 'spate' flows and fish passes. With the implementation of mitigation measures, the drought permit option is not considered to have adverse effects upon the Severn Estuary Ramsar/SAC either alone or in combination.

Regarding Chew, the drought permit has potential to reduce flow within the River Chew by approximately 50%, with impacts up to confluence with the River Avon, with potential for impacts on migratory brown/sea trout, Atlantic salmon and European eel. The drought permit implementation could coincide with the spawning and migratory periods of the designated species. A fish migration barrier assessment was completed within the zone of hydrological influence of the drought permit which noted several in-river structures that act as significant barriers to migratory fish during natural drought conditions and limits the potential usage of the impacted reaches during the implementation of the drought permit. It is possible that a 'winter' drought permit could impact on the passability of barriers by migratory fish. However, based on the abundance of Atlantic salmon and the significant barriers observed in the reaches it is evident that, currently, only Reach 3 of the hydrological zone of influence provides available habitat for Atlantic salmon. As some of the barriers to fish migration are considered impassable under any flow condition, the limited number of lamprey present in Reach 1 and 2 of the hydrological zone of influence are likely to represent brook lamprey. With the implementation of mitigation measures, the drought permit is not considered to have adverse effects on the Severn Estuary SAC/Ramsar sites. Mitigation measures include water quality monitoring with triggers for an environmental response plan, protection of 'spate' flows and fish passes, and improvement to fish passes.

No likely in-combination effects with other plans or projects have been identified for any of the supply measures in the DP. A review of the potential changes in freshwater inflows into the Severn Estuary indicates that the potential reduction in freshwater inflows as a result of the operation of the Bristol Water drought options equates to approximately 11.36M/d from May to November (inclusive) and 7.32Ml/d from December to April (inclusive). This represents a reduction of approximately 0.14% of the total freshwater flows into the Severn Estuary in a worst-case scenario (the operation of the River Severn Drought Order and all known water company drought permits/orders which could impact (directly or indirectly) the River Severn.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of HRA Screening Conclusions

Bristol Water has undertaken the first stage in the HRA process – screening - of its DP. The HRA screening stage establishes whether the measures contained in the Plan may have Likely Significant Effects on any European site.

A summary of the conclusions of HRA Stage 1 Screening is presented in **Table 5-1**. This shows that likely significant effects of the DP could not be ruled out upon the following European sites:

- North Somerset and Mendips Bats SAC
- Severn Estuary SAC
- Severn Estuary Ramsar site
- Mendip Limestone Grasslands SAC
- Somerset Levels and Moors SPA.

On the basis of the screening results in **Table 5-1**, Appropriate Assessment of the DP was **required** in order to assess potential adverse effects on the integrity of the identified European sites in relation to all of the supply augmentation and drought permit measures**.**

Table 5.1: Summary of HRA Stage 1 Screening Conclusions

Drought Option	Likely significant effects (LSE) on European Site(s) alone?	If no LSE alone: Residual low-level effect requiring in-combination assessment with existing consents?	If no LSE alone: Residual low-level effect requiring in-combination assessment with other drought options?	Appropriate Assessment Required?
Demand Management Measures				
Appeals for restreaint	No	No	No	No
Temporary Use Bans	No	No	No	No
Non-Essential Use Ban	No	No	No	No
Supply Augmentation Measures				
R24R Well	Yes	N/A	N/A	Yes
Drought Permits				
Blagdon Reservoir Reduced Compensation Flow	Yes	N/A	N/A	Yes
Cheddar Reservoir Reduced Prescribed Flow	Yes	N/A	N/A	Yes
Chew Valley Reservoir Reduced Compensation Flow	Yes	N/A	N/A	Yes

5.1.1 Integrity Test

The integrity test is the conclusion of the Appropriate Assessment and requires the competent authority (in this case Bristol Water) to confirm whether the drought plan measures (either alone or in-combination with other plans or projects) will not have an adverse effect on site integrity. The following definition of site integrity is provided by Defra: "*the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the level of populations of the species for which it was classified*"[27].

The Appropriate Assessment of the Bristol Water DP has concluded there will be no adverse effect on any European site.

5.1.2 Limitations

The approach to the Appropriate Assessment was as rigorous as can reasonably be undertaken, although it is accepted that there may be gaps in information which could affect the assessment process. The integrity test takes into account the precautionary principle which requires the competent authority to demonstrate that the plan, either alone or in combination with other plans and projects, will not have an adverse effect on site integrity, before it may proceed.

5.1.3 Consultation

The Appropriate Assessment, which can be found within the Appendix A2 of this report, was issued to Natural England and the Environment Agency (March 2021) for comment and consultation on the findings. Natural England confirmed it was satisfied with the approach and that the significant effects had been identified. **Section 4.2.4** addresses comments raised regarding in-combination assessments by Natural England. Further comments made by Natural England on designated site status in respect to its Conservation Objectives are addressed within the Appropriate Assessment reports (**Appendix A2**). Natural England also noted that recommendations for monitoring set out in the draft HRA report within **Table 4.2** were not present within the recommendations of the Appropriate Assessment; however, the table included a preliminary assessment of what mitigation and monitoring would be considered during Appropriate Assessment. The Appropriate Assessment reports fully assess the need for monitoring, which is detailed within **Appendix A2**. Therefore, as indicated earlier not all the recommendations included within **Table 4.1** were relevant. The assessments have been updated to address these comments.

5.1.4 Inclusion of measures in the Drought Plan

The findings of Appropriate Assessment have informed the selection of the measures included in Bristol Water's DP.

[27] Defra Circular 01/2005.

Appendices

A1 Assessment of Extreme Drought Management Actions

In response to the representation comments on the draft DP regarding the extreme drought management actions, a summary environmental assessment of each of these actions has been included in this appendix (as well as relevant information included as appendices to the SEA and WFD reports). As agreed with the Environment Agency, this is a "light touch" approach which sets out the triggers for carrying out more detailed assessment and data collation should an extreme drought event arise and the possible need for any of these measures becomes evident. These more detailed assessments will be discussed with the Environment Agency once the trigger has been reached. This is a proportionate approach to actions that would only be contemplated in an extreme drought which has a very low likelihood of arising during the lifetime of the DP.

The HRA summary assessment information is provided in the tables below for each of the supply-side extreme drought management actions included in the DP. The demand extreme drought management actions will not have any Likely Significant Effects on any European sites.

Table E1 Supply - Temporarily amend the River Axe licence to allow abstraction for a longer period

Type of action	Comments
Area affected	Whole supply area / whole resource zone
Trigger for implementation	Forecasting approach to the Level 4 trigger within 6 weeks.
Estimated benefit/saving	Additional yield of between 1.5Ml/d and 6.5Ml/d depending on the severity of the drought and flow availability in the river.
Description	Bristol Water has a licence to abstract from the River Axe over the winter period from November and April. This water is pre-treated and then transferred into Cheddar Reservoir. An extension of the abstraction period and the total annual licence volume would provide additional support for reservoir refill over the winter period. Under this option Bristol Water are proposing an extension of the period of abstraction by 2 months to include May and October (period of abstraction extended from November – April, to October to May) and an increase in the annual abstraction volume from 4750Ml/year to 7145Ml/year (increase of 2395Ml/year). As the drought permit would be valid for up to 6 months, Bristol Water would apply for the appropriate terms of licence extension based on the time of year the application is being submitted.
Time to implementation	Minimum of 6 weeks if no public hearing required, depending on the supporting environmental information available. Longer if a public hearing is called.
Permissions required	Drought permit from the Environment Agency.
Environmental Effects (HRA)	Potential for Likely Significant Effects regarding North Somerset and Mendip Bats SAC (4.2km) and Severn Estuary SAC and Ramsar (16km). Appropriate Assessment is required to conclude 'adverse effect' or 'no adverse effect' upon the European sites.
Data requirements to support detailed assessment	Further information on the likely hydrological effects of the drought permit (achieved through data to support the preparation of EAR). Undertake walkover surveys of potentially impacted reaches to improve the detail and breadth of possible migratory fish barriers and identify possible mitigation measures.
Trigger and further assessment required if option is to be implemented during an extreme drought	The additional environmental data relevant to the option will be collated when the Level 3 (DMZ 5) trigger is reached to carry out a detailed assessment in accordance with the requirements of the Conservation of Habitats and Species Regulations 2017 (and relevant guidance) if the option is likely to be required following dialogue with the EA and NE.

Table E2 Supply - Temporarily amend the Minimum Residual Flow conditions for the P08R abstraction licence

Type of action	Comments
Area affected	Whole supply area / whole resource zone
Trigger for implementation	Forecasting approach to the Level 4 trigger within 6 weeks.
Estimated benefit/saving	Estimated yield of c. 2Ml/d. This is based on a change to the authorised quantities of water to be abstracted at P08R when flow in the Ozleworth Brook is less than 13 Ml/d.
Description	Bristol Water has a groundwater licence to abstract at P08R throughout the year. The volume of water that can be abstracted is linked to the flow in the Ozleworth Brook. A change to the maximum quantity authorised to be abstracted under the specified flow conditions would enable abstraction to continue under drought conditions. Under this option it is proposed that abstraction of up to 4.5Ml/d would be permitted when flows in the Ozleworth Brook drop below 13Ml/d.
Time to implementation	Minimum of 6 weeks if no public hearing required, depending on the supporting environmental information available. Longer if a public hearing is called.
Permissions required	Drought permit from the Environment Agency
Environmental Effects (HRA)	Potential for Likely Significant Effects regarding Severn Estuary SAC and Ramsar (17km). Appropriate Assessment is required to conclude 'adverse effect' or 'no adverse effect' upon the European sites.
Data requirements to support detailed assessment	Further information on the likely hydrological effects of the drought permit on designated aquatic migratory species previously recorded within the Little Avon catchment (achieved through data to support the preparation of EAR. Undertake walkover surveys of potentially impacted reaches to improve the detail and breadth of possible migratory fish barriers and identify possible mitigation measures.
Trigger and further assessment required if option is to be implemented during an extreme drought	The additional environmental data relevant to the option will be collated when the Level 3 (DMZ 5) trigger is reached to carry out a detailed assessment in accordance with the requirements of the Conservation of Habitats and Species Regulations 2017 (and relevant guidance) if the option is likely to be required following dialogue with the EA and NE.

Table E3 Supply - Temporarily amend the Minimum Residual Flow conditions for the P05R abstraction licence

Type of action	Comments
Area affected	Whole supply area / whole resource zone
Trigger for implementation	Forecasting approach to the Level 4 trigger within 6 weeks.
Estimated benefit/saving	2.2 Ml/d based on the assumption of reducing the minimum flow condition at the River Kenn at Kenn Gauge to 2.21Ml/d.
Description	Bristol Water has a groundwater licence to abstract from P05R Well throughout the year. The volume of water that can be abstracted is linked to the flow at the Kenn gauge. During the summer, reduced river flows can restrict the volume of water available for abstraction. A change to the minimum flow at which abstraction is allowed would enable abstraction to continue for a longer period under drought conditions. Under this option Bristol Water are proposing that the flow at the Kenn gauge above which abstraction is allowed is reduced from 4.41Ml/d to 2.21Ml/d.
Time to implementation	Minimum of 6 weeks if no public hearing required, depending on the supporting environmental information available. Longer if a public hearing is called.
Permissions required	Drought permit from the Environment Agency.
Environmental Effects (HRA)	Potential for Likely Significant Effects regarding North Somerset and Mendip Bats SAC (2.9km) and Severn Estuary SAC and Ramsar (7.3km). Appropriate Assessment is required to conclude 'adverse effect' or 'no adverse effect' upon the European sites.
Data requirements to support detailed assessment	Further information on the likely hydrological effects of the drought permit (achieved through data to support the preparation of EAR). Undertake walkover surveys of potentially impacted reaches to improve the detail and breadth of possible migratory fish barriers and identify possible mitigation measures.
Trigger and further assessment required if option is to be implemented during an extreme drought	The additional environmental data relevant to the option will be collated when the Level 3 (DMZ 5) trigger is reached to carry out a detailed assessment in accordance with the requirements of the Conservation of Habitats and Species Regulations 2017 (and relevant guidance) if the option is likely to be required following dialogue with the EA and NE.

Table E4 Supply – Emergency storage and zero compensation releases

Type of action	Comments
Area affected	Whole supply area / whole resource zone
Trigger for implementation	Forecasting approach to the Level 4 trigger within 6 weeks.
Estimated benefit/saving	The Emergency storage in the Mendip Reservoirs provides approximately 30 days' supply as required from this part of the system. Assuming the compensation releases from the reservoirs have already been reduced, then between an additional 6.8Ml/d and 11.6 Ml/d would be available by reducing them to zero.
Description	On breaching the emergency storage level in the reservoirs, we would reduce the compensation volumes to zero in order to keep as much water in the reservoirs and available for public water supply as possible.
Time to implementation	Immediate. Reservoir level would drop into the emergency storage area and the compensation would be reduced to zero.
Permissions required	Drought permit from the Environment Agency to amend the licence conditions to implement zero compensation releases from reservoirs.
Environmental Effects (HRA)	Potential for Likely Significant Effects regarding the North Somerset and Mendip Bats SAC and Severn Estuary SAC & Ramsar sites. Appropriate Assessment required and likely to identify potential for adverse effects on European designated site integrity resulting in the assessment progressing to HRA Stage 3 (where reasonable alternative options must be examined). HRA Stage 4 would potentially be required which comprises an assessment of compensatory measures where, in the light of an assessment of Imperative Reasons of Overriding Public Interest (IROPI), it is deemed the Plan should proceed with this action.
Data requirements to support detailed assessment	High confidence in pathway of effects based on existing datasets. Undertake walkover surveys of potentially impacted reaches to improve the detail and breadth of possible mitigation measures and post-drought restoration actions.
Trigger and further assessment required if option is to be implemented during an extreme drought	The additional environmental data relevant to the option will be collated when the Level 3 (DMZ 5) trigger is reached to carry out a detailed assessment in accordance with the requirements of the Conservation of Habitats and Species Regulations 2017 (and relevant guidance) if the option is likely to be required following dialogue with the EA and NE.

Table E5 Supply – lowering pumps in boreholes

Type of action	Supply – lowering pumps in boreholes
Area affected	Whole supply area / whole resource zone
Trigger for implementation	Forecasting that Bristol Water are going to be approaching the Level 4 (DMZ6) trigger within 6 weeks
Estimated benefit/saving	Unknown. Groundwater sources would be selected based on the drought response and how resilient they have been.
Description	If pump levels were the limiting factor in the groundwater source supply, and water was still available for abstraction below the normal pumping water level, then we would consider lowering the pumps to enable the remaining water to be abstracted.
Time to implementation	Relatively short time to implement this response. Depending on the site it is likely to require some engineering works.
Permissions required	Possible drought permit if action resulted in abstracting outside licence conditions. This would be reviewed on a site by site/licence by licence basis in close liaison with the Environment Agency.
Environmental Effects (HRA)	Abstraction will be at existing licensed sources not new groundwater sources. No Likely Significant Effects expected as no existing sources are located in proximity to N2k sites.
Data requirements to support detailed assessment	Site specific details regarding borehole pump lowering against existing level.
Trigger and further assessment required if option is to be implemented during an extreme drought	The additional environmental data relevant to the option will be collated when the Level 3 (DMZ 5) trigger is reached to carry out a detailed assessment in accordance with the requirements of the Conservation of Habitats and Species Regulations 2017 (and relevant guidance) if the option is likely to be required following dialogue with the EA and NE.

Table E6 Supply – Re-instate source at Cold Bath Springs

Type of action	Comments
Area affected	Whole supply area / whole resource zone
Trigger for implementation	Forecasting approach to the Level 4 trigger within 6 weeks.
Estimated benefit/saving	3Ml/d annual average yield (5Ml/d peak daily) based on historic licence conditions.
Description	Start abstracting from the source at Cold Bath Springs and pump into Barrow No 3.
Time to implementation	Engineering and infrastructure requirements would be associated with this option to bring it back into supply. Time to implementation likely to be up to 6 months.
Permissions required	Drought permit from Environment Agency.
Environmental Effects (HRA)	Potential for Likely Significant Effects regarding North Somerset and Mendip Bats SAC (7km) and Severn Estuary SAC and Ramsar (12km). Appropriate Assessment is required to conclude 'adverse effect' or 'no adverse effect' upon the European sites.
Data requirements to support detailed assessment	Further information on the likely hydrological effects of the drought permit (achieved through data to support the preparation of EAR).
Trigger and further assessment required if option is to be implemented during an extreme drought	The additional environmental data relevant to the option will be collated when the Level 3 (DMZ 5) trigger is reached to carry out a detailed assessment in accordance with the requirements of the Conservation of Habitats and Species Regulations 2017 (and relevant guidance) if the option is likely to be required following dialogue with the EA and NE.

Table E7 Supply – Re-instate source at Gurney Slade

Type of action	Comments
Area affected	Whole supply area / whole resource zone
Trigger for implementation	Forecasting that we are going to be approaching the Level 4 trigger within 6 weeks.
Estimated benefit/saving	2Ml/d yield based on estimated dry weather yield – previous licence 4.4Ml/d annual average from May to October (10Ml/d peak daily)
Description	Start abstracting from the source at Gurney Slade and either pump into Line of Works, or installation of temporary treatment plant of site.
Time to implementation	Engineering and infrastructure requirements would be associated with this option to bring it back into supply. Time to implementation likely to be up to 6 months.
Permissions required	Drought permit from Environment Agency. Regulation 27 risk assessment to be completed and a Regulation 28 report submitted to DWI.
Environmental Effects (HRA)	Potential for Likely Significant Effects regarding North Somerset and Mendip Bats SAC (9km) and Mells Valley SAC (3km). Appropriate Assessment is required to conclude 'adverse effect' or 'no adverse effect' upon the European sites.
Data requirements to support detailed assessment	Further information on the likely hydrological effects of the drought permit (achieved through data to support the preparation of EAR).
Trigger and further assessment required if option is to be implemented during an extreme drought	The additional environmental data relevant to the option will be collated when the Level 3 (DMZ 5) trigger is reached to carry out a detailed assessment in accordance with the requirements of the Conservation of Habitats and Species Regulations 2017 (and relevant guidance) if the option is likely to be required following dialogue with the EA and NE.

A2 Appropriate Assessment

The following tables provide the Appropriate Assessment of the supply-side DP measures:

- Blagdon drought permit
- Cheddar drought permit
- Chew drought permit
- R24R Well supply augmentation measure

Blagdon Drought Permit

DESIGNATED SITE: North Somerset and Mendip Bats SAC REF: UK0030052			PLAN NAME: Bristol Water Drought Plan OPTION NAME: Blagdon Reservoir Reduced Compensation Flow		
Qualifying Feature	**Conservation Status:** **Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.** **Supplementary Advice on Conservation Objectives (SACOs)**	**Site Condition (where relevant to feature):** **Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)[28] where relevant.**	**Potential Effects**	**Mitigation**	**Effect assessment on conservation objectives and site integrity**
CONSTRUCTION PHASE					
N/A	There is no construction phase associated with this drought permit.	There is no construction phase associated with this drought permit.	There is no construction phase associated with this drought permit.	There is no construction phase associated with this drought permit.	N/A
OPERATIONAL PHASE					
1303 Lesser horseshoe bat **1304 Greater horseshoe bat**	The limestone caves of the Mendips provide a range of important hibernation sites for the lesser horseshoe bat and greater horseshoe bat. The total lesser horseshoe bat UK population of about 17,000 individuals is dispersed, occurring in over 170 maternity roosts and over 300 hibernation sites in south-west England and Wales. Greater horseshoe bat has suffered a loss of over half its range in the UK, and populations are close to the climatic limits for this species. The total UK population of approximately 4,000 individuals can be divided into about twelve discrete population which range from 80 to 600 breeding females. This site in south-west England is selected on the basis of the size of population represented (3% of the UK greater horseshoe bat population) and its good conservation of structure and function, having both maternity and hibernation sites. This site contains an exceptionally good range of the sites used by the population, comprising two maternity sites in lowland north Somerset and a variety of cave and mine hibernation sites in the Mendip Hills. <u>Summary of the SACOs</u> **Population abundance - hibernation site:** Maintain the abundance of the population.	SSSIs of relevance to this feature: King's Wood & Urchin Wood SSSI • Unfavourable - recovering/unfavourable declining The Cheddar Complex SSSI • Favourable / unfavourable – recovering Brockley Hall Stables SSSI • Favourable Wookey Hole SSSI • Favourable Compton Martin Ochre Mine SSSI • Unfavourable Banwell Caves SSSI • Favourable Relevant SAC Site Improvement Plan pressures/threats: • development in general; and • changes to site conditions.	The drought permit involves a reduction in the compensation flow release from Blagdon Reservoir to the Congresbury Yeo. The reservoir and Congresbury Yeo lie outside of the SAC geographical boundary but the drought permit could impact supporting habitat for the designated bat features. The operation of the option has the potential to impact on the flow/level regime downstream of the Blagdon Reservoir within the Congresbury Yeo. The zone of hydrological influence includes 6km of the Congresbury Yeo from Blagdon Reservoir to Iwood gauging station. The hydrological assessment presented in the 2021EAR[29] identified major impacts on low flow as a result of drought permit implementation from Blagdon Reservoir to the Iwood gauging station (47-35% reduction in Q99 and 33-47% reduction in Q95). In moderate and high flow periods, the hydrology impacts would be negligible. Downstream of the Iwood gauging station, the Congresbury Yeo is level controlled and therefore any potential hydrology impacts during low flow periods (up to 26% reduction in low flow) are restricted to moderate changes in water velocity (wetted depth and wetted width are controlled by local structures), and this potential effect could extend downstream to the tidal limit with the Severn Estuary (12km downstream of Iwood gauging station). The hydrological assessment identified three impacted reaches of the River Congresbury Yeo, from the Blagdon Reservoir compensation release point to the tidal limit at Woodspring Bay. Impacts reduce with distance downstream of the reservoir, as the reduction in the compensation flow is ameliorated by additional flow inputs from the intervening catchment area and tributary inflows.	<u>Habitat degradation:</u> • Decrease of water level downstream of the Iwood gauging station will be mitigated through the water-level control in place within the Congresbury Yeo. • Aquifer storage capacity is considered to provide a mitigating buffer against stresses of drought (Acreman, 2000) and will help maintain levels in groundwater-dependent wetland bat habitat hich will not be impacted by the drought permit • Temporary cessation or modification of compensation flow reduction if an adverse effect on foraging habitat identified during drought permit implementation.	No adverse effects alone or in combination.

[28] http://publications.naturalengland.org.uk/publication/6226153064890368
[29] Bristol Water Plc (2021) Blagdon Reservoir Environmental Assessment Report. Report by Ricardo Energy & Environment, September 2021

DESIGNATED SITE: North Somerset and Mendip Bats SAC REF: UK0030052			PLAN NAME: Bristol Water Drought Plan OPTION NAME: Blagdon Reservoir Reduced Compensation Flow		
Qualifying Feature	**Conservation Status:** **Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.** **Supplementary Advice on Conservation Objectives (SACOs)**	**Site Condition (where relevant to feature):** **Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)[28] where relevant.**	**Potential Effects**	**Mitigation**	**Effect assessment on conservation objectives and site integrity**
	Distribution of supporting habitat: Maintain the distribution and continuity of the feature and its supporting habitat. **Extent of supporting habitat:** Maintain the total extent of the habitats which support the feature. **Condition of underground site hibernation:** Maintain the structural integrity of the roost space, with no recent collapses/falls or signs of geological instability. Temperature, humidity, light levels. **Flightlines from roost into surrounding habitat and foraging areas:** Maintain the presence, structure and quality of any linear landscape features unlit, which function as flightlines. **Supporting off-site habitat (foraging areas):** feeding habitat outside of the SAC boundary that are critical to Lesser Horseshoe bats during their [breeding OR hibernation] period. **Internal condition of underground site - maternity and hibernation:** Maintain or as necessary restore appropriate light levels, humidity, temperature and ventilation. **Roost access:** Maintain the number of access points to the roost at an optimal size and in an unlit and unobstructed state, with surrounding vegetation providing sheltered flyways. **Adaptation and resilience:** Maintain the feature's ability, and that of its supporting habitat, to adapt or evolve to wider environmental change, either within or external to the site. **Air quality:** Restore concentrations and deposition of air		The impact on the pass-forward flow to the estuary at the tidal lock at the tidal limit is negligible. These hydrological impacts could affect the quality of supporting habitat for the horseshoe bats features of the SAC. However, the hydrological impacts will be between Blagdon and Iwood and drought permits are 6 months duration, which is unlikely to alter the habitat and foraging resource and would only create an adverse effect if implemented in multiple years. Impacts of the drought permit on water levels in Blagdon Reservoir are assessed as minor beneficial, with water levels being held higher for longer. No Likely Significant Effects on the wetland habitats of Blagdon Reservoir. Technical guidance[30] for the North Somerset and Mendips Bats SAC was issued by Somerset County Council in April 2019. This identifies consultation zones to help understand where it is necessary to seek ecological advice at the early stages of a project in order to avoid harm to the bat populations associated with the SAC. Blagdon Reservoir and the majority of the Congresbury Yeo lie within Zone C (Figure A1)[31] in respect of key foraging habitat, but outside the Juvenile Sustenance Zone (Figure A2), and therefore any works within this zone have potential to negatively impact on this feature. However, this guidance is for planning purposes and is more intended in relation to new build development. Therefore, the guidance does not strictly apply but has been referred to in developing a reasonable and proportionate approach. **Habitat loss**: No direct habitat loss. Impacted reaches of the Congresbury Yeo lie outside of the SAC. **Habitat degradation:** The drought permit has potential to alter wetland habitats which provide suitable foraging habitat for horseshoe bats if these habitats are within the zone of hydrological influence and are dependent on surface water flows from the river. Tipulid larval development is favoured by damp conditions and wetlands provide a secondary prey source at times when their primary sources are less abundant. Therefore, any aquatic environments and/or marshes can provide a secondary prey source. Aquatic environments could also		

[30] North Somerset and Mendip Bats Special Area of Conservation (SAC) Guidance on Development: Supplementary Planning Document Adopted January 2018
[31] North Somerset and Mendip Bats Special Area of Conservation (SAC) Guidance on Development: Supplementary Planning Document Adopted January 2018

DESIGNATED SITE: North Somerset and Mendip Bats SAC REF: UK0030052			PLAN NAME: Bristol Water Drought Plan OPTION NAME: Blagdon Reservoir Reduced Compensation Flow		
Qualifying Feature	**Conservation Status:** **Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.** **Supplementary Advice on Conservation Objectives (SACOs)**	**Site Condition (where relevant to feature):** **Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)[28] where relevant.**	**Potential Effects**	**Mitigation**	**Effect assessment on conservation objectives and site integrity**
	pollutants to at or below the site-relevant Critical Load. **Conservation measures:** Maintain the management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain the structure, functions and supporting processes associated with the feature and/or its supporting habitats. **Disturbance from human activity:** Control and minimise unauthorised public access to roost sites. **Water quantity/ quality:** Where the feature or its supporting habitat is dependent on surface water and/or groundwater, maintain water quality and quantity to a standard which provides the necessary conditions to support the feature. Additional SACOs for greater horseshoe: **Population abundance - maternity colony:** Maintain the abundance of the breeding population at a level which is above 350. **External condition of building - maternity colony:** Maintain the structural integrity and weatherproofing of roof, walls etc, with no significant shading of the main roost area by trees/vegetation or manmade structures.		favour the production of caddis flies in certain months, such as May and late August / September when other food supplies may be erratic[2]. The assessment for the EAR concludes a minor negative impact on wetland/rhyne/ditch habitat quality in the river reaches within the zone of hydrological influence as described above. Biddle Street, Yatton SSSI is located approximately 8.7km downstream of Blagdon Reservoir. The SSSI is designated for the presence of moors drained by a network of large rhynes and ditches and is a Groundwater Dependant Terrestrial Ecosystem (GWDTE). The site provides opportunities for invertebrates and is likely to be used as a foraging habitat for horseshoe bats. The SSSI is located outside the hydrological zone of hydrological influence (6km) and therefore is not considered to be impacted by the drought permit. No further sites have been identified within the zone of influence. Therefore, there will be no impacts to any surface water dependent, supporting wetland habitat. **Multi-season use of the drought permit:** The drought permit assessed is proposed for a one in 200-year drought. It is therefore considered highly unlikely that two such droughts would happen consecutively.		

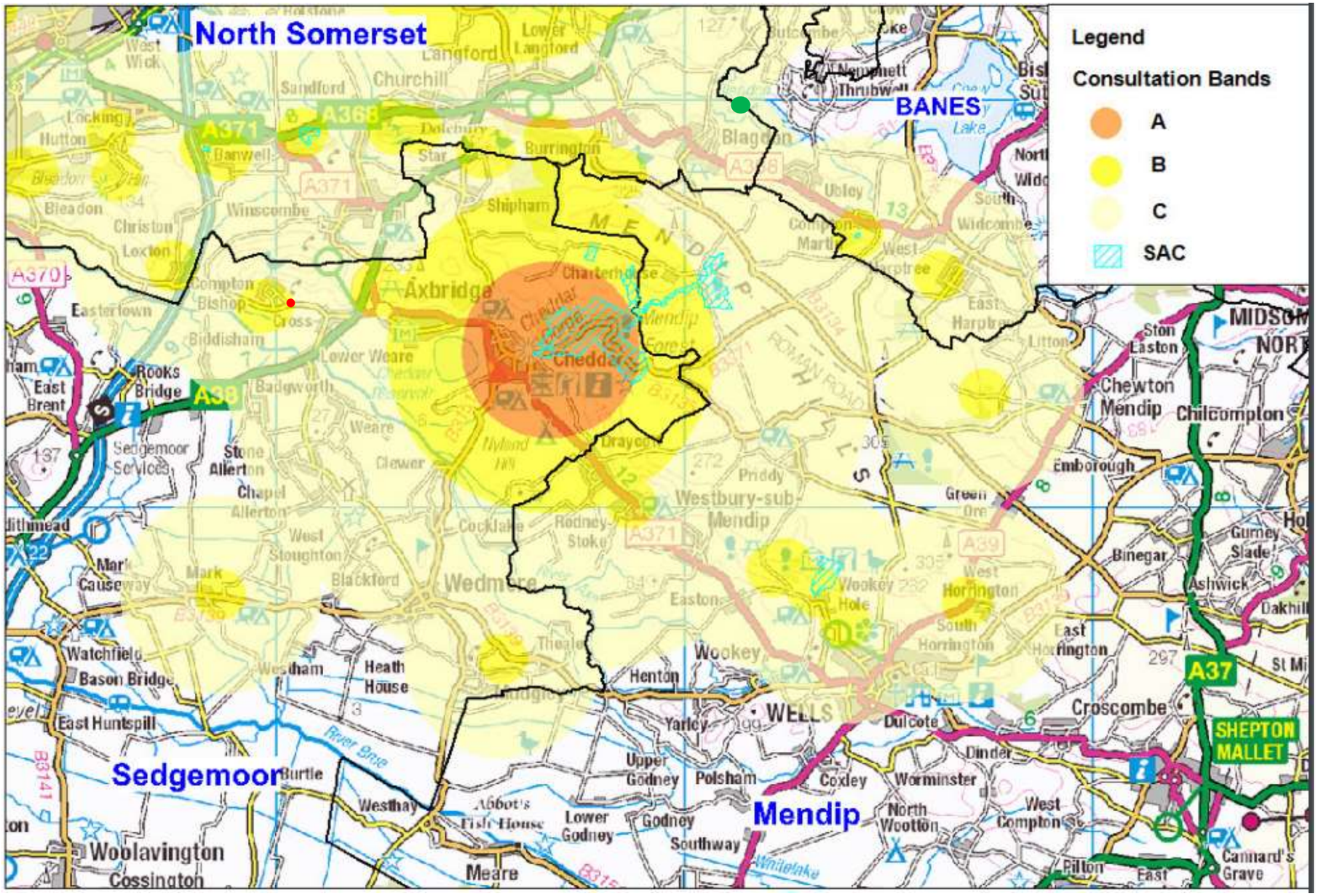


Figure A1 Bat Consultation Zone for Horseshoe Bats in North Somerset (North Somerset Council, 2018[32]). Blagdon Reservoir shown with a green dot on the map.

[32] North Somerset and Mendip Bats Special Area of Conservation (SAC) Guidance on Development: Supplementary Planning Document Adopted January 2018

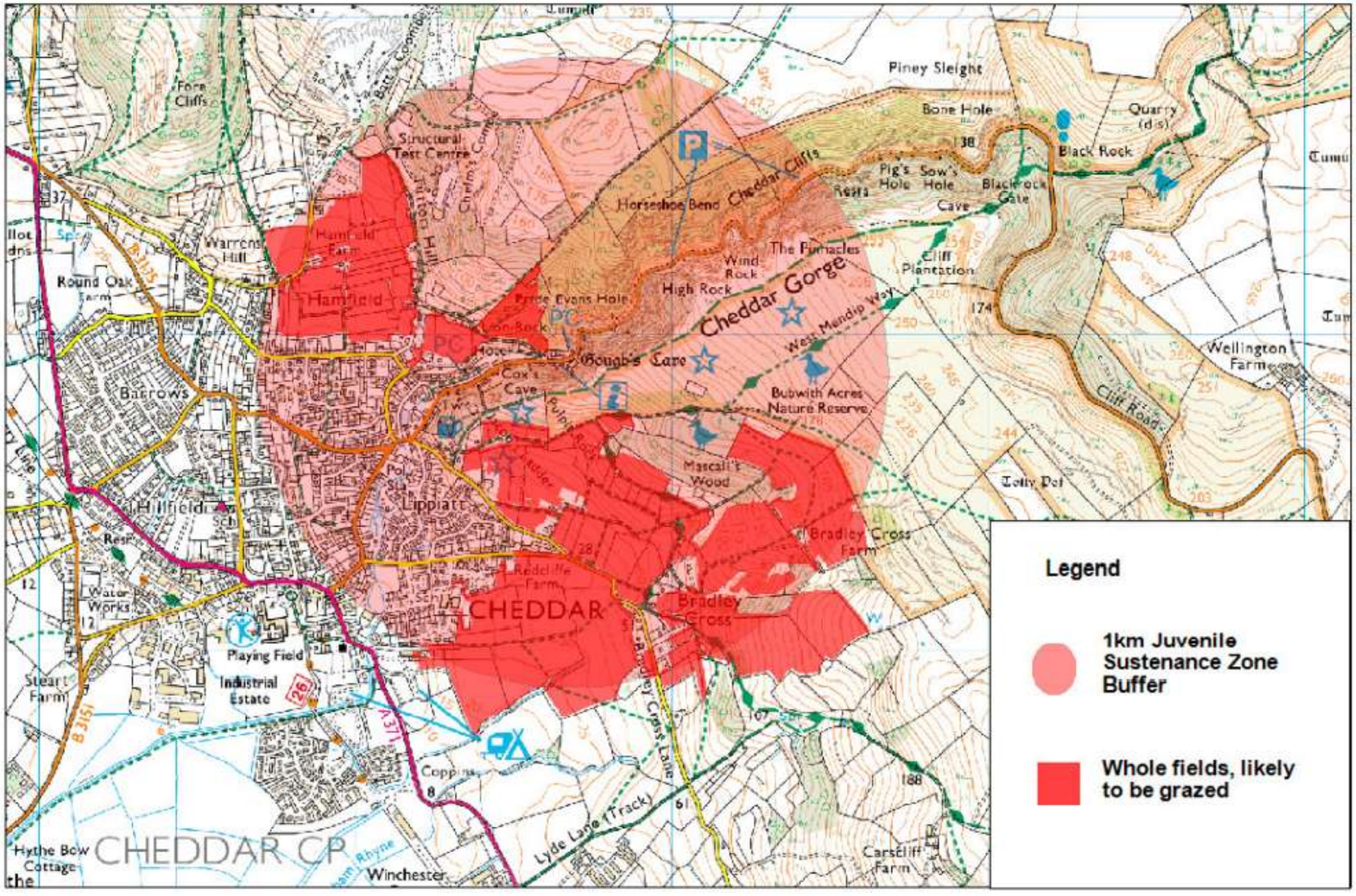


Figure A2. Juvenile Sustenance Zone (North Somerset Council, 201833). Option location outside the map, to the south-west.

[33] North Somerset and Mendip Bats Special Area of Conservation (SAC) Guidance on Development: Supplementary Planning Document Adopted January 2018

DESIGNATED SITE: Severn Estuary SAC & Ramsar **REF: UK0013030 (SAC) & UK11081 (Ramsar)**			**PLAN NAME: Bristol Water Drought Plan** **OPTION NAME: Blagdon Reservoir Reduced Compensation Flow**		
Qualifying Feature	**Conservation Status:** **Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.**	**Site Condition (where relevant to feature):** **Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)[34] where relevant.**	**Potential Effects**	**Mitigation**	**Assessment of effects on conservation objectives and site integrity**
CONSTRUCTION PHASE					
N/A	There is no construction phase associated with this drought permit.	There is no construction phase associated with this drought permit.	There is no construction phase associated with this drought permit.	There is no construction phase associated with this drought permit.	N/A
OPERATIONAL PHASE					
SAC: **1099 River lamprey *Lampetra fluviatilis*** **Ramsar:** **Criterion 4** Migratory: river lamprey, European eel *Anguilla anguilla* and brown/sea trout *Salmo trutta* **Criterion 8** The fish assemblage of the whole estuarine and river system is one of the most diverse in Britain, with over	The Congresbury Yeo catchment discharges to the Severn Estuary. The catchment provides suitable habitat for designated migratory fish including European eel, river lamprey and brown/sea trout as recorded in 2018 (EAR, 2019[35]) within the Congresbury Yeo. **River lamprey (SAC and Ramsar feature):** Species occurrence description not yet available. River lamprey is a normally anadromous species (i.e. spawning in freshwater but completing part of its life cycle in the sea), and therefore artificial obstacles such as weirs or dams impede migration. In the UK, the river lamprey is widespread and populations are strong. The UK populations are considered important for the conservation of the species at a European level. River lamprey migrate upstream to spawning grounds during winter and spring. **European eel (Ramsar feature):** European eel is a catadromous species (i.e. spawning in the sea and migrating into inland waters to grow and spend the majority of their life), and therefore artificial obstacles such as	SSSIs of relevance to this feature: Severn Estuary SSSI • Favourable / Unfavourable – recovering / Unfavourable – no change / Unfavourable declining Bridgewater Bay SSSI • Favourable / Unfavourable – recovering / Unfavourable – no change Upper Severn Estuary SSSI • Favourable / Unfavourable – recovering / Unfavourable – declining Relevant SAC Site Improvement Plan pressures/threats: • physical modification (barriers to migratory activities); • developments in general; • change in species distributions (caused by climate change/other events); and • water pollution (water and sediment quality).	The drought permit being assessed involves a reduction in the compensation flow release from Blagdon Reservoir to the river Congresbury Yeo. The operation of the drought permit has the potential to impact on the flow/level regime downstream of Blagdon Reservoir within the Congresbury Yeo. The zone of hydrological influence includes 6km of the Congresbury Yeo from Blagdon Reservoir to Iwood gauging station Downstream of the Iwood gauging station, the Congresbury Yeo is level controlled and therefore any potential hydrology changes during low flow periods would be restricted to potential minor changes in water velocity (wetted depth and wetted width are controlled by local structures), and this potential effect could extend downstream to the confluence with the Severn Estuary (12km downstream of Iwood gauging station). The impact on the pass-forward flow to the estuary at the tidal lock at the tidal limit is a negligible reduction in freshwater contribution to the estuary and the zone of hydrological influence therefore ends at the tidal limit. As such any estuarine habitats that may be dependent on freshwater inputs will not be affected. Three hydrological reaches have been identified within the River Yeo (Figure A3): • Reach 1: River Yeo from Blagdon Reservoir compensation release point to Rickford Stream. • Reach 2: River Yeo from Rickford Stream to EA gauging station at Iwood.	• Temporary reduction or cessation of the terms of the drought permit if water quality monitoring and/or fish distress monitoring indicate a sharp deterioration in aquatic conditions. • Timing restriction of the drought permit use to avoid utilisation during critical fish migration periods. • Fish distress monitoring with triggers for an environmental response plan: regular visual observations carried out on key stretches of the impacted river reaches to detect any signs of large scale fish distress and agree appropriate mitigation with the Environment Agency specific to the conditions identified. This might include temporary oxygenation measures. • Water quality monitoring: dissolved oxygen, pH, turbidity, conductivity and temperature using calibrated handheld equipment. • Protection of 'spate flows': Temporary increases in river flows following periods of rain can be important to flush sediment/pollutants from the system or promote fish passage. Where possible, the terms of the drought permit could be temporarily reduced/suspended so that these spate flows are preferentially allowed to pass through the river system. This decision would need to be taken in dialogue with the Environment Agency to take account of the prevailing conditions and considering the merits of encouraging fish migration during a drought. • Temporary fish pass to be considered and installed during drought permit use where deemed necessary to allow fish migration. Equipment to be	No adverse effects alone or in combination.

[34] http://publications.naturalengland.org.uk/publication/4590676519944192?category=5755515191689216
[35] Bristol Water Plc (2019) Blagdon Reservoir Drought Permit Environmental Assessment. Report by Ricardo, October 2019.

DESIGNATED SITE: Severn Estuary SAC & Ramsar REF: UK0013030 (SAC) & UK11081 (Ramsar)			PLAN NAME: Bristol Water Drought Plan OPTION NAME: Blagdon Reservoir Reduced Compensation Flow		
Qualifying Feature	**Conservation Status:** **Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.**	**Site Condition (where relevant to feature):** **Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)[34] where relevant.**	**Potential Effects**	**Mitigation**	**Assessment of effects on conservation objectives and site integrity**
110 species recorded.	weirs or dams impede migration. In the UK, European eel is widespread. **<u>Brown/sea trout (Ramsar feature):</u>** Brown/sea trout is an anadromous species, migrating upstream to spawning grounds usually between July and September whilst migrating downstream in April/June. Spawning activities typically occur between January and March. Therefore, artificial obstacles such as weirs or dams impede migration. In the UK, the brown/sea trout is widespread.		• Reach 3: River Yeo from EA gauging station at Iwood to tidal limit at Woodspring Bay. The hydrological impacts reduce with distance downstream of the reservoir as the reduction in the compensation flow is ameliorated by additional flow inputs from the intervening catchment area and tributary inflows. A review of recent (2010 - 2021) baseline data shows records of migratory fish (EAR, 2021), including brown/sea trout and European eel within reaches 1-2, and lamprey species within reach 2. **<u>Habitat / Connectivity degradation</u>** The Congresbury Yeo, as part of the Severn Estuary catchment, may provide suitable habitat (in particular spawning habitat) for migratory fish, namely brown/sea trout, river lamprey and European eel. Hydrological changes (water velocity, wetted depth, wetted width and natural flood regime) due to the drought permit could result in lower flow leading to siltation of spawning gravels, loss of important habitats (spawning gravels, nursery habitat and resting pools), water quality degradation (changes to physiochemical elements such as pH, temperature, ammonia and phosphate levels) and/or fragmentation of habitats and increased significance of obstacles/barriers. The drought permit implementation period is largely outside the spawning periods of the designated migratory fish species associated with the SAC (brown trout – November to January, river lamprey – March to April), and it is therefore considered to pose no risk on this stage of the fish life cycle. European eel are less sensitive to changes in flow, with the latter stages of the drought permit implementation period potentially coinciding with the downstream migration period (October to December) of adult eel; however, downstream migration of eel will not be affected. Elver (juvenile eel) enter rivers in early spring and a general upstream migration occurs throughout the course of the year. Elver migration is not linked to periods of increased flow, with low flow conditions unlikely to impact migration. Significant barriers have been identified within the impacted river reaches which significantly limit the upstream movement of migratory species during low flow and natural drought conditions. These barriers are considered non-passable to fish even without the implementation of the	specific for the need of the relevant designated fish species.	

DESIGNATED SITE: Severn Estuary SAC & Ramsar REF: UK0013030 (SAC) & UK11081 (Ramsar)			PLAN NAME: Bristol Water Drought Plan OPTION NAME: Blagdon Reservoir Reduced Compensation Flow		
Qualifying Feature	**Conservation Status:** **Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.**	**Site Condition (where relevant to feature):** **Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)[34] where relevant.**	**Potential Effects**	**Mitigation**	**Assessment of effects on conservation objectives and site integrity**
			drought permit (see sections below). A fish migration barrier assessment was completed within the zone of hydrological influence (see Figures A4 to A6), including 6km of the Congresbury Yeo from Blagdon Reservoir to Iwood gauging station. The assessment included a desktop review of satellite imagery and of all available barrier datasets detailed in the barrier assessment methodology[36] for known in-river obstructions in order to identify the likely passability by fish under low flow conditions. The tidal limit of the Congresbury Yeo is regulated by the Tutshill Sluice gate which was constructed in 1970 to replace the Phipp's Sluice gate. Tidal flaps and sluices represent obstructions to free movement of fish, such as small eels and lamprey migrating upstream, which are particularly vulnerable because of their limited swimming ability[37]. Tidal flap apparatus is designed to pass the highest flow that is likely to occur and would likely only be open a very small fraction of its maximum design flow during the period of landward migration of small eels, typically April to September. The structure therefore acts as a significant barrier to migratory fish during natural drought conditions and limits the potential usage of the impacted river reaches prior to the implementation of the drought permit. Additional barriers to fish migration have been identified in the impacted hydrological reaches which present significant barriers under low flow and natural drought conditions. There are no current plans submitted within the lifespan of the drought permit which that will see any changes to the barriers and sluices or improve passability within the impacted reaches. Therefore, the current baseline assessment of the barriers is unlikely to change within the lifespan of the DP. In summary, the drought permit will not be implemented within the upstream migration period of any of the migratory fish species associated with the Severn Estuary. Significant barriers to fish migration have been identified along the zone of hydrological influence, many of which are considered impassable under low flow and natural drought conditions. As such, the implementation of the drought permit will not have adverse effects on fish migration. **Habitat loss:**		

[36] Bristol Water Plc (2021) Bristol Water Drought Plan – HRA & Appropriate Assessment – Fish barrier walkover: Methodology Document. Reported by Ricardo, June 2021
[37] Environment Agency (2010) Eel passage at tidal structures and pumping stations, September 2010

DESIGNATED SITE: Severn Estuary SAC & Ramsar REF: UK0013030 (SAC) & UK11081 (Ramsar)			PLAN NAME: Bristol Water Drought Plan OPTION NAME: Blagdon Reservoir Reduced Compensation Flow		
Qualifying Feature	**Conservation Status:** **Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.**	**Site Condition (where relevant to feature):** **Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)[34] where relevant.**	**Potential Effects**	**Mitigation**	**Assessment of effects on conservation objectives and site integrity**
			Due to the presence of significant in-river barriers, it is assumed that the associated river reaches provide limited functionally-linked habitat to support the population abundances of the migratory species associated with the Severn Estuary Ramsar site and SAC. Available baseline data indicate that brown/sea trout, European eel and lamprey have been observed in low abundances within the zone of hydrological influence. Very low abundances of European eel have been observed in all reaches with brown/sea trout observed in Reach 1 and 2 only and lamprey observed in Reach 2 only. Lamprey ammocoetes were not recorded to species level during historical surveys due to the difficulty in identification during the larval life-stage of lamprey. Given the significant barriers that are present within the impacted river reaches, the lamprey species are most likely brook lamprey (which do not migrate from sea) and the brown trout are also unlikely to be migratory (sea) trout. Available river channel cross sectional evidence (see Blagdon Reservoir EAR) for upper Reach 1 identifies a shallow cross section with low velocities, with a reduction in flow principally reducing flow velocities while maintaining similar wetted depth and wetted width. This change in habitat availability and quality is assumed to be similar throughout Reaches 1 and 2. Given the wide and likely deep nature of the channel in Reach 3, as well as the impounded nature of Reach 3, changes in wetted width and depth are unlikely to be an impact here. As the typical effect of the hydrological impact of the drought permit would be on flow velocities, the wetted area and wetted depth of the channel would remain largely unaffected in all reaches, noting that the flow velocities will be within the normal range of the channel as the normal licensed ‘winter’ compensation flow is lower than the ‘summer’ drought permit compensation flow. In summary, no direct habitat loss will occur; Impacts as a result of the implementation of the drought permit are not likely, as significant barriers to migratory fish species throughout the reaches are present and the impacted reaches do not currently provide functional habitat for any of the associated migratory fish species. As noted in Section 4, Natural England have identified that there is potential for in combination effects on the migratory fish interests of the Severn Estuary SAC/Ramsar associated with the Bristol Water drought permits and existing abstractions, given that these options could be implemented		

DESIGNATED SITE: Severn Estuary SAC & Ramsar REF: UK0013030 (SAC) & UK11081 (Ramsar)			PLAN NAME: Bristol Water Drought Plan OPTION NAME: Blagdon Reservoir Reduced Compensation Flow		
Qualifying Feature	**Conservation Status:** **Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.**	**Site Condition (where relevant to feature):** **Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)[34] where relevant.**	**Potential Effects**	**Mitigation**	**Assessment of effects on conservation objectives and site integrity**
			together as they follow the same drought trigger. The potential impact pathway resulting from an in-combination assessment is the potential reduction in total freshwater inflows. The Bristol Water drought options will not impact on flows in the River Severn or any tributaries of the River Severn. As such, the in-combination impacts would be limited to any adults present within the Severn estuary and migration, spawning or juvenile lifestages would not be affected by the operation of the Bristol Water drought options in-combination with other abstractions (including exiting abstractions). To determine the magnitude of the potential impacts a number of scenarios for freshwater inflows have been considered. The approach considered flow data from the most downstream gauge on all watercourses within the Severn Estuary Catchment area. Flow data was obtained for the full record for the gauges as available on the National River Flow Archive (NRFA). It should be noted that significant gaps exist in the available data. Principally, no NRFA flow gauge data exist on the River Parrot, River Brue, River Gary or River Axe. These watercourses have a combined catchment area of approximately 258.49 km^2 as calculated on the Flood Estimation Handbook (FEH) Web Service Catchment Calculator. Furthermore, inputs from the numerous small tributaries and watercourses with small catchments without NFRA flow gauge data have not been included in the assessment. The different inflow scenarios that were considered include: • a baseline low flow scenario of Q95 inflows from tributaries of the Severn Estuary with the River Severn at the lowest Hands of Flow (HoF) target (2568Ml/d) (with and without the Bristol Water drought options operational • a baseline flow scenario of Q95 inflows from tributaries of the Severn Estuary with flows in the River Severn 1200Ml/d (with and without the Bristol Water drought options operational • a baseline flow scenario of Q95 inflows from tributaries of the Severn Estuary with flows in the River Severn 729Ml/d (with and without the Bristol Water drought options operational). This represents a worst-case scenario where abstraction the operation of the River Severn Drought Order and all known water company drought permits/orders which could impact (directly		

DESIGNATED SITE: Severn Estuary SAC & Ramsar REF: UK0013030 (SAC) & UK11081 (Ramsar)			PLAN NAME: Bristol Water Drought Plan OPTION NAME: Blagdon Reservoir Reduced Compensation Flow		
Qualifying Feature	**Conservation Status:** **Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.**	**Site Condition (where relevant to feature):** **Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)[34] where relevant.**	**Potential Effects**	**Mitigation**	**Assessment of effects on conservation objectives and site integrity**
			or indirectly) the River Severn, including abstractions for the Canal & Rivers Trust. The 729Ml/d represent the modelled flow at Lower Parting for a full in-combination for an acute drought[38]. The worst-case scenario with all Bristol Water Drought Permits operation is a reduction of approximately 11.36M/d from May to November (inclusive) and 7.32Ml/d from December to April (inclusive). In a baseline low flow scenario of Q95 inflows from tributaries of the Severn Estuary with the River Severn at the lowest Hands of Flow (HoF) target (2568Ml/d) the total inflows would be approximately 7249Ml/d. As noted above, this is an estimate based on available data and freshwater inflows are likely to be higher as there is limited data for numerous minor tributaries. A reduction in freshwater inflows as a result of the operation of the Bristol Water drought options would equate to approximately 0.16%. In a baseline flow scenario of Q95 inflows from tributaries of the Severn Estuary with flows in the River Severn 1200Ml/d total freshwater inflows would be approximately 5882Ml/d. A reduction in freshwater inflows as a result of the operation of the Bristol Water drought options would equate to approximately 0.19%. In a baseline flow scenario of Q95 inflows from tributaries of the Severn Estuary with flows in the River Severn 729Ml/d total freshwater inflows would be approximately 5411Ml/d. A reduction in freshwater inflows as a result of the operation of the Bristol Water drought options would equate to approximately 0.21%. Although there are no freshwater flow targets for the Severn Estuary[39] , the proportionate reduction in all of the scenarios considered is not considered significant. Furthermore, the proportionate reduction in freshwater inflows is likely an overestimation as data is not available for many of the minor tributaries and smaller catchments. It should also be noted that freshwater inflows into the Severn Estuary is controlled by a tidal sluice/flap located at the bottom of both the River Axe and the River Yeo. Freshwater/estuarine interaction is therefore driven by the tidal regime which will not be affected by the implementation		

[38] Environment Agency (2013). River Severn Drought Order Environmental Report (Working Draft). Version 7. Published December 2013.
[39] Severn Estuary SAC, SPA and Ramsar Site: Regulation 33 Advice from CCW and Natural England, June 2009

DESIGNATED SITE: Severn Estuary SAC & Ramsar REF: UK0013030 (SAC) & UK11081 (Ramsar)			PLAN NAME: Bristol Water Drought Plan OPTION NAME: Blagdon Reservoir Reduced Compensation Flow		
Qualifying Feature	**Conservation Status:** **Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.**	**Site Condition (where relevant to feature):** **Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)[34] where relevant.**	**Potential Effects**	**Mitigation**	**Assessment of effects on conservation objectives and site integrity**
			of the drought options (either alone or in-combination).		

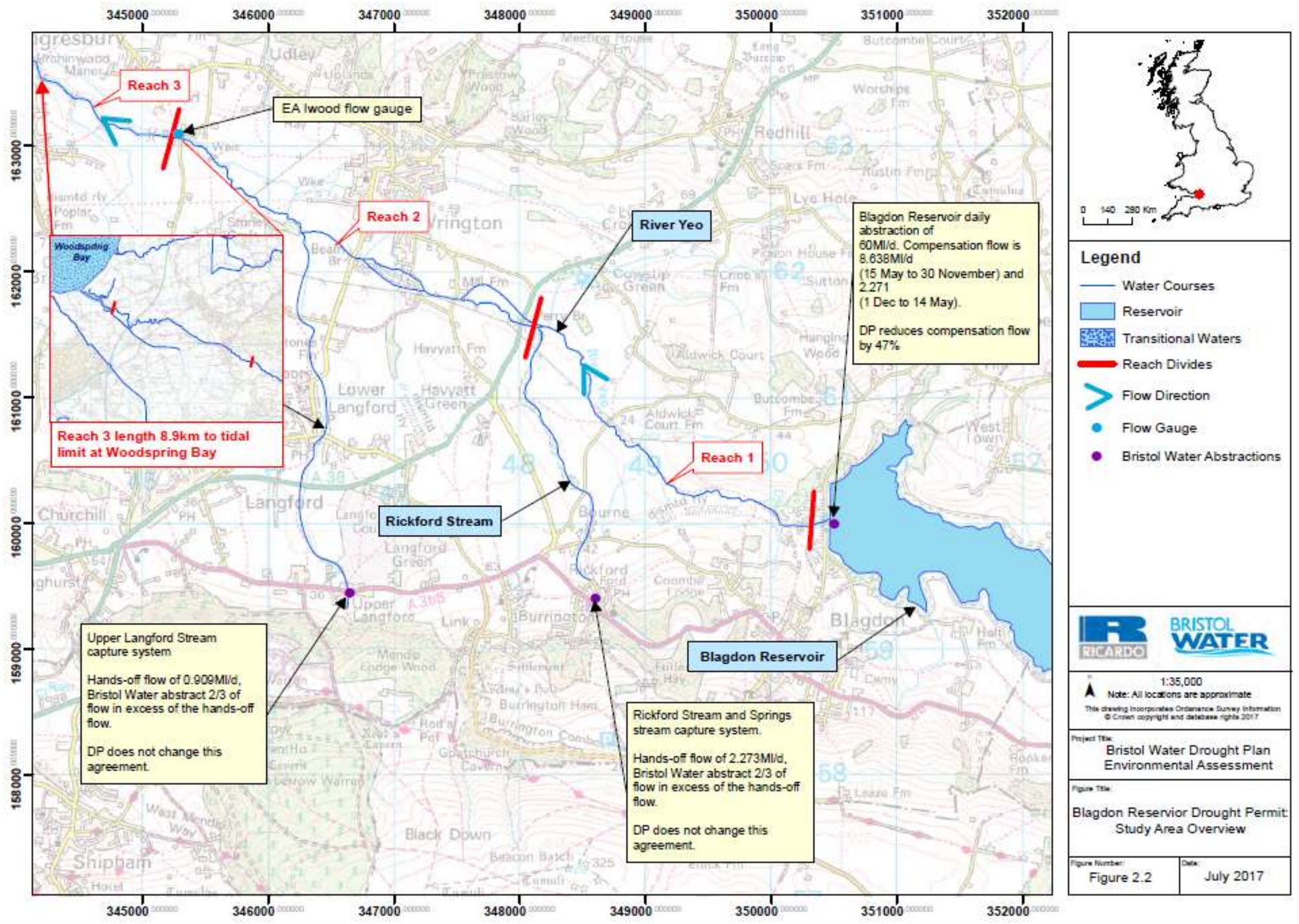


Figure A3 Location of the option in relation the wider catchment and the zone of influence

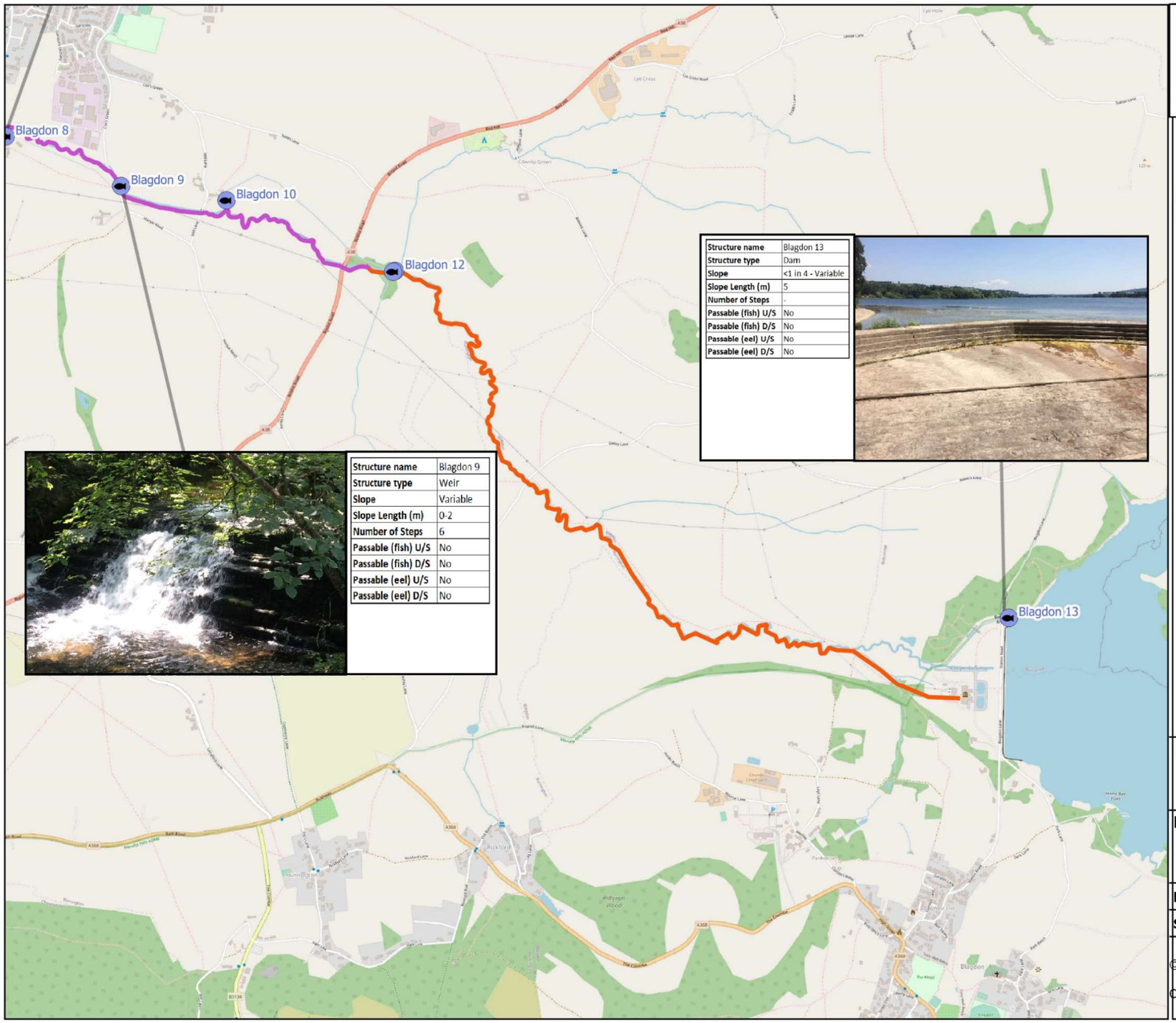


Figure A4. Location of the barriers identified during the barrier assessment walkovers

Figure A5. Location of the barriers identified during the barrier assessment walkovers

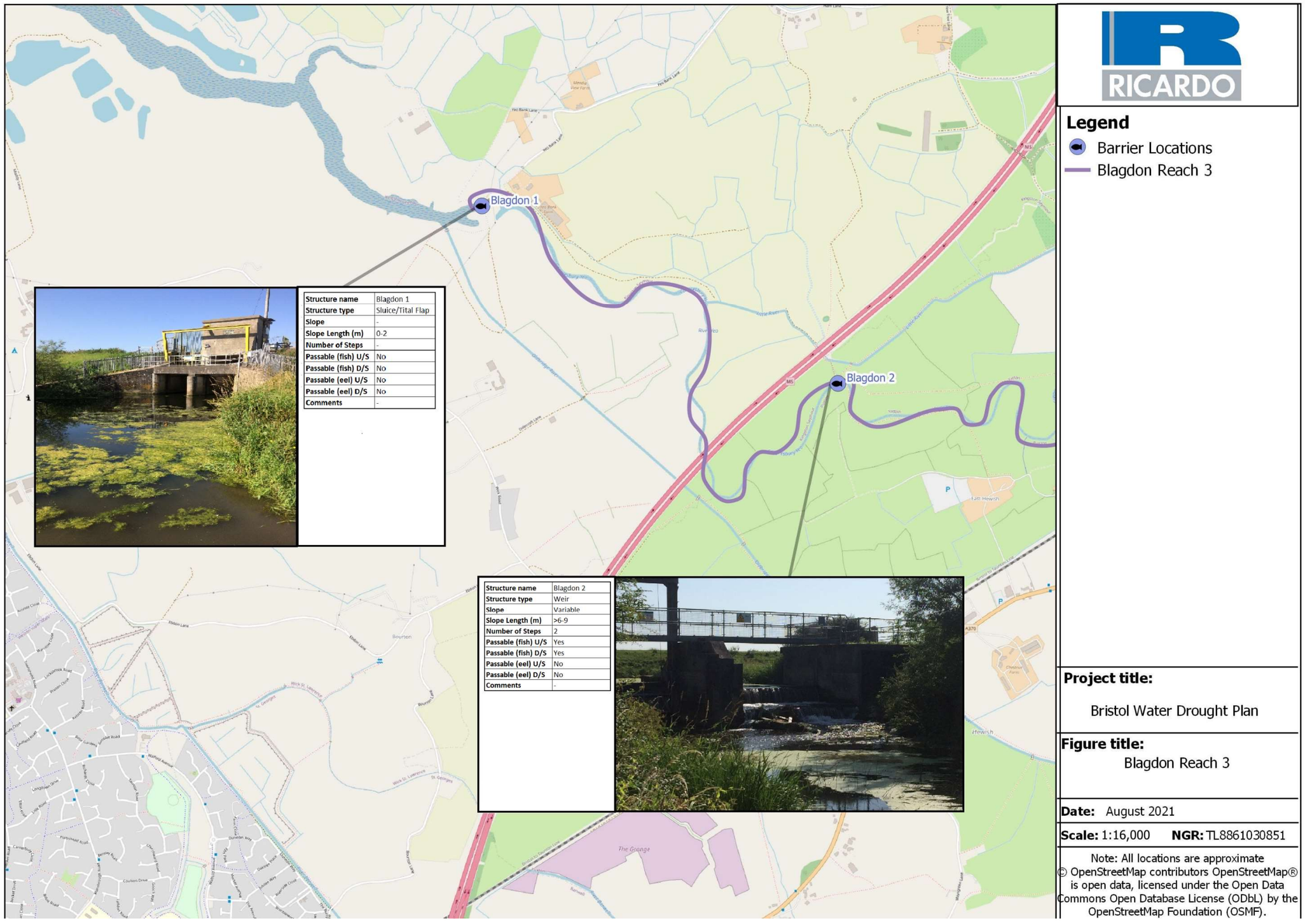


Figure A6 Location of the barriers identified during the barrier assessment walkovers

Cheddar Drought Permit

DESIGNATED SITE: Severn Estuary SAC & Ramsar REF: UK0013030 (SAC) & UK11081 (Ramsar)			PLAN NAME: Bristol Water Drought Plan OPTION NAME: Cheddar Ponds Reservoir Reduced Prescribed Flow in Cheddar Yeo		
Qualifying Feature	**Conservation Status:** **Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.**	**Site Condition (where relevant to feature):** **Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)[40] where relevant.**	**Potential Effects**	**Mitigation**	**Assessment of effects on conservation objectives and site integrity**
CONSTRUCTION PHASE					
N/A	There is no construction phase associated with this drought permit.	There is no construction phase associated with this drought permit.	There is no construction phase associated with this drought permit.	There is no construction phase associated with this drought permit.	N/A
OPERATIONAL PHASE					
SAC: **1099 River lamprey *Lampetra fluviatilis*** **Criterion 4** Migratory: river lamprey, European eel *Anguilla anguilla* Atlantic salmon *Salmo salar* and brown/sea trout *Salmo trutta* **Criterion 8** The fish assemblage of the whole estuarine and river system is one of the most diverse in Britain, with over 110 species recorded.	The Cheddar Springs naturally supply the River Cheddar Yeo, a small tributary of the River Axe, which discharge to the Severn Estuary (Figure A7). The Cheddar Yeo catchment provides suitable habitat for migratory fish including European eel, Atlantic salmon and brown/sea trout as recorded in 2018 (EAR, 2019[41]) within the river. While, juvenile Atlantic salmon were recorded for the first time in 2018, no stocked fish were reported by the Environment Agency and therefore Atlantic salmon are considered within this assessment. **European eel (Ramsar feature):** European eel is a catadromous species (i.e. spawning in the sea and migrating into inland waters to grow and spend the majority of their life), and therefore artificial obstacles such as weirs or dams impede migration. In the UK, European eel is widespread. **Brown/sea trout (Ramsar feature):** Brown/sea trout is an anadromous species, migrating upstream to spawning grounds usually between July and September whilst migrating downstream in April/June. Spawning activities typically occur between January and March. Therefore artificial obstacles such as weirs or	SSSI's of relevance to this feature: Severn Estuary SSSI • Favourable / Unfavourable – recovering / Unfavourable – no change / Unfavourable declining Bridgewater Bay SSSI • Favourable / Unfavourable – recovering / Unfavourable – no change Upper Severn Estuary SSSI • Favourable / Unfavourable – recovering / Unfavourable – declining Relevant SAC Site Improvement Plan pressures/threats: • physical modification (barriers to migratory activities); • developments in general;	The drought permit will involve a 50% reduction in the prescribed flow discharged to the Cheddar Yeo (reduced to 3.4Ml/d) during the period 1 December to 14 May. There would be an associated impact on the flow/level regime in the Cheddar Yeo downstream. The hydrological zone of influence is delimited by the downstream tidal limit at Brean Cross Sluice, where influence becomes negligible, and includes the River Cheddar Yeo and the River Axe for 19km from Cheddar Ponds. Within the zone of hydrological influence, the magnitude of influence on hydrological conditions diminishes with distance from the reservoir, with a corresponding decreasing effect on the wetted width, wetted depth and flow velocity affecting in-channel habitat availability and quality. Three impacted hydrological reaches have been identified within the zone of hydrological influence (Figure A7): • Reach 1: River Cheddar Yeo from Cheddar Ponds intake to Hythe. • Reach 2: River Cheddar Yeo from Hythe to the River Axe confluence. • Reach 3: River Axe from River Cheddar Yeo confluence to tidal limit at Brean Cross Sluice (tidal lock). Downstream of Hythe, the river is level-controlled, although there may be the potential for some effects (water velocity) to extend downstream to the confluence of the Cheddar Yeo and the River Axe. The River Axe is a significantly larger, level-controlled river at its confluence with the Cheddar Yeo. The Severn Estuary SAC and Ramsar is 14km downstream from this point.	• Temporary reduction or cessation of the terms of the drought permit where water quality monitoring and/or fish distress monitoring indicate a sharp deterioration in aquatic conditions. • Fish distress monitoring with triggers for an environmental response plan: regular visual observations carried out on key stretches of the impacted river reaches to detect signs of large-scale fish distress and agree appropriate mitigation with the Environment Agency specific to the conditions identified. This might include temporary oxygenation measures. • Water quality monitoring: dissolved oxygen, pH, turbidity, conductivity and temperature using calibrated handheld equipment. • Protection of 'spate flows': Temporary increases in river flows following periods of rain can be important to flush sediment/pollutants from the system or promote fish passage. Where possible, the terms of the drought permit could be temporarily reduced/suspended so that these spate flows are preferentially allowed to pass through the river system. This decision would need to be taken in dialogue with the Environment Agency to take account of the prevailing conditions and considering the merits of encouraging fish migration during a drought.	No adverse effects alone or in combination

[40] http://publications.naturalengland.org.uk/publication/4590676519944192?category=5755515191689216
[41] Bristol Water Plc (2019). Cheddar Ponds Drought Permit Environmental Assessment. Report by Ricardo, November 2019.

DESIGNATED SITE: Severn Estuary SAC & Ramsar REF: UK0013030 (SAC) & UK11081 (Ramsar)			PLAN NAME: Bristol Water Drought Plan OPTION NAME: Cheddar Ponds Reservoir Reduced Prescribed Flow in Cheddar Yeo		
Qualifying Feature	**Conservation Status:** **Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.**	**Site Condition (where relevant to feature):** **Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)[40] where relevant.**	**Potential Effects**	**Mitigation**	**Assessment of effects on conservation objectives and site integrity**
	dams impede migration. In the UK, the brown/sea trout is widespread. **Atlantic salmon (Ramsar feature):** Atlantic salmon is an anadromous species, migrating upstream to spawning grounds during the autumn. Spawning activities occur in autumn and winter months. Atlantic salmon is a widespread species in the UK and is found in several hundred rivers, many of which have adult runs in excess of 1000. The latest estimates of the UK spawning population size are however, about 50% down on the ten-year average. Atlantic salmon migrate upstream from November to February.	• change in species distributions (caused by climate change/other events); and • water pollution (water and sediment quality).	**Habitat degradation/loss:** A review of recent (2010- 2021) baseline data shows records of migratory fish (EAR, 2021), including low abundances of brown/sea trout and Atlantic salmon within Reach 1, and European eel within reach both reaches 1-2. The River Axe and the River Cheddar Yeo, as part of the Severn Estuary catchment, provide potential habitat (in particular spawning and juvenile habitat) for migratory fish, namely brown/sea trout, Atlantic salmon and European eel. Hydrological changes (water velocity, wetted depth, wetted width and natural flood regime) due to implementation of the drought permit could result in lower flow leading to siltation of spawning gravels, loss of important habitats (spawning gravels, nursery habitat and resting pools), water quality degradation (changes to physiochemical elements such as pH, temperature, ammonia and phosphate levels) and/or fragmentation of habitats and increased significance of obstacles/barriers to fish migration. Any impacts upon habitat quality in relation to migratory fish will be limited to the duration of the drought permit (1 December to 14 May) and are therefore outside of the brown/sea trout upstream migration period but during the Atlantic salmon upstream migration period as well as the period of spawning activities for both species. Reductions in flow can lead to a reduction in wetted width and depth, affect longitudinal connectivity and an increase in marginal river channel exposure within an affected watercourse. However, given the low channel slopes and highly modified nature of the impacted river reaches and their extensive resectioning to produce relatively box-shaped channels (particularly in Reach 2 and Reach 3), changes in flow are not likely to exert any adverse impact in any reach. There is a risk that hydrological changes could result in minor changes in wetted width and depth in Reach 1 and further fieldwork is planned to increase the evidence base, as set out in the DP Environmental Monitoring Plan. Changes in river channel wetted depth and velocity could impact on the habitat for Atlantic salmon fry and parr, particularly in the months following incubation (April and May). However, with the implementation of adequate mitigation measures to ensure that habitat quality is maintained during implementation of the drought permit, the Cheddar drought permit is not considered to have an adverse impact upon migratory fish. **Connectivity degradation** Baseline data from the Catchment Based Approach Data Hub[42]		

[42] Catchment Based Approach Data Hub, Environment Agency: Priority Barriers - Eel Priority | Catchment Based Approach accessed 2nd March 2021.

DESIGNATED SITE: Severn Estuary SAC & Ramsar REF: UK0013030 (SAC) & UK11081 (Ramsar)			PLAN NAME: Bristol Water Drought Plan OPTION NAME: Cheddar Ponds Reservoir Reduced Prescribed Flow in Cheddar Yeo		
Qualifying Feature	**Conservation Status:** **Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.**	**Site Condition (where relevant to feature):** **Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)[40] where relevant.**	**Potential Effects**	**Mitigation**	**Assessment of effects on conservation objectives and site integrity**
			and Bristol Avon Rivers Trust (BART, 2019[43]) identified two key obstructions along the River Axe: Bleadon sluice (marked as unknown on Figure A8), a flood management structure impassable to fish when closed, and the Brean Cross sluice at the tidal limit. One additional sluice was recorded during the walkover survey (BART, 2019) between the two key obstructions, on the River Axe. Additionally, a further fish migration barrier assessment was completed in 2021 within the zone of hydrological influence. The assessment included a desktop review satellite imagery and of all available barrier datasets detailed in the barrier assessment methodology[44] for known obstructions in order to identify the likely passability of fish under low flow conditions. Several additional barriers were noted in reaches 1 and 3 (see Figures A8 and A9). Whilst the Brean Cross sluice is equipped with fish and eel pass, the two further sluices create an obstruction to fish migration when closed. Presence of migratory fish have been recorded upstream of both obstructions, within the River Cheddar Yeo confirming that these obstacles do not obstruct fish migration with the current flow conditions when the sluices are opened. The implementation of the drought permit is not considered to reduce fish migration which depends on the sluice management rather than river flow. The implementation of the drought permit will therefore not create additional stress upon fish migration due to a decrease of the water flow. As such, impacts to fish migration within the impacted river reaches due to low flow conditions will likely be limited. European eel are less sensitive to changes in flow, with the drought permit implementation period potentially coinciding upon the downstream migration period (October to December) of adult eel. As noted above, eel migration within the zone of hydrological influence is closely linked to sluice management and is unlikely to be affected by the implementation of the drought permit. Elver (juvenile eel) enter rivers in early spring and a general upstream migration occurs throughout the course of the year. Elver migration is not linked to periods of increased flow, with low flow conditions unlikely to impact migration and with most of the elver migration period unaffected by the implementation of the drought permit. The operation of the Bristol Water drought options in-combination with other options has also been considered (see the appropriate assessment for the Blagdon drought permit). The assessment concluded that the proportionate reduction in all of the scenarios considered is not considered significant.		

[43] BART, 2019. River Axe (Somerset) Habitat Walkover Survey (version 0.1). Summer 2019.
[44] Bristol Water Plc (2021) Bristol Water Drought Plan – HRA & Appropriate Assessment – Fish barrier walkover: Methodology Document. Reported by Ricardo, June 2021

DESIGNATED SITE: Severn Estuary SAC & Ramsar REF: UK0013030 (SAC) & UK11081 (Ramsar)			PLAN NAME: Bristol Water Drought Plan OPTION NAME: Cheddar Ponds Reservoir Reduced Prescribed Flow in Cheddar Yeo		
Qualifying Feature	**Conservation Status:** **Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.**	**Site Condition (where relevant to feature):** **Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)[40] where relevant.**	**Potential Effects**	**Mitigation**	**Assessment of effects on conservation objectives and site integrity**
			Furthermore, the proportionate reduction in freshwater inflows is likely an overestimation as data is not available for many of the minor tributaries and smaller catchments. It should also be noted that freshwater inflows into the Severn Estuary is controlled by a tidal sluice/flap located at the bottom of both the River Axe and the River Yeo. Freshwater/estuarine interaction is therefore driven by the tidal regime which will not be affected by the implementation of the drought options (either alone or in-combination).		

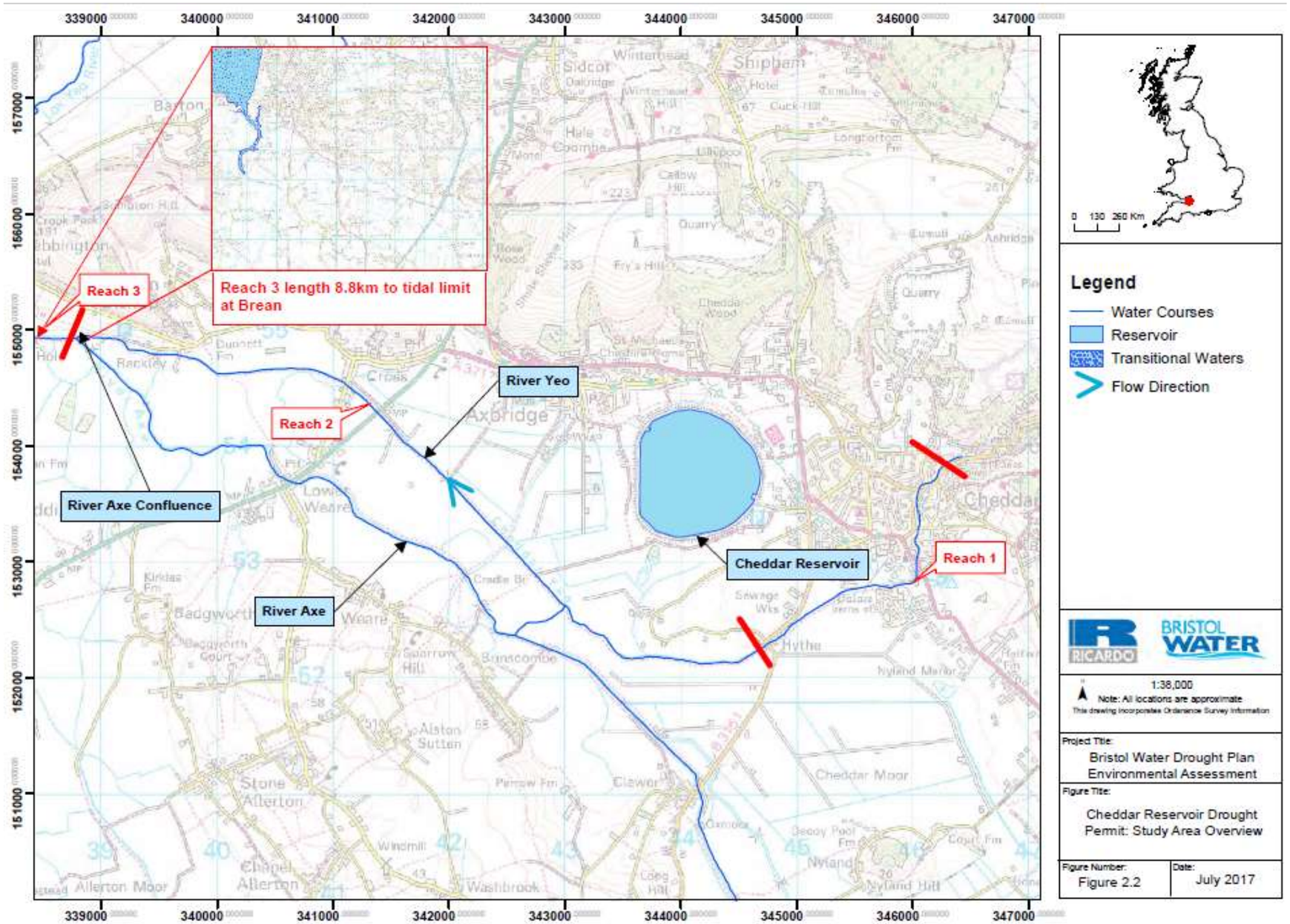


Figure A7.. Location of the Cheddar Ponds drought permit and its zone of hydrological influence.

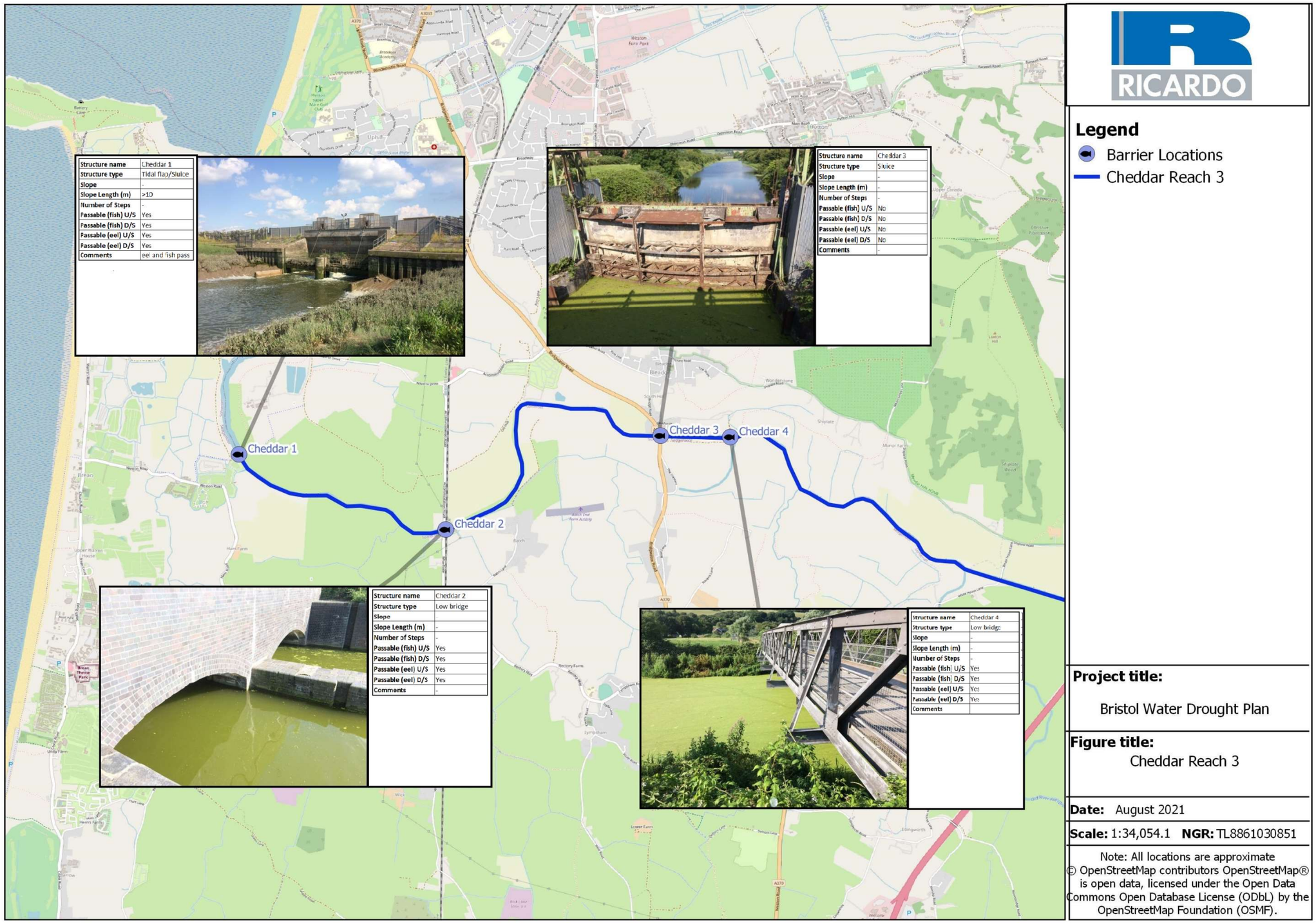


Figure A8.. Cheddar Ponds drought permit: presence of fish obstruction and fish passes on the River Axe (Reach 3).

Figure A9. . Cheddar Ponds drought permit: presence of fish obstruction and fish pass on the River Cheddar Yeo (Reach 1).

Chew Drought Permit

DESIGNATED SITE: Severn Estuary SAC & Ramsar REF: UK0013030 (SAC) & UK11081 (Ramsar)			PLAN NAME: Bristol Water Drought Plan OPTION NAME: Chew Reservoir Reduced Compensation Flow		
Qualifying Feature	**Conservation Status:** **Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.**	**Site Condition (where relevant to feature):** **Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)[45] where relevant.**	**Potential Effects**	**Mitigation**	**Assessment of effects on conservation objectives and site integrity**
CONSTRUCTION PHASE					
N/A	There is no construction phase associated with this drought permit.	There is no construction phase associated with this drought permit.	There is no construction phase associated with this drought permit.	There is no construction phase associated with this drought permit.	N/A
OPERATIONAL PHASE					
SAC: **1099 River lamprey *Lampetra fluviatilis*** **Ramsar**: **Criterion 4** Migratory: river lamprey, European eel *Anguilla anguilla* Atlantic salmon *Salmo salar* and brown/sea trout *Salmo trutta*	The River Chew and the River Bristol Avon (Figure A10) are part of the wider Severn Estuary catchment. The Chew and Bristol Avon catchment provides suitable habitat for migratory fish including river lamprey, European eel, Atlantic salmon and brown/sea trout as recorded in 2018 (EAR, 2019[46]) within the River Chew. **River lamprey (SAC and Ramsar feature):** Species occurrence description not yet available. River lamprey is a normally anadromous species (i.e. spawning in freshwater but completing part of its life cycle in the sea), and therefore artificial obstacles such as weirs or dams impede migration. In the UK, the river lamprey is widespread and populations are strong. The UK populations are considered	SSSI's of relevance to this feature: Severn Estuary SSSI • Favourable / Unfavourable – recovering / Unfavourable – no change / Unfavourable declining Bridgewater Bay SSSI • Favourable / Unfavourable – recovering / Unfavourable – no change Upper Severn Estuary SSSI • Favourable / Unfavourable – recovering / Unfavourable – declining	. The summer (May to November) and winter (December to April) implementation of the Chew drought permit would decrease the flow by approximately 50% in the River Chew, a tributary of the River Bristol Avon. The drought permit has the potential to reduce flow within the downstream River Chew by approximately 50%, with impacts extending downstream to the confluence with the River Bristol Avon. The hydrological zone of influence is delimited by the confluence with the River Bristol Avon (17km from Chew Valley Reservoir) at which point the reduction in flow is negligible due to the overwhelmingly large catchment area of the River Bristol Avon. Three hydrological reaches have been identified within the River Chew (Figure A10) • Reach 1: River Chew from Chew Valley Reservoir compensation release point to Winford Brook confluence.	• Temporary reduction or cessation of the terms of the drought permit if water quality monitoring and/or fish distress monitoring during the implementation of the drought permit indicate a sharp deterioration in aquatic conditions. • Fish distress monitoring with triggers for an environmental response plan: regular visual observations carried out on key stretches of the impacted river reaches to detect signs of large-scale fish distress and agree appropriate mitigation with the Environment Agency specific to the conditions identified. This might include temporary oxygenation measures. • Water quality monitoring: dissolved oxygen, pH, turbidity, conductivity and temperature using calibrated handheld equipment. • Protection of 'spate flows': Temporary increases in river flows following periods of rain can be important to flush sediment/pollutants from the system or promote fish passage. Where possible, the terms of the drought permit could be	No adverse effects alone or in combination

[45] http://publications.naturalengland.org.uk/publication/4590676519944192?category=5755515191689216
[46] Bristol Water Plc (2019). Chew Valley Reservoir Drought Permit Environmental Assessment. Report by Ricardo, October 2019.

DESIGNATED SITE: Severn Estuary SAC & Ramsar REF: UK0013030 (SAC) & UK11081 (Ramsar)			PLAN NAME: Bristol Water Drought Plan OPTION NAME: Chew Reservoir Reduced Compensation Flow		
Qualifying Feature	**Conservation Status:** **Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.**	**Site Condition (where relevant to feature):** **Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)[45] where relevant.**	**Potential Effects**	**Mitigation**	**Assessment of effects on conservation objectives and site integrity**
Criterion 8 The fish assemblage of the whole estuarine and river system is one of the most diverse in Britain, with over 110 species recorded.	important for the conservation of the species at a European level. River lamprey migrate upstream to spawning grounds during winter and spring. **European eel (Ramsar feature):** European eel is a catadromous species (i.e. spawning in the sea and migrating into inland waters to grow and spend the majority of their life), and therefore artificial obstacles such as weirs or dams impede migration. In the UK, European eel is widespread. **Brown/sea trout (Ramsar feature):** Brown/sea trout is an anadromous species, migrating upstream to spawning grounds usually between July and September whilst migrating downstream in April/June. Therefore artificial obstacles such as weirs or dams impede migration. In the UK, the brown/sea trout is widespread. **Atlantic salmon (Ramsar feature):** Atlantic salmon is an anadromous species, migrating upstream to spawning grounds during the autumn. Atlantic salmon is a widespread species in the UK and is found in several hundred rivers, many of which have adult runs in excess of 1000. The latest estimates of the UK spawning population size are however, about 50% down on the ten-year average.	Relevant SAC Site Improvement Plan pressures/threats: • physical modification (barriers to migratory activities); • developments in general; • change in species distributions (caused by climate change/other events); and • water pollution (water and sediment quality).	• Reach 2: River Chew from Winford Brook confluence to EA gauging station at Compton Dando. • Reach 3: River Chew from EA gauging station at Compton Dando to River Bristol Avon confluence. **Habitat / Connectivity degradation** The River Chew, as part of the Severn Estuary catchment, provides potential habitat (in particular spawning habitat) for migratory fish, including brown/sea trout, Atlantic salmon, river lamprey and European eel. Hydrological changes (water velocity, wetted depth, wetted width and natural flood regime) due to implementation of the drought permit could result in lower flow leading to siltation of spawning gravels, loss of important habitats (spawning gravels, nursery habitat and resting pools), water quality degradation (changes to physiochemical elements such as pH, temperature, ammonia and phosphate levels) and/or fragmentation of habitats and increased significance of obstacles/barriers to fish migration. These impacts have the potential to be significant upon migratory fish, due to a decrease of fish recruitment, growth decrease or mortality. The drought permit implementation could coincide with the spawning periods of the designated migratory species associated with the European sites including: brown trout (November to January); river lamprey – March to April; and Atlantic salmon (January-March). The drought permit period could also coincide with the upstream migration period for brown trout and Atlantic salmon as well as the downstream migration period of smolt and post-metamorphic transformers (lamprey). European eel are less sensitive to changes in flow, with the latter stages of the drought permit implementation period potentially impacting upon the downstream migration period (October to December) of adult eel. Elver (juvenile eel) enter rivers in early spring and a general upstream migration occurs throughout the course of the year. Elver migration is not linked to periods of increased flow, with low flow conditions unlikely to impact their migration. Significant barriers to fish migration have been identified within the impacted reaches which will limit the upstream movement of elver and lamprey during low flow conditions and natural drought conditions. These barriers are not likely to be passable under natural drought conditions prior to the implementation of the drought permit. As such, impacts to migration within the impacted reaches due to low flow conditions will likely be limited.	temporarily reduced/suspended so that these spate flows are preferentially allowed to pass through the river system. This decision would need to be taken in dialogue with the Environment Agency to take account of the prevailing conditions and considering the merits of encouraging fish migration during a drought. • Supporting BART's strategy to improve fish connectivity within the River Chew should be considered for long-term enhancement. Where permanent solutions cannot be implemented for the purpose of the drought permit, temporary fish pass to be considered and installed during drought permit implementation where deemed necessary to support fish migration.	

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Qualifying Feature	**Conservation Status:** **Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.**	**Site Condition (where relevant to feature):** **Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)[45] where relevant.**	**Potential Effects**	**Mitigation**	**Assessment of effects on conservation objectives and site integrity**
			A fish migration barrier assessment (Figures A12 to A14) was completed within the zone of hydrological influence, including 18km of the River Chew from Chew Reservoir to the River Bristol Avon confluence. The assessment included a desktop review of satellite imagery and of all available barrier datasets detailed in the barrier assessment methodology[47] for known obstruction in order to identify the likely passability of fish under low flow conditions. The barrier assessment noted several structures which act as significant barrier to migratory fish during natural drought conditions and that limit the potential usage of the impacted river reaches during the implementation of the drought permit. There are no current plans submitted within the lifespan of the DP that will see any changes to the barriers and sluices or improve passability within the impacted reaches. Fisheries surveys conducted by Bristol Avon Rivers Trust (BART) in 2019[48] identified the presence of ten significant barriers to fish passage downstream of Chew Valley Lake (Figure A11). The comparison of fisheries surveys completed in 2016 and 2019 (BART, 2020) concluded that large barriers located along the River Chew were impacting fish stock, in particularly migratory species such as European eel, brown trout and Atlantic salmon. Measures advised by the Environment Agency mention the need to improve fish passage and restore habitat. The current baseline assessment of the barriers to fish migration is unlikely to change within the lifespan of this current DP. It is possible that the 'winter' drought permit could impact on the passability of fish barriers. However, based on the abundance of Atlantic salmon and the significant barriers observed in the reaches it is evident that, currently, only Reach 3 presents available habitat to Atlantic salmon. As some of the barriers are considered impassable to fish under any flow condition, the limited number of lamprey present in Reach 1 and 2 are also likely to represent brook lamprey rather than designated river lamprey. With the implementation of adequate mitigation measures, the drought permit is not considered to have adverse effects on the Severn Estuary SAC or Ramsar site.		

[47] Bristol Water Plc (2021) Bristol Water Drought Plan – HRA & Appropriate Assessment – Fish barrier walkover: Methodology Document. Reported by Ricardo, June 2021
[48] BART, 2020. River Chew Fisheries Improvement Strategy: Opportunities Report (version 1.0).

DESIGNATED SITE: Severn Estuary SAC & Ramsar REF: UK0013030 (SAC) & UK11081 (Ramsar)			PLAN NAME: Bristol Water Drought Plan OPTION NAME: Chew Reservoir Reduced Compensation Flow		
Qualifying Feature	**Conservation Status:** **Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.**	**Site Condition (where relevant to feature):** **Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)[45] where relevant.**	**Potential Effects**	**Mitigation**	**Assessment of effects on conservation objectives and site integrity**
			<u>Habitat loss:</u> No direct habitat loss is expected as a result of either the winter or summer drought permit implementation. Change in river habitat availability and quality with changes in flow is assumed to be similar throughout the impacted Reaches 1, 2 and 3 with a moderate reduction in flow velocities in these reaches, noting that in the summer months the lower velocities due to the drought permit are within the normal range of the river channel as the licensed 'winter' compensation flow is lower than the 'summer' drought permit compensation flow. In winter, the drought permit would reduce flows and velocities lower than the current range in Reach 1, but flow accretion further downstream is expected to return to within the normal range in Reaches 2 and 3. As noted above, as a result of significant barriers to fish migration, the impacted river reaches 1 and 2 do not appear to provide functional habitat for Atlantic salmon, sea trout and river lamprey. As such, any changes in habitat are unlikely to affect these species. Adult European eel are less sensitive to the changes in velocity and prefer deeper habitats (such as pools) which will not be affected by the implementation of the drought permit in either the summer or winter. It is evident that functionally-linked/supporting habitat is limited to impacted river Reach 3. This is a relatively low energy river reach and reductions in flow due to the drought permit are considered to lead to indistinct reductions in the already negligible velocities, although this is uncertain. As such, there will be no material change in habitat availability for the migratory fish species within this reach. Further fieldwork is planned to increase the evidence base, as set out in the accompanying DP Environmental Monitoring Plan. The assessment set out in the EAR concludes that the hydrology impacts would be negligible within the zone of hydrological influence as described above. With the implementation of mitigation measures the Chew drought permit is not considered to have any adverse effects on the Severn Estuary SAC or Ramsar site. The operation of the Bristol Water drought options in-combination with other options has also been considered (see the appropriate assessment for the Blagdon drought permit). The assessment concluded that the proportionate reduction in all		

DESIGNATED SITE: Severn Estuary SAC & Ramsar REF: UK0013030 (SAC) & UK11081 (Ramsar)			PLAN NAME: Bristol Water Drought Plan OPTION NAME: Chew Reservoir Reduced Compensation Flow		
Qualifying Feature	**Conservation Status:** **Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.**	**Site Condition (where relevant to feature):** **Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)[45] where relevant.**	**Potential Effects**	**Mitigation**	**Assessment of effects on conservation objectives and site integrity**
			of the scenarios considered is not considered significant. Furthermore, the proportionate reduction in freshwater inflows is likely an overestimation as data is not available for many of the minor tributaries and smaller catchments. It should also be noted that freshwater inflows into the Severn Estuary is controlled by a tidal sluice/flap located at the bottom of both the River Axe and the River Yeo. Freshwater/estuarine interaction is therefore driven by the tidal regime which will not be affected by the implementation of the drought options (either alone or in-combination).		

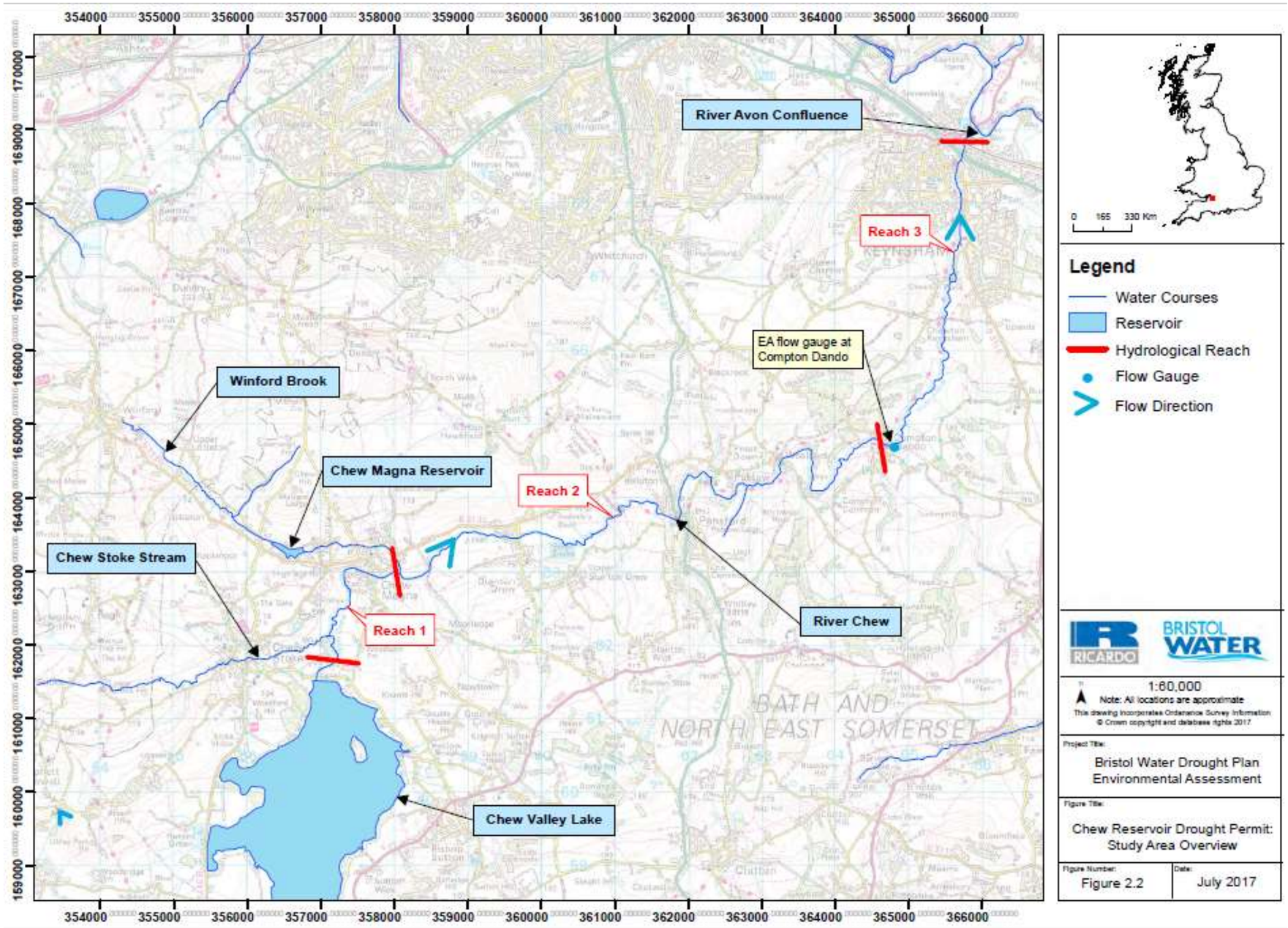

Figure A10.. Location of the Chew Reservoir drought permit and its hydrological zone of influence.

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Figure A11.. Example of BART's River Chew fish barrier mapping: Black circles represent potential barriers to fish movement (BART, 2020)

Figure A12 . Location of the fish migration barriers identified in River Chew Reach 1 from the barrier assessment

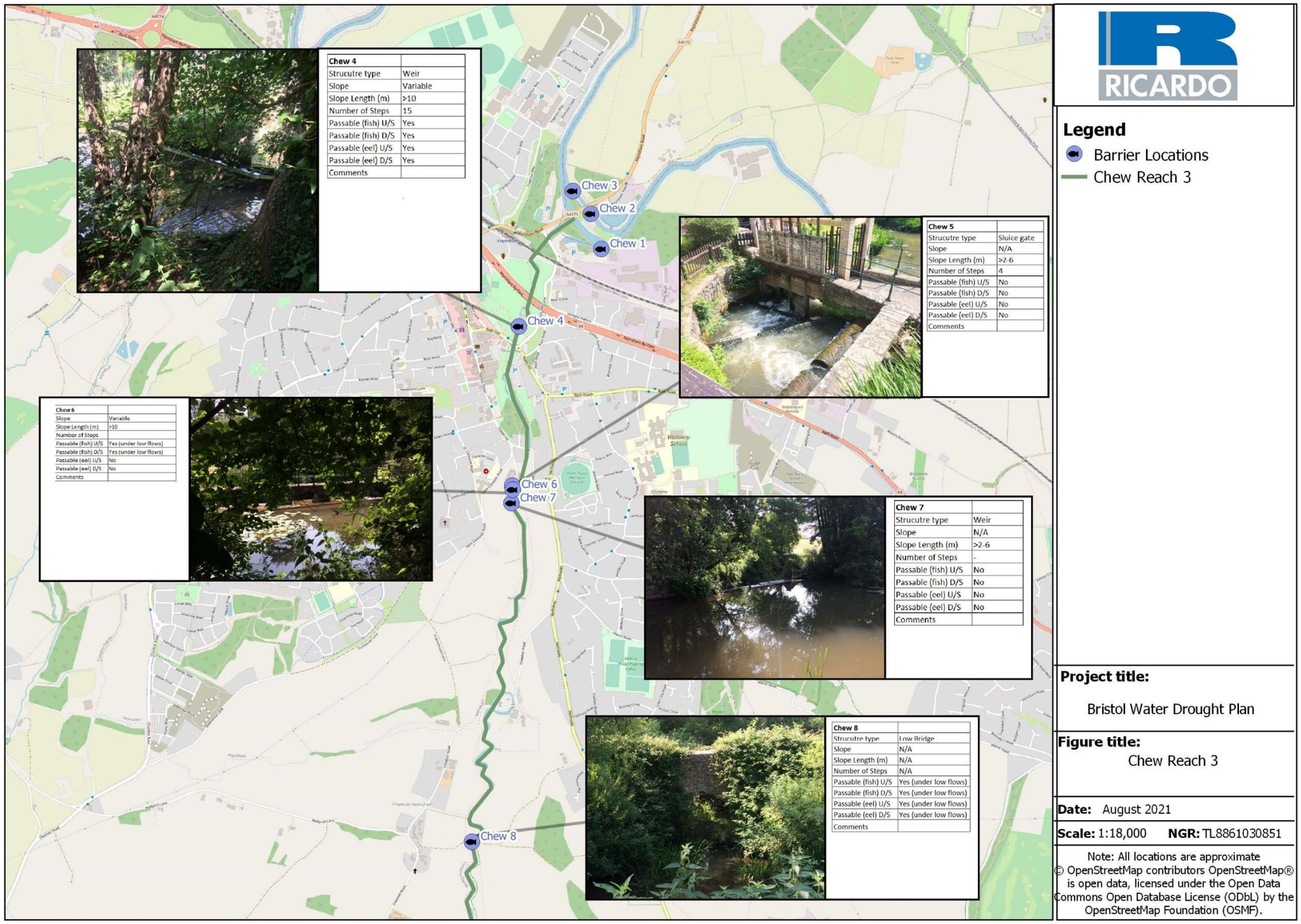

Figure A13. Location of the fish barriers identified in the River Chew Reach 3 from the barrier assessment

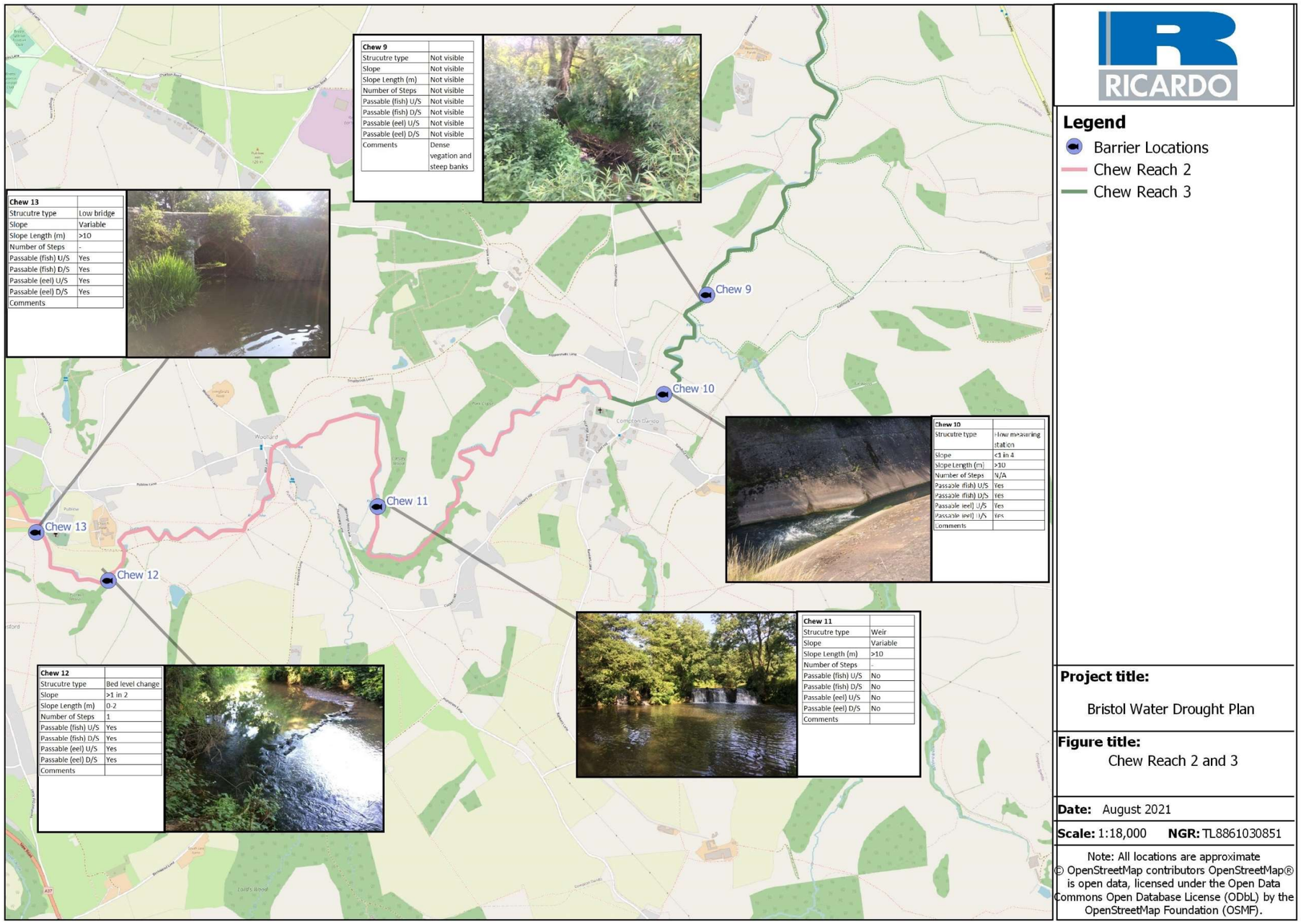

Figure A14. Location of the fish migration barriers identified in the River Chew reaches 2 and 3 from the barrier assessment

R24R Well Supply Augmentation Measure

DESIGNATED SITE: North Somerset and Mendip Bats SAC REF: UK0030052			PLAN NAME: Bristol Water Drought Plan OPTION NAME: R24R Well Supply Augmentation Measure		
Qualifying Feature	**Conservation Status:** **Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.** **Supplementary Advice on the conservation Objectives (SACOs)**	**Site Condition (where relevant to feature):** **Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)[49] where relevant.**	**Potential Effects**	**Mitigation**	**Assessment of effects on conservation objectives and site integrity**
CONSTRUCTION PHASE					
1303 Lesser horseshoe bat *Rhinolophus hipposideros* **1304 Greater horseshoe bat *Rhinolophus ferrumequinum***	The limestone caves of the Mendips provide a range of important hibernation sites for the lesser horseshoe bat and greater horseshoe bat. The total lesser horseshoe bat UK population of about 17,000 individuals is dispersed, occurring in over 170 maternity roosts and over 300 hibernation sites in south-west England and Wales. Greater horseshoe bat has suffered a loss of over half its range in the UK, and populations are close to the climatic limits for this species. The total UK population of approximately 4,000 individuals can be divided into about twelve discrete population which range from 80 to 600 breeding females. This site in south-west England is selected on the basis of the size of population represented (3% of the UK greater horseshoe bat population) and its good conservation of structure and function, having both maternity and hibernation sites. This site contains an exceptionally good range of the sites used by the population, comprising two maternity sites in lowland north Somerset and a variety of cave and mine hibernation sites in the Mendip Hills. Summary of the SACOs: **Population abundance - hibernation site:** Maintain the abundance of the population **Distribution of supporting habitat:** Maintain the distribution and continuity of the feature and its supporting habitat.	SSSI's of relevance to this feature: King's Wood & Urchin Wood SSSI • Unfavourable - recovering/unfavourable declining The Cheddar Complex SSSI • Favourable / unfavourable - recovering Brockley Hall Stables SSSI • Favourable Wookey Hole SSSI • Favourable Compton Martin Ochre Mine SSSI • Unfavourable Banwell Caves SSSI • Favourable Relevant SAC Site Improvement Plan pressures/threats: • development in general; • changes to site conditions; and	The construction phase for this option is estimated to last approximately 6 months to reinstate the water source and construct of a new 4.2km pipeline from the source to Cheddar. Technical guidance[50] for the North Somerset and Mendips Bats SAC was issued by Somerset County Council in April 2019. The guidance document identifies consultation zones to help understand where it is necessary to seek ecological advice at the early stages of a project in order to avoid harm to the bat populations associated with the SAC. Within these consultation zones the guidance sets out clear requirements for survey information and puts a strong emphasis on retaining and enhancing key habitat for bats and effective mitigation where required. The consultation zones within the vicinity of the R24R Well proposed construction works are shown in Figures A15 to A17. The route falls mostly within Band B of the Bat Consultation Zone. However, this guidance is for planning purposes and is more intended in relation to new build development. The guidance does not strictly apply to pipeline construction of a pipeline, but it has been referred to in developing a reasonable and proportionate approach. The proposed option is located within Zone A and B of the Bat Consultation Zones (Figure A16) but outside the Juvenile Sustenance Zone (Figure A17). The proposal is not located within the SAC boundary. Where a proposal within Zones A or B of the Consultation Zone has the potential to affect the features identified as known bat roost, SSSI, linear features (hedgerows, tree lines), pasture or wetland habitats, early discussions should take place with the Local Planning Authority (LPA) who will consult Natural England (NE) as necessary. Zone C requires consultation with an ecologist.	**Consultation etc. for Zone A-C:** Consultation was undertaken with Natural England on 25 March 2021. The potential effects and approach to mitigation and the overall conclusion, as set out below were discussed and agreed. **Mitigation:** Mitigation measures are in accordance with the technical guidance for the North Somerset and Mendips Bats SAC, where applicable, and the consultation response, using existing practices with proven success. Owing to the nature of the works, novel, bespoke mitigation is not required. **Habitat loss/Degradation/Fragmentation:** • There is not much scope for avoidance through radical re-routing, however, minor alterations to the alignment will be sought where this would avoid a valuable feature (mature trees and use of existing hedgerow gaps) • Trees with potential and confirmed roosts would be avoided • Hedgerows and linear features that cannot be avoided through minor alternations to the route, (drainage ditches and hedgerows), will be avoided through directional drilling / use of existing gaps. • Construction will be undertaken by working in short sections to minimise the duration of temporary grassland loss • Separate topsoil and subsoil for layered replacement to aid recovery of habitats • Habitat replacement (grassland) and maintenance to establishment. Unimproved or species rich semi-improved grassland would not be re-seeded, whereas species poor grasslands would.	No adverse effects alone or in combination

[49] http://publications.naturalengland.org.uk/publication/6226153064890368
[50] North Somerset and Mendip Bats Special Area of Conservation (SAC) Guidance on Development: Supplementary Planning Document Adopted January 2018

DESIGNATED SITE: North Somerset and Mendip Bats SAC REF: UK0030052			PLAN NAME: Bristol Water Drought Plan OPTION NAME: R24R Well Supply Augmentation Measure		
Qualifying Feature	**Conservation Status:** **Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.** **Supplementary Advice on the conservation Objectives (SACOs)**	**Site Condition (where relevant to feature):** **Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)[49] where relevant.**	**Potential Effects**	**Mitigation**	**Assessment of effects on conservation objectives and site integrity**
	Extent of supporting habitat: Maintain the total extent of the habitats which support the feature **Condition of underground site hibernation:** Maintain the structural integrity of the roost space, with no recent collapses/falls or signs of geological instability. Temperature, humidity, light levels. **Flightlines from roost into surrounding habitat and foraging areas:** Maintain the presence, structure and quality of any linear landscape features unlit, which function as flightlines. **Supporting off-site habitat (foraging areas):** Feeding habitat outside of the SAC boundary that are critical to Lesser Horseshoe bats during their [breeding OR hibernation] period. **Internal condition of underground site - maternity and hibernation:** Maintain or as necessary restore appropriate light levels, humidity, temperature and ventilation **Roost access:** Maintain the number of access points to the roost at an optimal size and in an unlit and unobstructed state, with surrounding vegetation providing sheltered flyways **Adaptation and resilience:** Maintain the feature's ability, and that of its supporting habitat, to adapt or evolve to wider environmental change, either within or external to the site. **Air quality:** Restore concentrations and deposition of air pollutants to at or below the site-relevant Critical Load. **Conservation measures:** Maintain the management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain the structure, functions and supporting processes	• air pollution (atmospheric nitrogen)	The pipeline route is shown in Figures 18a and 18b and starts within Cheddar (Zone A) and follows the route of main roads out to the B3151 to the southwest of the town. This is a short, direct route out of a built-up area through Zone A, then through pastures bordered by hedgerows and trees as (identified via aerial photography). The route then crosses several open fields (Band B). From aerial photography these appear to be pasture grassland with maintained hedgerows and a rhyne (i.e. drainage ditch). The route ends at a proposed pumping station to the south of the village of Draycot (border of Band B and C). **Habitat loss:** Unmitigated, the pipeline has potential to result in short-term, temporary habitat loss of hedgerows, trees and grazed pasture along a linear route, with potential for habitat fragmentation. This area would represent a small area of temporary habitat (5.7ha) within a wider foraging area. Without mitigation measures, the proposed pipeline could result in loss of roosting habitat if trees offering Potential Roosting Features were to be removed. **Habitat Degradation:** There is a risk of habitat degradation from dust during construction. The production of dust through construction activities is not considered to be an issue at a distance of greater than 50m from the construction site. No dust producing activities will occur within 50m of a designated site. However, the route lies within zones A-C and therefore dust pollution could degrade important foraging and commuting habitat for horseshoe bats. This is a temporary effect, approximately 6 months. Dust has a short-term effect and causes a temporary reduction of photosynthesis to vegetation, until the next rainfall that will wash it off. **Disturbance:** In the event that any construction work is to be undertaken at night, then this activity is likely to result in an increase of noise/vibration/lighting disturbance to foraging bats, with potential effects on foraging success and survival. **Pollution Incidents – oil, contaminated discharges:** Toxic contamination is a threat to all habitats within the vicinity of the works that support bats, through oil spills and discharges of contaminated liquids. Pollution impacts on habitat quality have temporary effects on foraging resource and survival. **Biological Disturbance – Invasive non-native species:**	• In order to provide biodiversity net gain, opportunities for enhancement to hedgerows will be sought. With the above measures in place, there will be: • No habitat fragmentation. • Minor, temporary loss of grassland habitat only. The proportion of the habitat lost within Zone B is 0.001ha. • Impacts of short duration **Disturbance** will be avoided through the following measures: • Route alignment will be a safe distance from trees with potential and confirmed roosts to avoid risk of disturbance to roosts. • No night working • No artificial lighting near sensitive woodlands, potential or confirmed roosts, watercourses and hedgerows **Pollution** will be avoided through the following measures: • As a matter of course, any work undertaken will adhere to strict best practice pollution prevention measures • Best practice pipeline construction and drainage strategy will be developed and implemented, in particular ensuring no discharging of surface run-off and groundwater into the adjacent habitats within Bat Consultation Zones. • A drainage strategy including treatment measures will need to be agreed with the relevant regulators (EA and NE). If the measures to remove silt and contamination do not satisfy the EA and NE then an alternative discharge arrangement will need to be made e.g. to sewer or tankered off site. **Air quality** impacts will be avoided through: • Use of dust suppression measures. **Invasive non-native species** impacts will be avoided through: • A habitat survey of the works areas will be undertaken to identify the presence of invasive non-native species, as part of the baseline assessments. • If identified, a suitable control programme will be	

DESIGNATED SITE: North Somerset and Mendip Bats SAC REF: UK0030052			PLAN NAME: Bristol Water Drought Plan OPTION NAME: R24R Well Supply Augmentation Measure		
Qualifying Feature	**Conservation Status:** **Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.** **Supplementary Advice on the conservation Objectives (SACOs)**	**Site Condition (where relevant to feature):** **Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)[49] where relevant.**	**Potential Effects**	**Mitigation**	**Assessment of effects on conservation objectives and site integrity**
	associated with the feature and/or its supporting habitats. **Disturbance from human activity:** Control and minimise unauthorised public access to roost sites **Water quantity/ quality:** Where the feature or its supporting habitat is dependent on surface water and/or groundwater, maintain water quality and quantity to a standard which provides the necessary conditions to support the feature <u>Additional SACOs for greater horseshoe:</u> **Population abundance - maternity colony:** Maintain the abundance of the breeding population at a level which is above 350 **External condition of building - maternity colony:** Maintain the structural integrity and weatherproofing of roof, walls etc, with no significant shading of the main roost area by trees/vegetation or manmade structures.		The works may have the potential to spread invasive non-native species.	undertaken and biosecurity best practice measures adopted. **<u>Surveys:</u>** On this basis of this assessment and given the guidance, habitat surveys are required to obtain sufficient information to determine the detail of the exact location for the above mitigation measures for tree/hedgerow avoidance and directional drilling, prior to implementation of construction. The survey will involve a habitats-based approach of the route to: • Ground truth the grassland habitats, to confirm the locations for habitat re-instatement methods for species rich and species poor grasslands. • Identify the exact locations of features that require directional drilling for avoidance. Species surveys are not considered necessary, as: • the mitigation is clear; • linear features will be avoided; • footprint of the scheme will result in such a small area of temporary habitat loss relative to surrounding habitat • impacts are over a very short duration, replacement and one growing season (bat activity season) With the above mitigation in place, and for the reasons set out above, the impacts will not have an adverse effect on site integrity, nor result in any long-term impacts.	
OPERATIONAL PHASE					
1303 Lesser horseshoe bat *Rhinolophus hipposideros* **1304 Greater horseshoe bat *Rhinolophus ferrumequinum***	As above for Construction Phase	As above for Construction Phase	Operational impacts relate to abstraction from R24R Well. **<u>Habitat degradation:</u>** Wetland habitat provides suitable foraging habitat for bats. The abstraction point lies on the edge of Zone B of the Bat Consultation Zone for horseshoe bats (Figure A15 and A16) in respect of impacts to key foraging habitat. Review of WFD groundwater tests in the Wells groundwater body identified the potential for abstraction to lead to minor (temporary and local) impacts on the water balance and negligible effects on saline intrusion or groundwater dependant terrestrial ecosystems. There are no groundwater dependent terrestrial ecosystems identified within the catchment and therefore no adverse effects on terrestrial habitats, including wetland	<u>Habitat degradation</u> The presence of level control structures provides mitigation for the abstraction to protect wetland habitats and bat foraging habitat. <u>Maintenance</u> Low level maintenance work is unlikely to cause an impact within appropriate mitigation for lighting, noise, vibration and vegetation removal, as described under 'construction mitigation'. Any potential impacts to roosts would be a licensable activity. <u>Pollution and Invasive Non-native Species</u> Minimise risk through pollution prevention and biosecurity measures during maintenance (as for construction	No adverse effects alone or in combination

DESIGNATED SITE: North Somerset and Mendip Bats SAC REF: UK0030052			PLAN NAME: Bristol Water Drought Plan OPTION NAME: R24R Well Supply Augmentation Measure		
Qualifying Feature	**Conservation Status:** **Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.** **Supplementary Advice on the conservation Objectives (SACOs)**	**Site Condition (where relevant to feature):** **Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)[49] where relevant.**	**Potential Effects**	**Mitigation**	**Assessment of effects on conservation objectives and site integrity**
			habitats will occur. Within the River Axe, downstream of the Stoke Brook confluence, flow reduction due to abstraction from R24R Well is likely to impact on river velocities, rather than level, due to the management of water level by weirs and other structures in the River Axe. In particular, the presence of Bleadon Sluice downstream on the River Axe ensures that a sufficient water level is maintained within the River Axe. Consequently, no adverse effects are expected through the use of the R24R Well abstraction for a single year upon the horseshoe bats foraging habitats **Multi-season use of the drought plan:** The R24R Well option would be used to aid refill of Cheddar Reservoir with respect to a one-year drought and to provide support to the local supply area regarding a two-year drought. If the option is to be used over consecutive years, the effects on the River Axe are ameliorated by level-control and the presence of Bleadon Sluice that ensure water levels are maintained in the river, providing a sufficient water level to maintain wetland habitats. Additionally, wetland habitats are adapted to changes in water level and therefore no adverse impacts would result from any temporary reduced water level. **Maintenance:** Any maintenance of the pipeline involving machinery or works that result in noise above background noise, vibration, artificial lighting or vegetation removal have potential for disturbance to roosts and commuting routes. **Pollution incidents – accidental contaminated discharges:** During maintenance, if machinery is used there is potential for accidental spills that could damage vegetation that provides supporting habitat for horseshoe bats.	mitigation)	

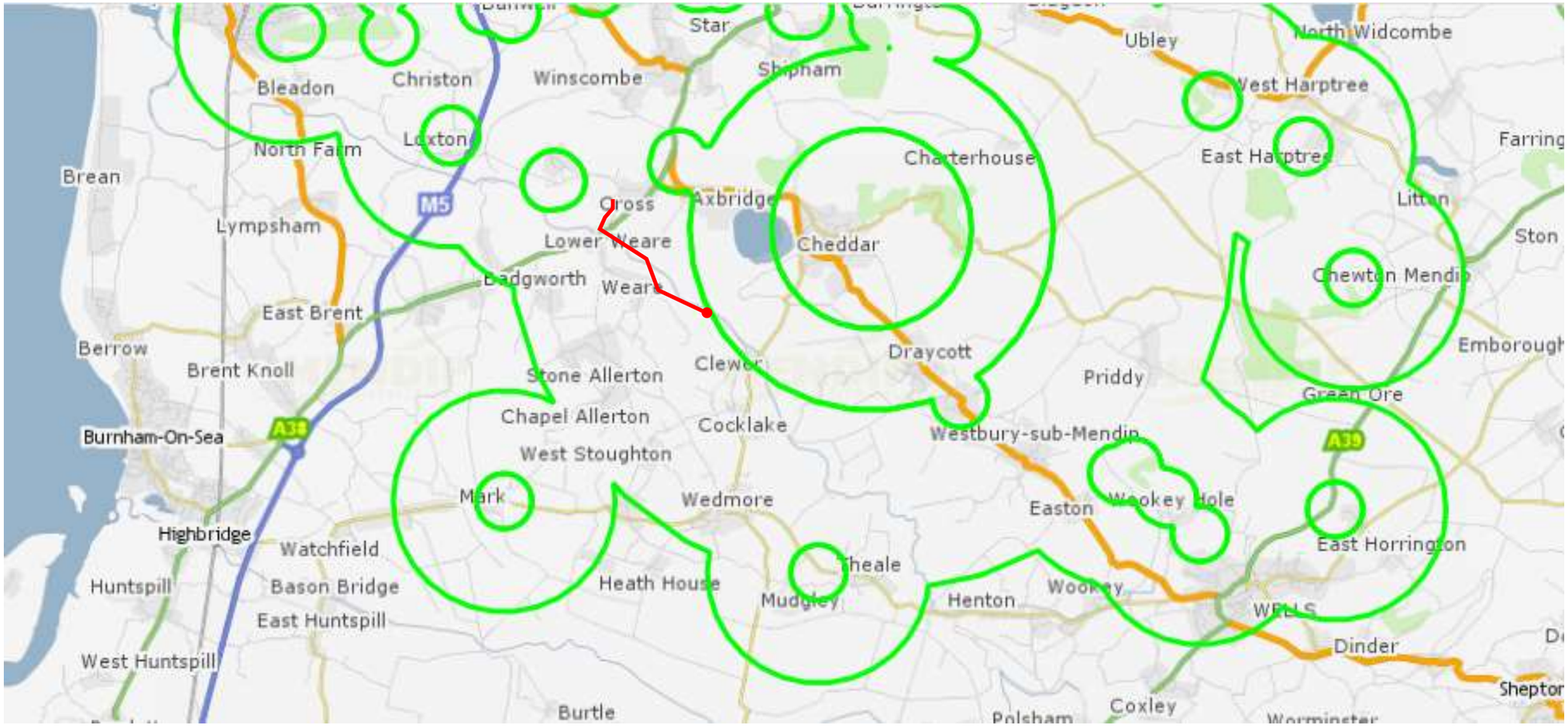

Figure A15.: North Somerset and Mendip Bats SAC Consultation Zones (North Somerset Council, January 202151) and location of R24R Well pipeline (red line)

[51] https://maps.mendip.gov.uk/mycouncil.aspx

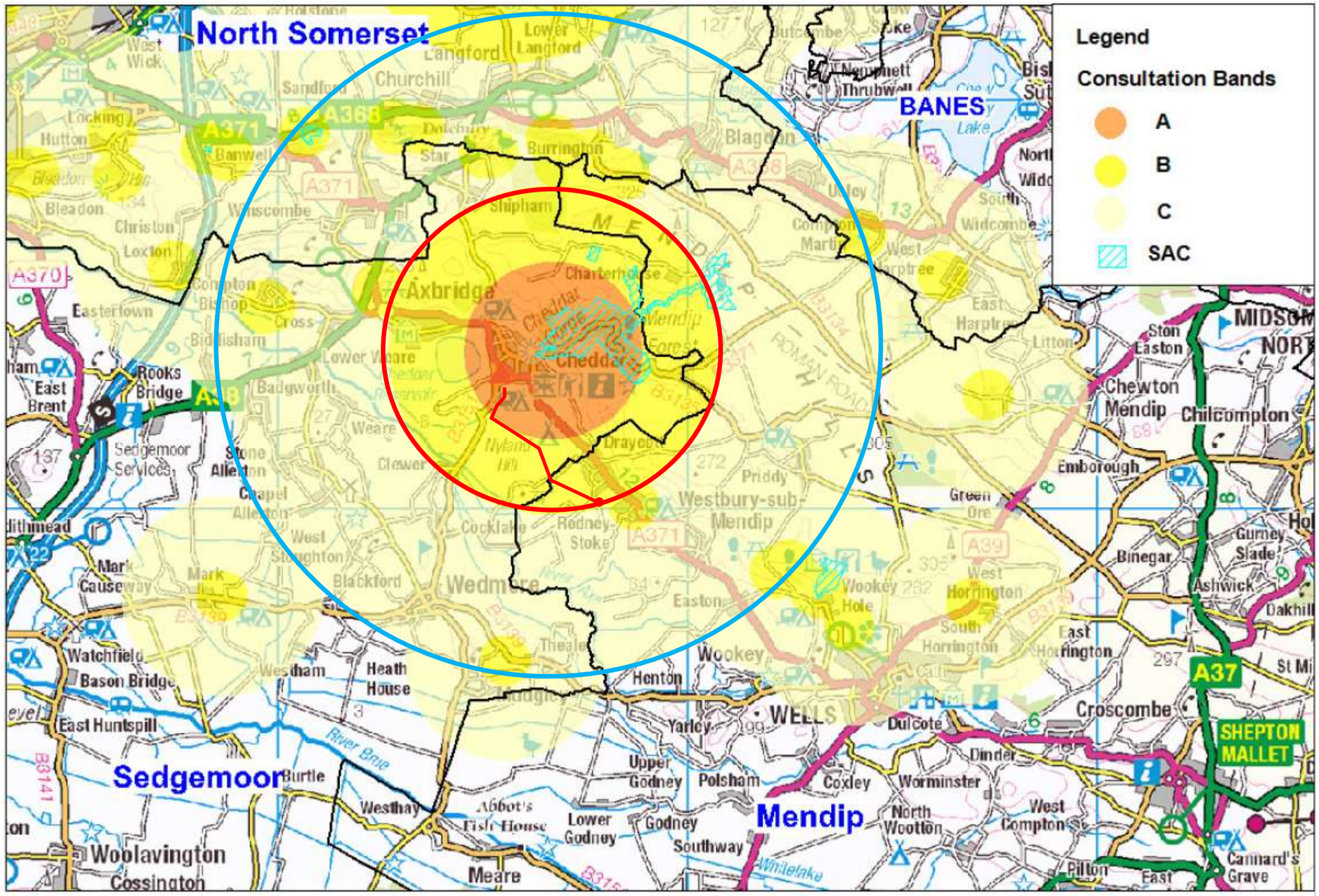

Figure A16. : Bat Consultation Zones for Horseshoe Bats in North Somerset (North Somerset Council, 201852) (Red circle is the boundary of Zones A and B, the blue circle is the boundary of Zone C, the route is shown as a red line)

[52] North Somerset and Mendip Bats Special Area of Conservation (SAC) Guidance on Development: Supplementary Planning Document Adopted January 2018

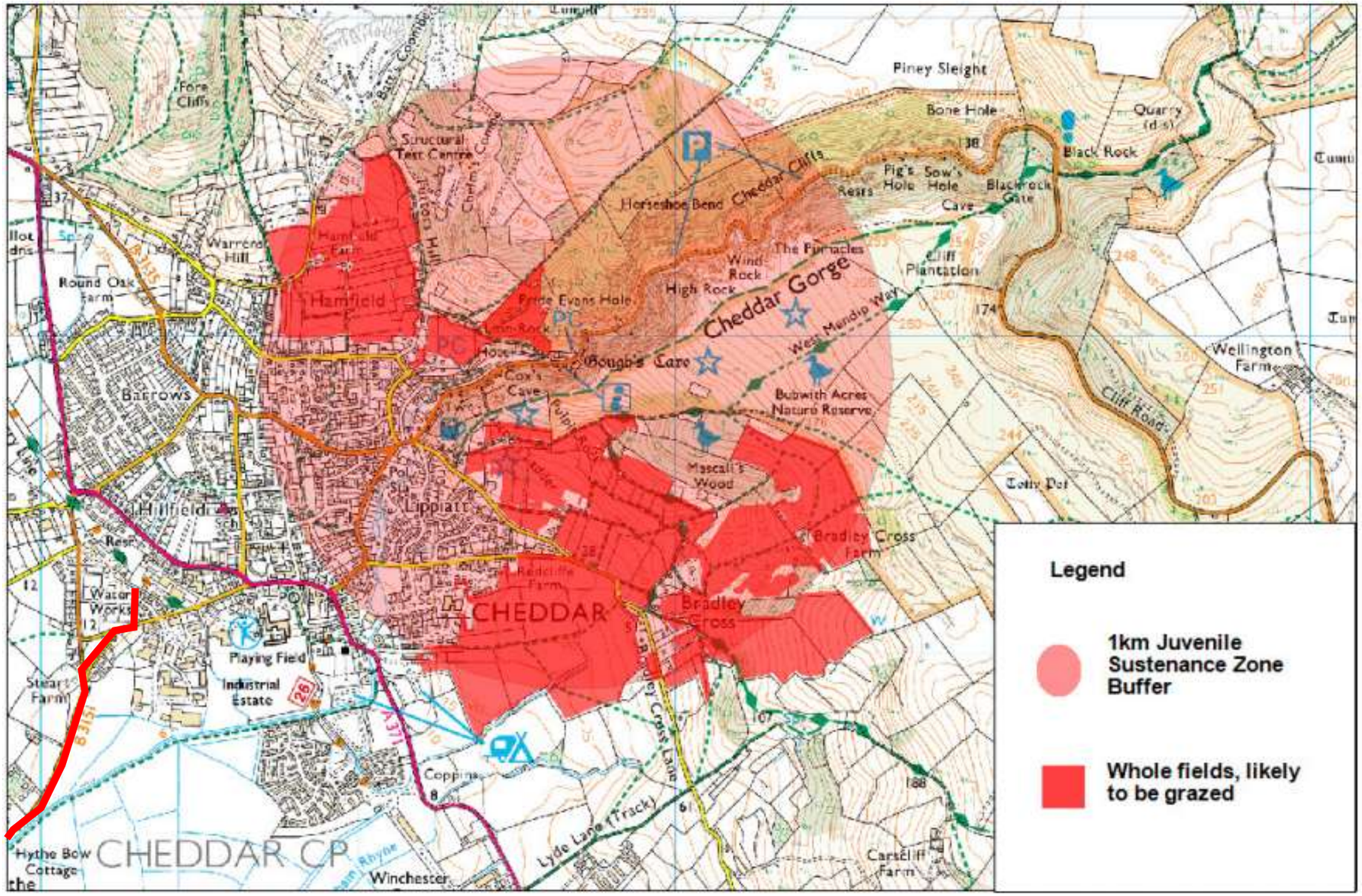

Figure A17: Juvenile Sustenance Zone, North Somerset (North Somerset Council, 20184) and the pipeline route (red line to the south-west corner)

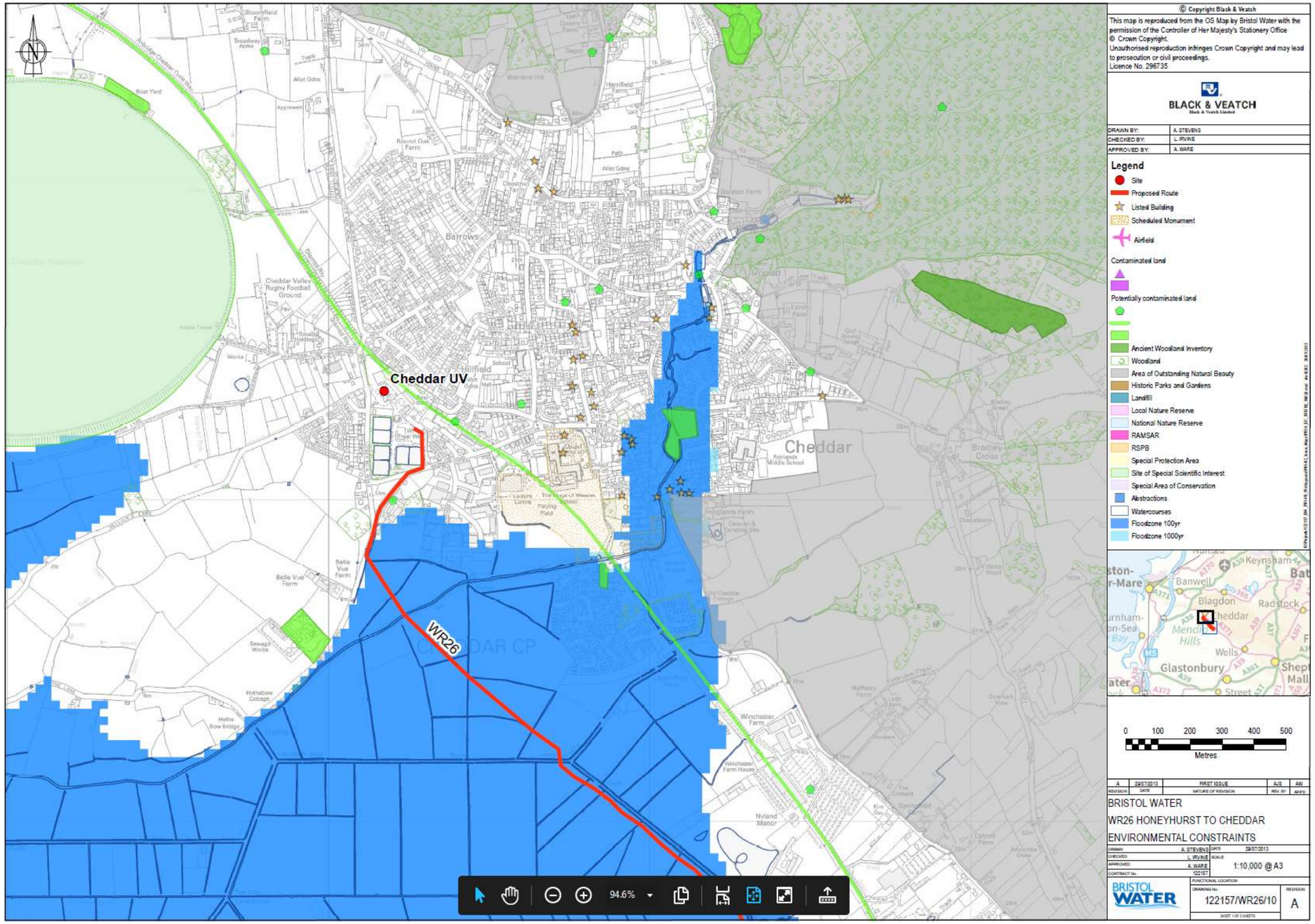

Figure A18a : Pipeline location (red line)

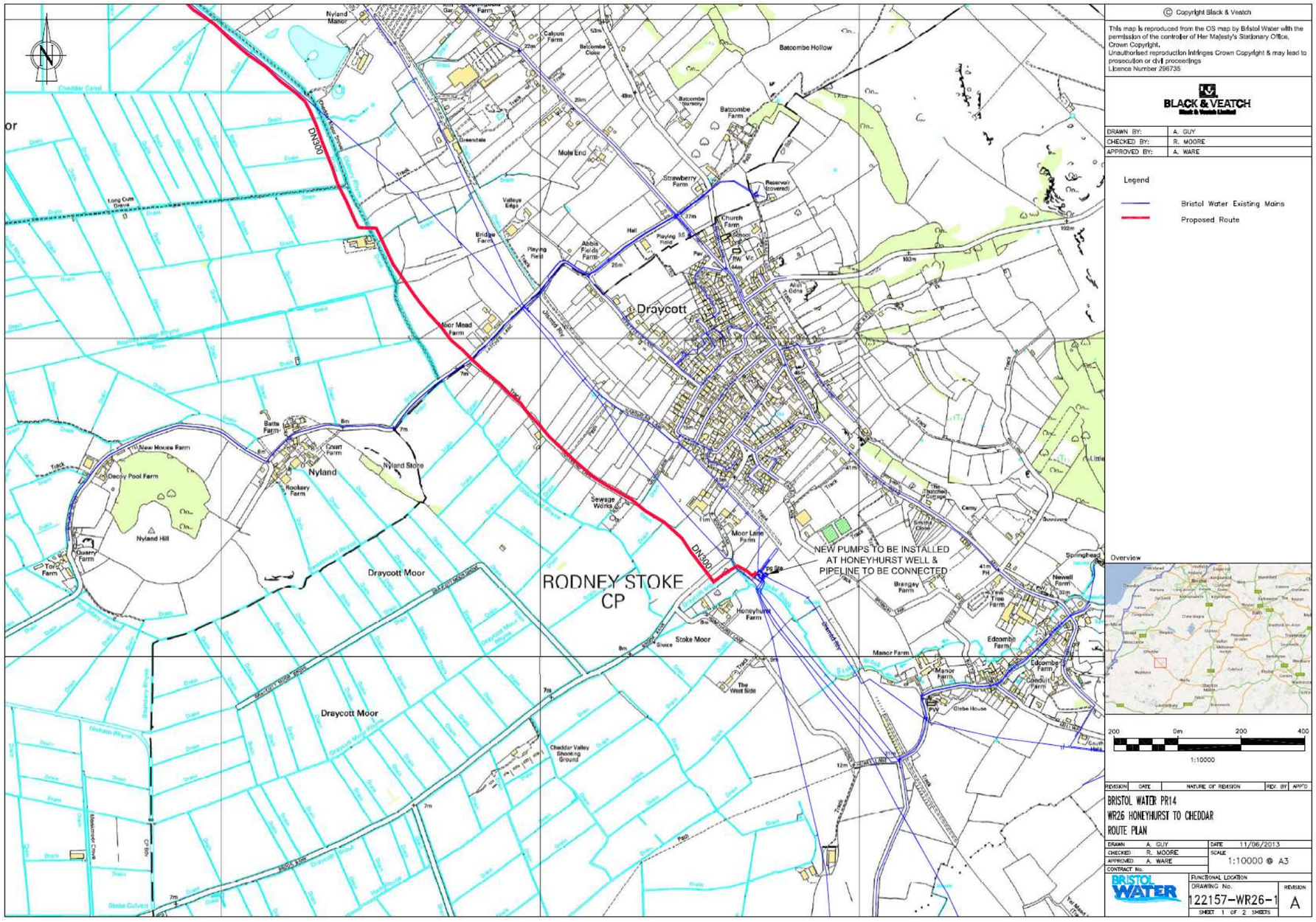

Figure A18b: Pipeline location (red line)

DESIGNATED SITE: Severn Estuary SAC & Ramsar REF: UK0013030 (SAC) & UK11081 (Ramsar)			PLAN NAME: Bristol Water Drought Plan OPTION NAME: R24R Well Supply Augmentation Measure		
Qualifying Feature	**Conservation Status:** **Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.**	**Site Condition (where relevant to feature):** **Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)53 where relevant.**	**Potential Effects**	**Mitigation**	**Assessment of effects on conservation objectives and site integrity**
CONSTRUCTION PHASE					
<u>SAC:</u> **1099 River lamprey *Lampetra fluviatilis*** **<u>Ramsar:</u>** **Criterion 4** Migratory: European eel *Anguilla anguilla* Atlantic salmon *Salmo salar* and brown/sea trout *Salmo trutta* **<u>Criterion 8</u>** The fish assemblage of the whole estuarine and river system is one of the most diverse in Britain, with over 110 species recorded.	Described under operational phase impacts below.	Described under operational phase impacts below.	Construction is estimated to last approximately 6 months to reinstate the water source and to construct a 4.2km pipeline to Cheddar. The construction activity is not located within the SAC boundary and is located approximately 20 km of the Severn Estuary SAC & Rasmar. Due to the distance of the construction works from the SAC& Rasmar and the localised scale/nature of the works, no adverse effects from the construction phase on the SAC and Ramsar designated features and site integrity will occur. Mitigation measures will be in place during construction to prevent any adverse effects on the water quality of the River Axe and Stoke Brook tributary stream that might potentially affect designated fish species migrating through the River Axe system.	**Pollution** will be avoided through the following measures: • As a matter of course, any work undertaken will adhere to strict best practice pollution prevention measures • Best practice pipeline construction and drainage strategy will be developed and implemented, in particular ensuring no discharging of surface run-off and groundwater into the river system. • A drainage strategy including treatment measures will need to be agreed with the relevant regulators (EA and NE). If the measures to remove silt and contamination do not satisfy the EA and NE then an alternative discharge arrangement will need to be made e.g. to sewer or tankered off site.	No adverse effects alone or in combination
OPERATIONAL PHASE					

[53] http://publications.naturalengland.org.uk/publication/4590676519944192?category=5755515191689216

DESIGNATED SITE: Severn Estuary SAC & Ramsar REF: UK0013030 (SAC) & UK11081 (Ramsar)			PLAN NAME: Bristol Water Drought Plan OPTION NAME: R24R Well Supply Augmentation Measure		
Qualifying Feature	**Conservation Status:** **Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.**	**Site Condition (where relevant to feature):** **Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)53 where relevant.**	**Potential Effects**	**Mitigation**	**Assessment of effects on conservation objectives and site integrity**
SAC: **1099 River lamprey *Lampetra fluviatilis*** **Ramsar:** **Criterion 4** Migratory: river lamprey, European eel *Anguilla anguilla* Atlantic salmon *Salmo salar* and brown/sea trout *Salmo trutta* **Criterion 8** The fish assemblage of the whole estuarine and river system is one of the most diverse in Britain, with over 110 species recorded.	Stoke Brook is a drainage ditch which flows into the River Axe, which ultimately discharges into the Severn Estuary. The catchment provides suitable habitat for migratory fish including European eel, Atlantic salmon and brown/sea trout as recorded in 2018 (EAR, 2021[54]) within the River Axe. Whilst, Atlantic salmon and trout were not recorded in the impacted reaches, based on the precautionary approach they are considered within this assessment. **River lamprey (SAC and Ramsar feature):** Species occurrence description not yet available. River lamprey is a normally anadromous species (i.e. spawning in freshwater but completing part of its life cycle in the sea), and therefore artificial obstacles such as weirs or dams impede migration. In the UK, the river lamprey is widespread and populations are strong. The UK populations are considered important for the conservation of the species at a European level. River lamprey migrate upstream to spawning grounds during winter and spring. **European eel (Ramsar feature):** European eel is a catadromous species (i.e. spawning in the sea and migrating into inland waters to grow and spend the majority of their life), and therefore artificial obstacles such as weirs or dams impede migration. In the UK, European eel is widespread. **Brown/sea trout (Ramsar feature):**	SSSI's of relevance to this feature: Severn Estuary SSSI • Favourable / Unfavourable – recovering / Unfavourable – no change / Unfavourable declining Bridgewater Bay SSSI • Favourable / Unfavourable – recovering / Unfavourable – no change Upper Severn Estuary SSSI • Favourable / Unfavourable – recovering / Unfavourable – declining Relevant SAC Site Improvement Plan pressures/threats: • physical modification (barriers to migratory activities). • developments in general; • change in species distributions (caused by climate change/other events); and • water pollution (water and sediment quality).	The R24R Well option will involve a 31.2% reduction in the Q95 flows in the River Axe downstream of the Stoke Brook confluence during the period May and October. There would be an associated impact on the flow/level regime in the River Axe downstream. The hydrological zone of influence is delimited by the downstream tidal limit of the River Axe at Brean Cross Sluice, where the influence of the R24R abstraction becomes negligible, and includes the River Axe for 12km from R24R Well. Within the zone of hydrological influence, the magnitude of influence on river hydrology diminishes with distance from the abstraction source, with a decreasing effect downstream on the river channel wetted width, wetted depth and flow velocity which affects in-channel habitat availability and quality. Three hydrological reaches have been identified within the zone of influence: • Reach 1: Stoke Brook from R24R wells to the River Axe confluence. • Reach 2: River Axe to the River Old Axe confluence. • Reach 3: River Axe from River Yeo confluence to tidal limit at Brean Cross Sluice (tidal lock). The River Axe is a level-controlled river at its confluence with the River Old Axe. The Severn Estuary SAC, SPA and Ramsar is 9km downstream from this point. **Habitat degradation/loss:** A review of recent (2010- 2021) baseline data shows records of migratory fish (EAR, 2021), including low abundances of European eel within Reach 2. The River Axe, as part of the Severn Estuary catchment, provides potential habitat (in particular spawning and juvenile habitat) for migratory fish, including brown/sea trout, Atlantic salmon and European eel. Hydrological changes (water velocity, wetted depth, wetted width and natural flood regime) due to the R24R	• Temporary reduction or cessation of the terms of the abstraction if water quality monitoring and/or fish distress monitoring indicate a sharp deterioration in aquatic conditions. • Fish distress monitoring with triggers for an environmental response plan: regular visual observations carried out on key stretches of the impacted river reaches to detect signs of large-scale fish distress and agree appropriate mitigation with the Environment Agency specific to the conditions identified. This might include temporary oxygenation measures. • Water quality monitoring: dissolved oxygen, pH, turbidity, conductivity and temperature using calibrated handheld equipment. •	No adverse effects alone or in combination

[54] Bristol Water Plc (2021). R24R Wells Drought Permit Environmental Assessment. Report by Ricardo, October 2021.

DESIGNATED SITE: Severn Estuary SAC & Ramsar REF: UK0013030 (SAC) & UK11081 (Ramsar)			PLAN NAME: Bristol Water Drought Plan OPTION NAME: R24R Well Supply Augmentation Measure		
Qualifying Feature	**Conservation Status:** **Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.**	**Site Condition (where relevant to feature):** **Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)53 where relevant.**	**Potential Effects**	**Mitigation**	**Assessment of effects on conservation objectives and site integrity**
	Brown/sea trout is an anadromous species, migrating upstream to spawning grounds usually between July and September whilst migrating downstream in April/June. Spawning activities typically occur between January and March. Therefore, artificial obstacles such as weirs or dams impede migration. In the UK, the brown/sea trout is widespread. **<u>Atlantic salmon (Ramsar feature):</u>** Atlantic salmon is an anadromous species, migrating upstream to spawning grounds during the autumn. Spawning activities occur in autumn and winter months. Atlantic salmon is a widespread species in the UK and is found in several hundred rivers, many of which have adult runs in excess of 1000. The latest estimates of the UK spawning population size are however, about 50% down on the ten-year average. Atlantic salmon migrate upstream from November to February.		Well abstraction could result in lower flow leading to siltation of spawning gravels, loss of important habitats (spawning gravels, nursery habitat and resting pools), water quality degradation (changes to physiochemical elements such as pH, temperature, ammonia and phosphate levels) and/or fragmentation of habitats and increased significance of obstacles/barriers. Reductions in flow can lead to a reduction in river channel wetted width and depth, affect longitudinal connectivity and an increase in marginal channel exposure within an affected watercourse. However, given the low channel slopes and highly modified nature of the reaches and their extensive resectioning to produce relatively box-shaped channels, particularly Reach 2 and Reach 3, changes in flow are not likely to exert any adverse impact in these two reaches. There is a risk that hydrological changes could result in changes in wetted width and depth in Reach 1. Changes in wetted depth and width could impact on the habitat for Atlantic salmon fry and parr, particularly in the months following incubation (April and May). However, with the implementation of adequate mitigation measures to ensure that habitat quality is maintained during abstraction, the R24R Well option is not considered to have an adverse impact upon migratory fish. **<u>Connectivity degradation</u>** Baseline data from the Catchment Based Approach Data Hub[55] and Bristol Avon Rivers Trust (BART, 2019[56]) identified two key obstructions along the River Axe: Bleadon sluice, (a flood management structure impassable to fish when closed, and Brean Cross sluice at the tidal limit. One additional sluice was recorded during the fish barrier walkover survey (BART, 2019) between these two key obstructions on the River Axe. Additionally, a further barrier assessment was completed in 2021 within the zone of hydrological influence. The assessment included a desktop review satellite imagery and of all available barrier datasets detailed in the barrier assessment methodology[57] for known obstruction in order to identify the likely passability of		

[55] Catchment Based Approach Data Hub, Environment Agency: Priority Barriers - Eel Priority | Catchment Based Approach accessed 2nd March 2021.
[56] BART, 2019. River Axe (Somerset) Habitat Walkover Survey (version 0.1). Summer 2019.
[57] Bristol Water Plc (2021) Bristol Water Drought Plan – HRA & Appropriate Assessment – Fish barrier walkover: Methodology Document. Reported by Ricardo, June 2021

DESIGNATED SITE: Severn Estuary SAC & Ramsar REF: UK0013030 (SAC) & UK11081 (Ramsar)			PLAN NAME: Bristol Water Drought Plan OPTION NAME: R24R Well Supply Augmentation Measure		
Qualifying Feature	**Conservation Status:** **Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.**	**Site Condition (where relevant to feature):** **Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)53 where relevant.**	**Potential Effects**	**Mitigation**	**Assessment of effects on conservation objectives and site integrity**
			fish under low flow conditions. Several additional barriers for noted in Reach 3. Whilst the Brean Cross sluice is equipped with fish and eel pass, the two further sluices create an obstruction when closed. Presence of migratory fish have been recorded upstream of the obstructions within the catchment confirming that these obstacles do not obstruct fish migration with the current flow conditions when the sluices are opened. Therefore, the implementation of the R24R Well abstraction itself is not considered to reduce the fish migration which depends on the sluice management. The additional abstraction will not create additional stress upon the fish migration due to a decrease of the water flow. As such, impacts to migration within the reaches due to low flow conditions will likely be limited. European eel are less sensitive to changes in flow. As noted above, migration within the zone of hydrological influence is closely linked to sluice management and is unlikely to be affected by the implementation of the abstraction. Elver (juvenile eel) enter rivers in early spring and a general upstream migration occurs throughout the course of the year. Elver migration is not linked to periods of increased flow, with low flow conditions unlikely to impact migration. The operation of the Bristol Water drought options in-combination with other options has also been considered (see the appropriate assessment for the Blagdon drought permit). The assessment concluded that the proportionate reduction in all of the scenarios considered is not considered significant. Furthermore, the proportionate reduction in freshwater inflows is likely an overestimation as data is not available for many of the minor tributaries and smaller catchments. It should also be noted that freshwater inflows into the Severn Estuary is controlled by a tidal sluice/flap located at the bottom of both the River Axe and the River Yeo. Freshwater/estuarine interaction is therefore driven by the tidal regime which will not be affected by the implementation of the drought options (either alone or in-combination).		

DESIGNATED SITE: Severn Estuary SAC & Ramsar REF: UK0013030 (SAC) & UK11081 (Ramsar)			PLAN NAME: Bristol Water Drought Plan OPTION NAME: R24R Well Supply Augmentation Measure		
Qualifying Feature	**Conservation Status:** **Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.**	**Site Condition (where relevant to feature):** **Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)53 where relevant.**	**Potential Effects**	**Mitigation**	**Assessment of effects on conservation objectives and site integrity**

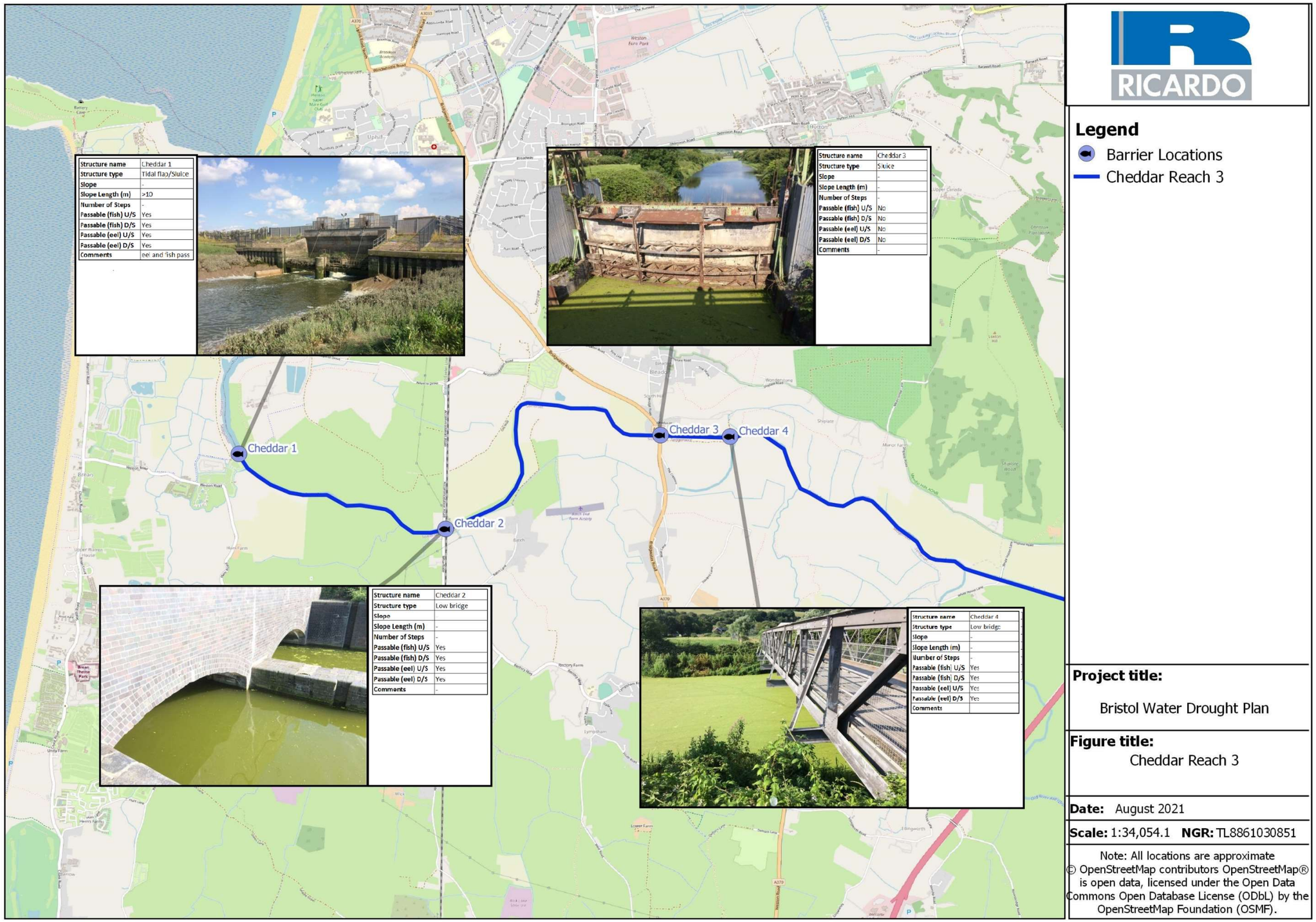

Figure A19. Presence of fish obstruction and fish pass on the River Axe

DESIGNATED SITE: Mendip Limestone Grasslands SAC REF: UK0030203			PLAN NAME: Bristol Water Drought Plan OPTION NAME: R24R Well Supply Augmentation Measure		
Qualifying Feature	**Conservation Status:** **Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.** **Supplementary Advice on Conservation Objectives (SACOs):**	**Site Condition (where relevant to feature):** **Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)[58] where relevant.**	**Potential Effects**	**Mitigation**	**Assessment of effects on conservation objectives and site integrity**
CONSTRUCTION PHASE					
1304 Greater horseshoe bat	The greater horseshoe bat is one of the largest bats in the UK. During the summer, they form maternity colonies, generally in large old buildings, and forage in pasture, edges of mixed deciduous woodland and hedgerows. In winter, they depend on caves, abandoned mines and other underground sites for undisturbed hibernation. A system or series of sites is required. Summer and winter roosts are usually less than 20-30 km apart. The bats are vulnerable to the loss of insect food supplies due to insecticide use, changing farming practices and the loss of broad-leaved tree-cover, and to the loss or disturbance of underground roost sites. Summary of the SACOs **Population abundance - hibernation site**: Maintain OR if necessary, restore the abundance of the hibernating population to that recorded in the 2002-03 **Distribution of supporting habitat**: Maintain OR if necessary, restore the distribution and continuity of the feature and its supporting habitat **Extent of supporting habitat:** Maintain OR if necessary, restore the total extent of the habitat(s) which support the feature. Grasslands, Tilio-Acerion forests of slopes, screes and ravines; woodland with rocky slopes, other woodland, scrub, hedges and heathland. **Flightlines from roost into surrounding habitat and foraging areas:** Maintain OR if necessary, restore the presence,	SSSI's of relevance to this feature: King's Wood & Urchin Wood SSSI • Unfavourable - recovering/unfavourable declining The Cheddar Complex SSSI • Favourable / unfavourable - recovering Brockley Hall Stables SSSI • Favourable Wookey Hole SSSI • Favourable Compton Martin Ochre Mine SSSI • Unfavourable Banwell Caves SSSI • Favourable Relevant SAC Site Improvement Plan pressures/threats: • development in general; • changes to site conditions; and • air pollution (atmospheric nitrogen)	The site is approximately 2.9km from the likely construction area and direct or indirect construction effects are possible given the construction route lies within Zones A and B of a Bat Consultation Zone for horseshoe bats (see earlier for North Somerset and Mendip Bats SAC). (, in respect of impacts to key foraging habitat. Therefore, the potential construction impacts are as per North Somerset and Mendip Bats SAC (above).	As per North Somerset and Mendip Bats SAC (see above).	No adverse effects either alone or in combination

[58] http://publications.naturalengland.org.uk/publication/6226153064890368

DESIGNATED SITE: Mendip Limestone Grasslands SAC REF: UK0030203			PLAN NAME: Bristol Water Drought Plan OPTION NAME: R24R Well Supply Augmentation Measure		
Qualifying Feature	**Conservation Status:** **Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.** **Supplementary Advice on Conservation Objectives (SACOs):**	**Site Condition (where relevant to feature):** **Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)[58] where relevant.**	**Potential Effects**	**Mitigation**	**Assessment of effects on conservation objectives and site integrity**
	structure and quality (unlit) of any linear landscape features which function as flightlines. **Roost access:** Maintain OR if necessary, restore the number of access points to the roost, with sheltered flyways without obstructing accesses. **Soils, substrate and nutrient cycling:** Maintain OR Restore the properties of the underlying soil types within typical values for the supporting habitat. **External condition of underground site – hibernation:** Maintain the structural integrity of the roost space and vegetation close to the entrance. **Adaptation and resilience:** Maintain OR if necessary, restore the feature's ability, and that of its supporting habitat, to adapt or evolve to wider environmental change, either within or external to the site. **Air quality:** Maintain or, where necessary, restore concentrations and deposition of air pollutants to at or below the site-relevant Critical Load. **Conservation measures:** Maintain OR if necessary, restore the management measures (either within and/or outside the site boundary as appropriate) to maintain OR restore the structure, functions and supporting processes associated with the feature and/or its supporting habitats. **Disturbance from human activity:** Control and minimise human access to roost				

DESIGNATED SITE: Mendip Limestone Grasslands SAC REF: UK0030203			PLAN NAME: Bristol Water Drought Plan OPTION NAME: R24R Well Supply Augmentation Measure		
Qualifying Feature	**Conservation Status:** **Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.** **Supplementary Advice on Conservation Objectives (SACOs):**	**Site Condition (where relevant to feature):** **Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)[58] where relevant.**	**Potential Effects**	**Mitigation**	**Assessment of effects on conservation objectives and site integrity**
	sites				
OPERATIONAL PHASE					
1304 Greater horseshoe bat	As above for Construction	As above for Construction	Wetland habitat provides suitable foraging habitat for bats. The abstraction point lies within Zones A and B of a Bat Consultation Zone for horseshoe bats in respect of impacts to key foraging habitat. Therefore, the potential construction impacts are as per North Somerset and Mendip Bats SAC (see above).	As per North Somerset and Mendip Bats SAC (see above).	No adverse effects either alone or in combination

DESIGNATED SITE: Somerset Levels and Moors SPA and Ramsar REF: UK9010031			PLAN NAME: Bristol Water Drought Plan OPTION NAME: R24R Well Supply Augmentation Measure		
Qualifying Feature	**Conservation Status:** **Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.**	**Site Condition (where relevant to feature):** **Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)[59] where relevant.**	**Potential Effects**	**Mitigation**	**Assessment of effects on conservation objectives and site integrity**
CONSTRUCTION PHASE					
A037 Bewick's swan *Cygnus columbianus bewickii*; (Non-breeding) **A052 Eurasian teal *Anas crecca*; (Non-breeding)** **A140 European golden plover *Pluvialis apricaria*; (Non-breeding)** **A142 Northern lapwing *Vanellus vanellus*; (Non-breeding)** **Waterbird assemblage** **Article 4.1** **Over winter the area supports:** Bewick's swan Golden plover **Article 4.2** **Over winter, the area supports:** Shoveler *Anas clypeata,* Teal*,* Wigeon *Anas Penelope,* snipe *Gallinago gallinago*, lapwing, pintail *Anas acuta*, gadwall *Anas strepera*, golden plover, Bewick's swan, whimbrel *Numenius phaeopus*. **Ramsar Criterion 5** Assemblages of international importance – species with peak counts in winter: 97,155 waterfowl (5-year peak mean) **Ramsar Criterion 6** Species/populations occurring at levels of international	The SPA is designated for its internationally important wintering (non-breeding) bird populations including Bewick's swan (2.7% of the GB population 5 year peak mean), Eurasian teal (3.3% of the population 5 year peak mean), European golden plover (1.2% of the GB population 5 year peak mean), northern lapwing (0.5% of the population 5 year peak mean), and its overall waterbird assemblage which overwinter the area regularly supports: 73014 waterfowl (5 year peak mean 1991/92-1995/96). The Ramsar site consists of a series of Sites of Special Scientific Interest (SSSI) within the largest area of lowland wet grassland and associated wetland habitat remaining in Britain. It covers about 35,000 ha in the flood plains of the Rivers Axe, Brue, Parrett, Tone and their tributaries. The majority of the site is only a few metres above mean sea level and drains through a large network of ditches, rhynes, drains and rivers. Flooding may affect large areas in winter depending on rainfall and tidal conditions. Parts of the site in the Brue Valley include areas of former raised peat bog which have now been substantially modified by agricultural improvement and peat extraction which has created areas of open water, fen and reedbed. The site attracts internationally important numbers of wildfowl in winter and is one of the most important sites in southern Britain for breeding waders. The network of rhynes and ditches support an outstanding assemblage of aquatic invertebrates, particularly beetles. Summary of the SACO's: **Population abundance** – restore or maintain **Assemblage abundance** – maintain **Diversity of species** – maintain the assemblage	The trends for and condition of the internationally important waterbird populations for which the Ramsar site and SPA are designated are outlined below. Bewick's Swan Cygnus: When the SPA was notified it supported a peak mean of 310 individuals in the five-year period from 1989/90 to 1993/94. Since notification there has been a dramatic **decline** in numbers visiting the SPA with a 5-year peak mean of 5 individuals in the period 2012/13 to 2016/17. This reflects national and international trends since the mid-1990s. European Golden Plover: When the SPA was notified it supported a peak mean of 3,110 individuals in the five-year period from 1989/90 to 1993/94. Since notification there has been a substantial **increase** in numbers with a 5-year peak mean of 14,024 individuals in the period 2012/13 to 2016/17. Eurasian Teal: When the SPA was notified it supported a peak mean of 7,476 individuals in the five-year period from 1989/90 to 1993/94. Since notification there has been a substantial **increase** in numbers with a peak mean of 21,918 individuals in the period 2012/13 to 2016/17. The Somerset Levels and Moors is now the most important overwintering site for Teal in Great Britain. Northern Lapwing: When the SPA was notified it supported a peak mean of 36,565 individuals in the five-year period from 1989/90 to 1993/94. Since notification there has been a **decline** in numbers with a peak mean of 32,896 individuals in the period 2012/13 to 2016/17. A WeBS (Wetland Birds Survey). The overwintering	Distance from the R24R Well abstraction site (12km) makes it very unlikely that construction effects will have any direct effect on these European sites, although some the interest features (including teal and shoveler) are known to roost on the Cheddar reservoir but feed elsewhere on the Somerset Levels, and other migrant waders (e.g. golden plover, lapwing) are known to use the reservoir as a feeding station when on passage. It is therefore possible that the construction of the new pipeline may affect the designated species when using the reservoir. The pipeline construction works at their nearest are 600m from the Cheddar Reservoir and with intervening roads and developed areas, so disturbance impacts are likely to be insignificant. The European sites are designated for overwintering bird populations. Noise/visual disturbance during the over-wintering period could reduce the time birds forage or rest, which can reduce survival, but the mitigation measures proposed will avoid adverse effects.	As per North Somerset and Mendip Bats SAC (see above).	No adverse effects either alone or in combination

[59] http://publications.naturalengland.org.uk/publication/6226153064890368

<table>
<tr><th colspan="2">DESIGNATED SITE: Somerset Levels and Moors SPA and Ramsar
REF: UK9010031</th><th colspan="3">PLAN NAME: Bristol Water Drought Plan
OPTION NAME: R24R Well Supply Augmentation Measure</th></tr>
<tr><th>Qualifying Feature</th><th>Conservation Status:
Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.</th><th>Site Condition (where relevant to feature):
Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)[59] where relevant.</th><th>Potential Effects</th><th>Mitigation</th><th>Assessment of effects on conservation objectives and site integrity</th></tr>
<tr>
<td>importance: tundra swan, Cygnus columbianus bewickii – 112 individuals, representing an average of 1.3% of the GB population (5-year peak mean)</td>
<td>of waterfowl

Extent and distribution of supporting non-breeding habitat - Maintain the extent and distribution of suitable habitat within and outside the SPA boundary.

Water quantity – maintain supply, flood regime, low level flooding during winter.

Water quality – maintain current quality

Conservation measures – maintain management of grassland for birds, maintain aquatic soil invertebrates and a landscape free of trees.

Air quality - Maintain concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System.

Minimising disturbance caused by human activity - Reduce the frequency, duration and/or intensity of disturbance within close proximity of affecting roosting, foraging, feeding, moulting and/or loafing birds so that the qualifying features are not significantly disturbed</td>
<td>population in Great Britain has also declined significantly since the 1990s.

Qualifying assemblage of species (Article 4.2):

Since notification there has been a substantial increase in numbers with a 5-year peak mean of 90,205 individuals in the period 2012/13 to 2016/17.

The SPA and Ramsar site comprise 11 individual SSSIs, the summary of the latest condition assessments at each SSSI are shown below. The SSSIs are predominantly in unfavourable- declining condition with only two sites Shapwick Heath SSSI and Westhay Heath SSSI in predominantly favourable or recovering condition.
<table>
<tr><th>SSSI name</th><th>Summary condition</th></tr>
<tr><td>Catcott Edington and Chilton Moors SSSI</td><td>98.53% Unfavourable - Declining

1.47% Partially destroyed</td></tr>
<tr><td>Curry and Hay Moors SSSI</td><td>100% Unfavourable - Declining</td></tr>
<tr><td>King's Sedgemoor SSSI</td><td>100% Unfavourable - Declining</td></tr>
<tr><td>Moorlinch SSSI</td><td>100% Unfavourable - Declining</td></tr>
<tr><td>Shapwick Heath SSSI</td><td>73.24% Favourable

26.76% Unfavourable - Declining</td></tr>
<tr><td>Southlake Moor SSSI</td><td>100% Unfavourable - Declining</td></tr>
<tr><td>Tealham and Tadham Moors SSSI</td><td>100% Unfavourable - Declining</td></tr>
<tr><td>West Moor SSSI</td><td>100% Unfavourable - Declining</td></tr>
<tr><td>West Sedgemoor SSSI</td><td>100% Unfavourable - Declining</td></tr>
<tr><td>Westhay Heath SSSI</td><td>100% favourable</td></tr>
<tr><td>Westhay Moor SSSI</td><td>21.48% Favourable

2.59% Unfavourable - Recovering

12.18% Unfavourable - No change

59.92% Unfavourable - Declining

3.83% Partially destroyed</td></tr>
</table>
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DESIGNATED SITE: Somerset Levels and Moors SPA and Ramsar REF: UK9010031			PLAN NAME: Bristol Water Drought Plan OPTION NAME: R24R Well Supply Augmentation Measure		
Qualifying Feature	**Conservation Status:** **Status of species/habitat in EU and UK: numbers, distribution, trends, threats etc.**	**Site Condition (where relevant to feature):** **Refer to underpinning SSSI condition where relevant. Refer to Site Improvement Plan (SIP)[59] where relevant.**	**Potential Effects**	**Mitigation**	**Assessment of effects on conservation objectives and site integrity**
		Wet Moor SSSI: 100% Unfavourable - Declining			
OPERATIONAL PHASE					
As for construction	As above for construction	As above for construction	Site not hydrologically linked to the R24R Well source and therefore no adverse effects on site integrity will occur.	n/a	No adverse effects either alone or in combination

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