Thames Water Utilities Limited

Environmental Assessment Report: Farmoor drought permit

Drought Permit Application 2026

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Thames Water Utilities Limited

Drought Permit Implementation 2026

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Issue log

Issue	Date	Author	Content/changes
Issue 1	22/05/2025	Katie Moran, Trevor Wade, Curt Williams, Andrew Coe	Update of shelf-copy Farmoor EAR for DP27
Issue 2	11/07/2025	Katie Moran, Andrew Coe, Lisa Campbell, Trevor Wade	Update following review by Thames Water
Issue 3	16/09/2025	Katie Moran, Andrew Coe, Trevor Wade	Updated shelf-copy EAR for permit application
Issue 4	25/08/2026	Molly Preen, Andrew Coe, Trevor Wade, Katie Moran	Updated EAR for 2026 permit application
Issue 5	14/09/2026	Molly Preen, Andrew Coe, Trevor Wade, Katie Moran	Update following review by Environment Agency

CONTENTS

EXECUTIVE SUMMARY

This Environmental Assessment Report (EAR) provides an independent and robust assessment of the potential environmental effects of the implementation of Thames Water Utilities Ltd's (Thames Water) Farmoor drought permit option, over and above those conditions that already exist under "normal", i.e. licensed, baseline conditions, with the onset of a natural drought.

The Drought Plan (DP) provides a comprehensive statement of the actions Thames Water will consider implementing during drought conditions to safeguard essential water supplies to customers and minimise environmental impact. It encompasses a number of drought options that will only be implemented if and when required and includes drought permit options.

A drought permit is a management action that, if granted, can allow more flexibility to manage water resources and the effects of drought on public water supply and the environment.

This document is being prepared to support an application for a drought permit at Farmoor in September 2026.

The environmental assessment has been conducted in accordance with Government regulations and using the Environment Agency's 2025 Drought Plan Guideline (DPG)[1] and the Environment Agency's 'Environmental Assessment for Water Company Drought Plans' supplementary guidance.

In accordance with the DPG, the environmental assessment comprises the following components:

1. an assessment of the likely changes in hydrology (flow/level regime) due to implementing the proposed drought options;
2. identification of the key environmental receptors that are sensitive to these changes and an assessment of the likely impacts on these receptors;
3. identification of mitigation that may be required to prevent or reduce impacts on sensitive receptors; and
4. recommendations for baseline, in-drought and post-drought permit monitoring requirements.

Farmoor is located in Thames Water's Swindon and Oxfordshire (SWOX) Water Resource Zone (WRZ). The study area and focus of this environmental assessment of the Farmoor drought permit, covers the following WFD waterbodies:

- Thames (Leach to Evenlode) (GB106039030333)
- Thames (Evenlode to Thame) (GB106039030334)
- Thames (Wallingford to Caversham) (GB106039030331)

The environmental assessment also covers the potential changes to water availability (levels and flows) and any consequent implications for river habitats, water quality, ecology and other relevant environmental receptors, for example, landscape, navigation, recreation and heritage. The assessment also considers how implementation of the drought permit may affect the environment in combination with the effects of existing licences, consents and plans in line with the requirements of the Conservation of Habitats and Species Regulations 2017 (Habitats Regulations).

This EAR considers the impacts of the Farmoor drought permit in **Appendix A** and **Appendix B**, with a summary presented in **Sections** Error! Reference source not found. and Error! Reference source not found.. Cumulative impacts with other drought options listed in Thames Water's Drought Plan are considered. The assessments undertaken confirm the receptors requiring consideration of monitoring and mitigation; which are summarised in **Appendix C** and provided in full in the Drought Plan Environmental Monitoring Plan (EMP). A standalone Habitats Regulations assessment is included as **Appendix D**.

Throughout the environmental assessment process, Thames Water have proactively engaged key stakeholders, including the Environment Agency and Natural England. Key stakeholders would be further consulted throughout any drought permit application process.

[1] Environment Agency (2025) Water Company Drought Plan Guideline, March 2025.

1. INTRODUCTION

1.1 PURPOSE OF DOCUMENT

Thames Water Utilities Ltd's (Thames Water) Drought Plan (DP) 2022 provides a comprehensive statement of the actions Thames Water will consider implementing during drought conditions to safeguard essential water supplies to customers and minimise environmental impact. It encompasses a number of drought options that will only be implemented if and when required and includes drought permit options.

A drought permit is a drought management action that, if granted, can allow more flexibility to manage water resources and the effects of drought on public water supply.

The objective of this environmental assessment report (EAR) is to provide an independent and robust assessment of the potential environmental effects of implementing a drought permit at Farmoor (located in the Swindon and Oxfordshire (SWOX) Water Resource Zone (WRZ[2]), over and above those conditions that already exist under "normal", i.e. licensed, baseline conditions, with the onset of a natural drought. **This document is being prepared to support an application for a drought permit at Farmoor in autumn and winter 2026 for a maximum six-month duration to the early spring of 2027**.

The environmental assessment has been undertaken in accordance with Government regulations and using the Environment Agency's 2025 Drought Plan Guidance (DPG)[3] and the 'Environmental Assessment for Water Company Drought Plans' supplementary guidance.

In accordance with the DPG, the environmental assessment comprises the following components:

1. an assessment of the likely changes to flows, in support of hydro-ecology; river habitats; and water quality due to implementing the proposed drought permit.
2. identification of the key environmental receptors that are sensitive to these changes and an assessment of the likely impacts on these receptors.
3. identification of measures that may be required to avoid, reduce or mitigate impacts on sensitive receptors.
4. recommendations for baseline, in-drought and post-drought order monitoring requirements.

The methodology for this environmental assessment has been developed in consultation with the Environment Agency and Natural England and is documented separately in 'Thames Water's Drought Plan 2027 Environmental Assessment Methodology'[4] ("the Methodology"). 'The Methodology' has been updated as required during consultation on the EARs post-Drought Plan 2022 submission, following the drought in 2022 and throughout the preparation of the DP 2027. A summary of the assessment approach is provided in **Section** Error! Reference source not found..

The assessments undertaken in this EAR confirm the receptors requiring consideration of mitigation and appropriate monitoring triggering mitigation. Mitigation actions identified reflect previous agreement with the Environment Agency (see **Appendix C**). These will be reviewed during consultation throughout the drought permit application process. The methodologies and details for monitoring and mitigation requirements are documented in **Appendix C**.

Consideration has been given to the potential impacts of drought permit implementation on statutory designated sites including Habitats Regulations sites. This is discussed further in **Section 6**.

In accordance with the DPG, the assessment also considers how the proposed drought permit may affect the environment in combination with the effects of existing abstraction licences, discharge permits and plans, including the potential for cumulative impacts of drought permit / order options implemented by neighbouring water companies. The cumulative assessments associated with the drought option are provided in **Section 8** of this EAR.

[2] UKWIR/Environment Agency define a WRZ as: 'The largest possible zone in which all resources, including external transfers, can be shared, and hence, the zone in which all customers will experience the same risk of supply failure from a resource shortfall.'

[3] Environment Agency (2025) Water Company Drought Plan Guideline, March 2025.

[4] Thames Water Utilities Ltd (2026). Thames Water Drought Plan 2027: Environmental Assessment Methodology Report – Prepared by Ricardo (V6 March 2026).

The assessments undertaken in the EAR consider implementation of the Farmoor drought permit for a maximum six month period at any time of year and subsequent effects post implementation. The assessment is based on the flow banding approach which provides the general pattern of physical environment effects.

The assessments only consider the effects of a single drought permit application by Thames Water and not the cumulative, or in-combination effects if a second drought permit application were needed directly afterwards. If this situation were to arise where the drought permit would be required for more than six months, cumulative impacts would need to be considered in further detail at the time of the actual applications. It should be noted, however, that Thames Water provided a methodology for assessing the environmental impacts of severe droughts and a high-level summary of the environmental impacts of their drought actions in droughts worse than record ('severe droughts') in its Final DP 2017. In the context of the assessments, severe droughts referred to droughts with a return period of 1:200 or greater. These droughts were considered to be multi-season droughts that could require a re-application for drought permits / orders beyond their original six months.

Further details of this severe drought methodology and the findings of the assessments are described in 'the Methodology'. The impacts associated with a re-application will require a consideration of the antecedent conditions after a six-month implementation. As such, there remains significant uncertainty with regards to the baseline against which impacts are assessed and the high-level summary provided to date is considered sufficient for DP purposes (e.g. screening of receptors at risk and monitoring and mitigation requirements).

1.2 BACKGROUND TO THE STUDY

Water companies in England and Wales are required to prepare and maintain Statutory DPs under Sections 39B and 39C of the Water Industry Act 1991, as amended by the Water Act 2003 (and subsequently the Water Act 2014) and in accordance with the DP Regulations 2005 and the DP Direction 2025, which set out the short operational steps a company will take before, during and after a drought. The Water Industry Act 1991 defines a DP 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 or drought permits'.

The DP provides a comprehensive statement of the actions Thames Water will consider implementing during drought conditions to safeguard essential water supplies to customers and minimise environmental impact.

DPs encompass a number of drought options that will only be implemented if and when required. Each drought is different in terms of its severity, season, location and duration and each combination of these factors may require a bespoke reaction in terms of measures. In the context of drought planning, individual drought options are taken to constitute alternatives.

1.3 CONSULTATION

The purpose of these studies is to inform future assessment processes, provide a generic template and support a more considered consultation process, which enables consultees' concerns to be addressed in a timely manner, without the time pressures associated with an actual drought permit application.

To ensure that the stakeholder and regulatory engagement requirements have been met, Thames Water have consulted with key stakeholders throughout the drought planning process. Following submission of the Final DP 2022, Thames Water have continued to engage with the Environment Agency and Natural England on the scope and outcomes of the environmental assessment, including during potential drought permit applications in 2022, 2025 and 2026. This consultation has included consideration and agreement on the approach to the EARs, which is summarised in the Methodology. A summary of the consultation undertaken post-DP 2022 submission is listed in in **Table 1-1**, these discussions have informed the update of this EAR.

Table 1-1 Stakeholder/regulatory engagement post-DP 2022 submission and during DP27 development

Date	Regulator/stakeholder	Type	Aim of meeting/correspond
23/08/2022 – 14/12/2022	Environment Agency and Natural England	Teleconference	Discussion of the 2022 drought permit application process and developments, including revisions to the EARs and the specification of monitoring and mitigation.
22/02/2023 - ongoing	Environment Agency	Teleconference	Discussion of the DP2022 methodology and refocussing groundwater modelling and streamflow assessment to support hydro-ecology understanding for receptors assessment.
11/07/2024 and 16/07/2024 - ongoing	Environment Agency	Teleconference	Continued discussion of EAR methodology using Baunton 1 as example.
06/05/2025 – 11/06/2025	Environment Agency, Natural England and Historic England	Formal 5-week consultation period	SEA Scoping Consultation comments provided to Thames Water.
Summer – Winter 2025	Environment Agency and Natural England	Teleconference	Discussion of the 2025 drought permit application process and developments, including revisions to several EARs (e.g. Farmoor, Gatehampton), the specification of monitoring and mitigation and updates to the methodology.
28/05/2026-23/07/26	Environment Agency, Natural England and other stakeholders	Formal consultation period	Public consultation on draft DP27
Summer 2026	Environment Agency, Natural England and other stakeholders	Teleconference	Discussion of the 2026 drought permit application process and developments.

Consultation with both the Environment Agency and Natural England on the Farmoor Drought Permit EAR has continued throughout the preparation of the application.

1.4 STRUCTURE AND CONTENT OF REPORT

This EAR reflects the environmental assessment reporting components described in the DPG. The structure of this EAR is provided below with reference to other relevant documents.

Section 1: **Introduction**

Section 2: **Background to the drought management options** – description of Thames Water's supply system and drought planning process. The statement of need for the drought permit, review of alternative options, regulatory arrangements and drought permit programmes will be completed in the event of an actual drought permit application.

Section 3: **Approach to environmental assessment** - description of the approach to assessing environmental impacts and identification of mitigation and monitoring requirements, with reference to the details which are provided in Thames Water's Drought Plan 2027 Environmental Assessment Methodology' ("the Methodology").

Section 4: **Drought option overview** - overview of drought permit conditions.

Section 5: **Physical environment effects** - baseline assessment of physical environment and assessment of potential changes in the physical environment as a result of the drought permit, and from cumulative operation with options described in other EARs. Detailed information is provided in **Appendix A** and summarised in **Section 5.**

Section 7: **Environmental Monitoring Plan and Mitigation –** identification of mitigation and monitoring requirements. **Appendix C** summarises the full suite of monitoring and mitigation measures.

Section 8: **Cumulative Impacts.**

Appendices

Appendix A **Physical Environment** - Includes sub-sections describing detailed assessments setting out the zone of influence associated with the drought option, the baseline conditions, and the potential changes in the physical environment as a result of the drought option.

Appendix B **Environmental Receptors** - Includes sub-sections describing: the distribution and sensitivity of environmental receptors identified as associated with the drought option, the baseline conditions, data used to inform the baseline conditions and the detailed assessment of impacts associated with the drought option.

Appendix C **Environmental Monitoring and Mitigation Measures** – Includes a section on mitigation requirements, the principle of mitigation measures and an indication of potential mitigation options to consider for the drought option. Also includes a section providing details of proposed monitoring including information on the principle of monitoring, baseline monitoring requirements, monitoring at the on-set of drought, monitoring during drought permit/order implementation, monitoring post drought option implementation and details of the specific mitigation requirements for each drought option.

Appendix D **Habitats Regulations Assessment** – Includes a Habitats Regulations Assessment of the proposed drought permit, including Stage 1 Screening and, where appropriate, Stage 2 Appropriate Assessment and any in-combination effects resulting from implementing the proposed drought permit with other plans and projects, as identified in the HRA.

2. BACKGROUND TO THE DROUGHT MANAGEMENT OPTION

2.1 THAMES WATER'S SUPPLY SYSTEM AND DROUGHT PLANNING PROCESS

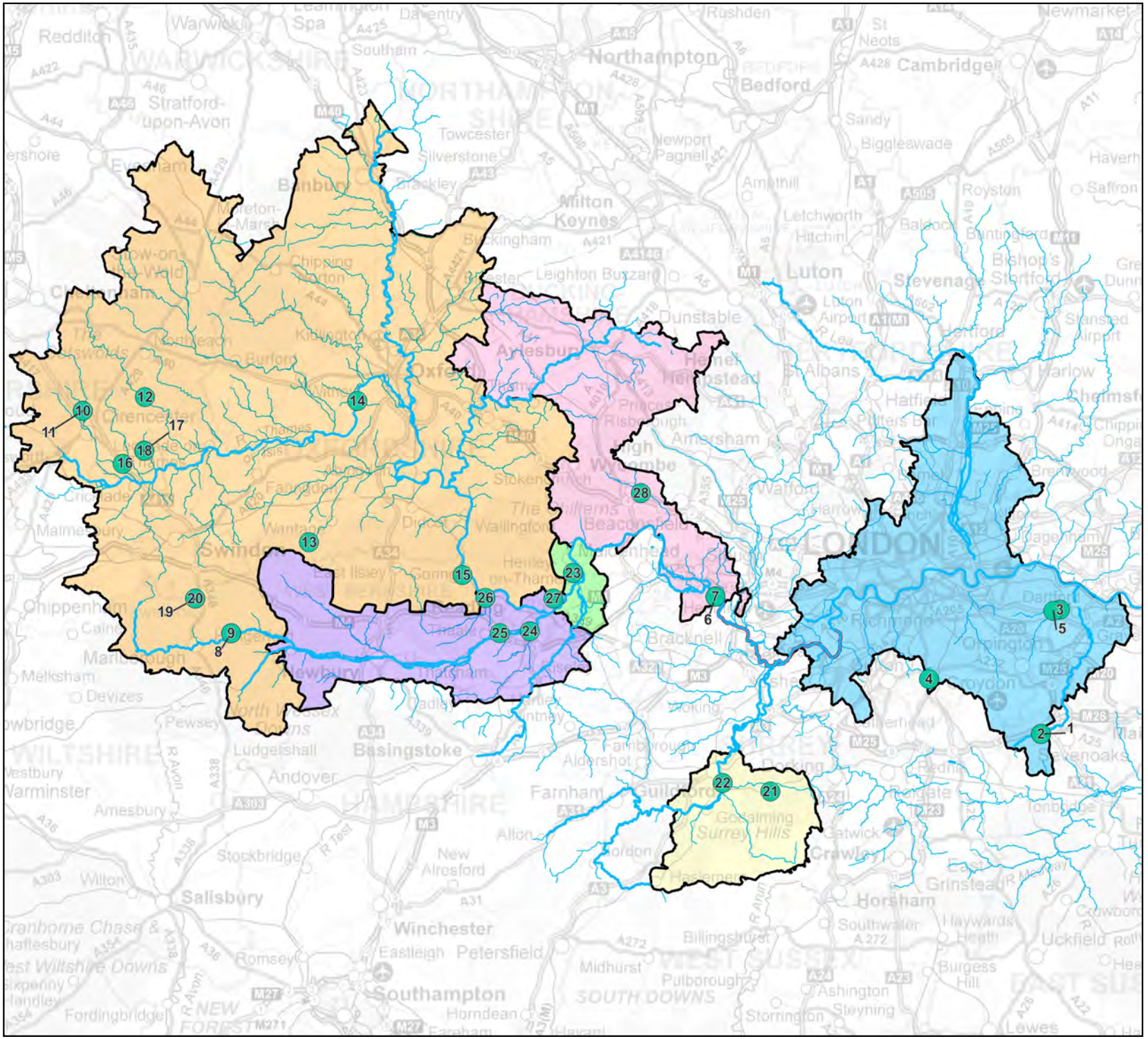
Thames Water supplies water to some 10 million people and 250,000 businesses. For water resource planning purposes, the Thames Water water supply area is divided into six independent Water Resource Zones (WRZs) reflecting the different characteristics of the supply areas and associated risks to meeting demand within the Thames Water area (see **Figure 2-1**). The London WRZ is the largest of the six zones and covers the Greater London area. The next largest is the Swindon and Oxfordshire zone (SWOX). The other WRZs are Kennet Valley (including Reading and Newbury), Henley, Slough/Wycombe/Aylesbury (SWA) and Guildford.

Apart from the London area, some 69% of Thames Water's water supply is derived from groundwater abstraction and the remainder is derived from surface water abstraction. In contrast, approximately 88% of Thames Water's water supply to the London area is derived from surface water and the remainder from groundwater. As for most of South East England, during periods of prolonged low rainfall leading to a serious drought, water supply is largely sustained by groundwater abstraction, baseflow within rivers and available water stored in reservoirs.

Thames Water sets out how it will maintain planned levels of service in a Water Resources Management Plan (WRMP). A WRMP is a strategic plan which sets out how the company plans to achieve a secure supply of water for customers and a protected and enhanced environment. Its primary objective is to ensure that there is sufficient water available to meet anticipated demands, under various weather conditions but in particular, in dry and very dry conditions, whilst protecting the environment. However, the WRMP can't plan for all eventualities and during extended periods of low rainfall our water supplies can become depleted, and therefore Thames Water may need to take action to reduce demand for water such as Temporary Use Bans (TUBs) and Non-Essential Use Bans (NEUBs), as well as measures to increase the amount of water that is available. A DP sets out how a water company will manage supply and demand during the course of a drought.

The DP provides a comprehensive plan of the actions Thames Water will consider implementing during drought conditions to safeguard essential water supplies to customers and minimise environmental impact. It encompasses a number of drought options that will only be implemented if and when required. Every drought is different in terms of its severity, season, location and duration and each combination of these factors requires a bespoke reaction. Thames Water's DP comprises a number of drought management options, which consist of demand-side options and supply-side options. The supply-side measures can be grouped into a number of categories including the optimisation of existing sources, strategic schemes and bulk supplies. Further information on all the drought management options is provided in the DP. The majority of the supply-side options are drought permits/order options.

The EAR of each drought permit/order option can assist in the prioritisation of which options are most appropriate for the ensuing drought. For example, it is noted that some drought options may have different environmental effects depending on the season of implementation. Through experience, there are a number of options that are considered by Thames Water to be required first, irrelevant of the characteristics of the drought. However, as guided by the DPG, Thames Water are producing comprehensive EARs for all drought options identified in the Drought Plan, as there is the potential that any of these drought options could be implemented.


Legend
Thames Water Water Resource Zones
Guildford
Henley
Kennet
London
Slough, Wycombe and Aylesbury
Swindon & Oxfordshire (SWOX)
Drought Permit/Order Option
Main Watercourses
Drought Permit / Order Options:
1 Sundridge 1
2 Sundridge 2
3 Crayford
4 Waddon
5 Wansunt
6 Lower Thames 1
7 Lower Thames 2
8 Axford 1
9 Axford 2
10 Baunton 1
11 Baunton 2
12 Bibury
13 Childrey Warren
14 Farmoor
15 Gatehampton
16 Latton
17 Meysey Hampton 1
18 Meysey Hampton 2
19 Ogbourne
20 Ogbourne EBH
21 Albury
22 Shalford
23 Harpsden / Sheeplands
24 Fobney Direct
25 Fobney EBH
26 Pangbourne
27 Playhatch
28 Pann Mill
RICARDO
Member of WSP
Thames Water
Project Title:
Thames Water Drought Plan 2022
Figure Title:
Thames Water Water Resource Zones and Drought Permit/Order Options
Figure Number:
Figure 2-1
Date:
March 2026
N
0 7.5 15 22.5 30 km
Note: All locations are approximate
Contains Ordnance Survey Data © Crown copyright and database rights 2020

2.2 STATEMENT OF THE NEED FOR DROUGHT PERMIT

The Drought Permit is required because of an exceptional shortage of rainfall in the SWOX water resource zone. This has led to threat of a shortfall in supplies. This need is set out in detail in the Statement of Reasons including the case for an exceptional shortage of rainfall, which accompanies this application.

2.3 REVIEW OF ALTERNATIVE OPTIONS

Thames Water do not have any strategic drought sources readily available in the SWOX WRZ. Therefore, the alternative options are to use drought permit options as set out in our Drought Plan subject to availability of the options. If dry weather continues, it is expected that this application will be followed by the following drought permit applications in the SWOX WRZ:

- Gatehampton
- Meysey Hampton 1
- Latton
- Baunton 1
- Axford 1
- Ogbourne
- Childrey Warren

2.4 DROUGHT PERMIT – REGULATORY ARRANGEMENTS

The Farmoor drought permit includes an increase of the volume of water that can be abstracted when the flow constraint is in place from 59.1 Ml/d to 90 Ml/d with an increase in the hourly rate when the flow constraint is in force from 2.55 Ml/hour to 3.75 Ml/hour.

2.5 DROUGHT PERMIT PROGRAMME

The application will be made in September 2026 as part of a programme of drought permit applications required to address the risk to supply caused by the drought leading to reduction in storage at Farmoor reservoir. It is expected that the Environment Agency will determine the application within 12 days assuming that a hearing is not required.

3. APPROACH TO ENVIRONMENTAL ASSESSMENT

3.1 OVERVIEW

The environmental assessment of the drought option in this report has been prepared in accordance with Environment Agency's 2025 DPG; specifically the Environment Agency's 'Environmental Assessment for Water Company Drought Plans' supplementary guidance. The approach to environmental assessment and the bespoke assessment methodologies used have been developed and agreed in consultation with the Environment Agency and Natural England and are documented separately in 'the Methodology'.

Depending on the particular ongoing water resources drought, different management options may be available and the full range of drought permit/orders may not be used by Thames Water at the same time. This EAR considers the impacts of implementation of all the Farmoor drought permit.

The Environment Agency's 2025 DPG requires the completion of environmental assessment and production of an environmental monitoring plan (EMP) for each of the supply side actions included in a drought plan. The environmental assessments should also include any mitigation measures that could be implemented. 'The Methodology' provides detailed approaches to the specific requirements of the DPG which are:

1. Set out the likely changes to flows, in support of hydro-ecology; river habitats; and water quality due to a proposed action (see Section 3.4 of 'the Methodology').
2. Identifying the key environmental receptors which are likely to be affected by these changes and assess their sensitivity (see Section 3.5 of 'the Methodology').
3. Assess the likely impact on these receptors, allocate a level of confidence in your assessment and set out the actions you will take to reduce uncertainty (see Section 3.6 of 'the Methodology').
4. Avoid, reduce or mitigate against the potential impacts and where datasets are considered insufficient to undertake an environmental assessment it is the responsibility of the water company to implement environmental monitoring to generate the information required (see Section 3.7 of 'the Methodology').

The overall approach taken in completing the environmental assessment to demonstrate an understanding of the impact on the environment of implementing the proposed drought options is illustrated in **Figure 3-1**.

The Environment Agency's 2025 DPG also requires water companies to 'consider the combined environmental effects of your supply side drought options, and where relevant, the combination effects of your actions with those of neighbouring water companies and other abstractors'. The SEA and HRA for a drought plan as a whole inform these combined assessments. For DP 2022, HRA screening concluded no likely significant effects of the drought option on statutory designated sites, either alone, or in combination with other drought permits (see **Section 5**). The DP 2022 SEA did not identify any drought permit/order options in other water company drought plans that could result in cumulative effects with the Farmoor drought permit (see **Section 8**). The SEA and HRA are in the process of being updated for DP 2027.

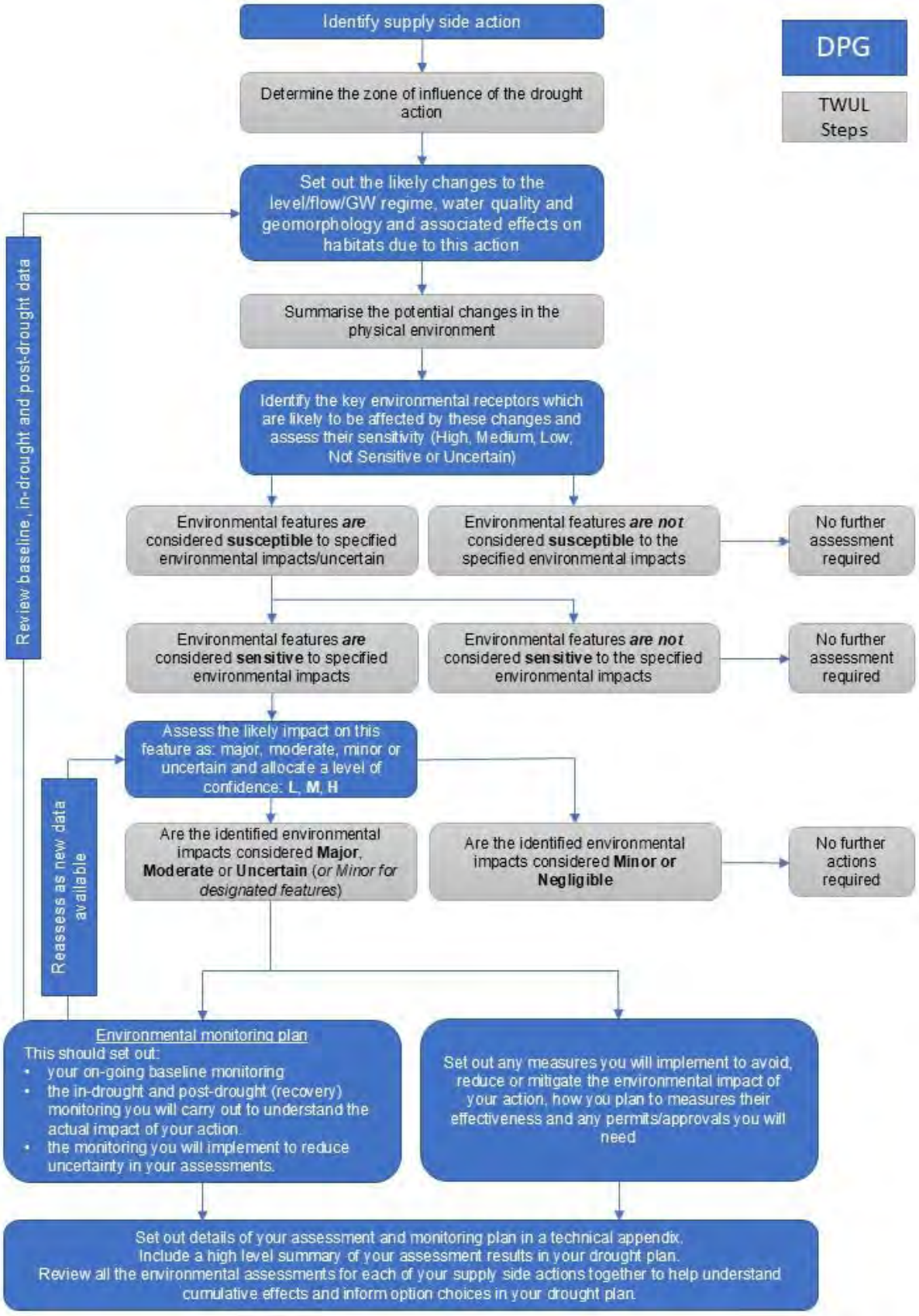
3.2 UPDATES TO APPROACH FOLLOWING DP 2022

Following publication of Thames Water's Final DP 2022, consultation with the Environment Agency has continued (i.e. throughout permit applications in autumn 2022) regarding the approach to environmental assessment. Following discussion of the DP2022 methodology, the approach was revised to refocus the assessments (both surface water hydrology and groundwater modelling and baseflow assessment) to support hydro-ecology understanding for the receptors assessment.

The hydro-ecological changes are now set out as descriptive evidence supported by quantification of the amount of change; the river habitat changes are now set out in categories (major. moderate, minor, negligible) to support the receptors assessment approach which in turn, identifies the environmental risk of the drought permit.

Further information documenting the changes to the approach is provided in the Methodology.

Figure 3-1 Approach to undertaking environmental assessments as identified in the DPG2025. The steps identified in blue are as per the DPG2025 and the steps indicated in grey are additional /interim steps included by Thames Water.



3.3 LIMITATIONS OF ASSESSMENT

Details on the quality of the data collected and used in the assessment, limitations and any assumptions made, are included in the relevant technical appendices (**Appendices A and B**).

For receptors where the assessment remains uncertain because of data limitation, the requirement for additional targeted monitoring has been considered and is documented in **Appendix C**.

4. DROUGHT OPTION OVERVIEW

4.1 DROUGHT PERMIT DESCRIPTION

Licence details and proposed drought permit details are provided in **Table 4-1** below. The location of the abstraction is indicated on **Figure 4-1**. The drought permit option includes a revised abstraction rate to Farmoor Reservoir when naturalised flows in the River Thames derived for the Farmoor gauging station are below 377.3 Ml/d. This includes a greater range of river flows at which 300 Ml/d would be abstracted and a higher rate of reduced abstraction - in all cases with a minimum flow downstream of Farmoor flow gauging station of 46.38 Ml/d, which is lower than that licensed. Where river flows downstream of Farmoor flow gauging station are less than 46.38 Ml/d this would not be a change to licence conditions.

Table 4-1 Existing and Proposed Drought Permit Abstraction

Abstraction Water Source	NGR	Normal Abstraction	Proposed Drought Permit Abstraction	Benefit Ml/d
River Thames	SP 439 064	Thames Water are licensed to abstract 55,312 Ml/year at an abstraction rate not exceeding 300 Ml/d or 12.502 Ml/hour. The following conditions also apply: At any time when naturalised flow at Farmoor flow gauging station, downstream of the abstraction, is greater than 377.3 Ml/d, abstraction shall not exceed 300 Ml/d or 12.502 Ml/hour. Under these circumstances, there would be a residual flow of at least 77.3 Ml/d downstream of the abstraction. At any time when naturalised flow at Farmoor flow gauging station, downstream of the abstraction, is between 136.4 Ml/d and 377.3 Ml/d, abstraction shall not result in the residual flow being reduced below 77.3 Ml/d. Abstractions of at least 59.1 Ml/d would be possible. At any time when naturalised flow at Farmoor flow gauging station, downstream of the abstraction, is less than 136.4 Ml/d, abstraction shall not exceed 59,100 cubic meters per day (59.1 Ml/d) with a maximum hourly abstraction rate of 2,546 cubic meters per hour (2.55 Ml/hour).	Normal conditions apply other than: At any time when naturalised flow at Farmoor flow gauging station, downstream of the abstraction, is greater than 346.38 Ml/d, abstraction shall not exceed 300 Ml/d or 12.502 Ml/hour. Under these circumstances, there would be a residual flow of at least 46.38 Ml/d downstream of the abstraction. At any time when naturalised flow at Farmoor flow gauging station, downstream of the abstraction, is between 136.384 Ml/d and 346.38 Ml/d, abstraction shall not result in the residual flow being reduced below 46.38 Ml/d. Abstraction shall not exceed 90,000 cubic meters per day (90 Ml/d) with a maximum hourly abstraction rate of 3,750 cubic meters per hour (3.75 Ml/hour). At any time when naturalised flow at Farmoor flow gauging station, downstream of the abstraction is between 105.48 Ml/d and 346.38 Ml/d abstraction shall not allow flow at the gauging station to reduce below 46.38 Ml/d. Abstraction shall not exceed 59,100 cubic meters per day (59.1 Ml/d) with a maximum hourly abstraction rate of 2,546 cubic meters per hour (2.55 Ml/hour). At any time when naturalised flow at Farmoor flow gauging station, downstream of the abstraction, is less than 105.48 Ml/d, abstraction shall not exceed 59.1 Ml/d with a maximum hourly abstraction rate of 2.55 Ml/hour.	Up to 30

Surface water is abstracted from the River Thames and transferred to the pumped storage Farmoor Reservoir. Stored water is treated at Farmoor water treatment works (WTW) or Swinford WTW for treatment and public water supply to the SWOX WRZ.

It should be noted that licensed flow conditions are based on the naturalised flow. Naturalised flows in this context are adjusted flow records that approximate the flows that would occur in the absence of artificial influences (abstractions and discharges). The naturalised flow at Farmoor referred to in the abstraction licence

is effectively a partially naturalised flow that only takes account of the Thames Water abstraction immediately upstream of the Farmoor gauging station. The naturalised flow for the Farmoor licence is calculated as the measured flow at the gauging station plus the abstraction at the Thames Water Farmoor intake.

As part of the Farmoor drought permit implementation, over-pumping of water from the River Thames into selected distributaries is proposed to help maintain a minimum flow (or level) in the sensitive distributaries. The principle of the proposed over-pumping operation is as follows: as the River Thames downstream of the upper two licensed Farmoor abstraction intakes is effectively made up of a series of ponds (or pounds) when the locks and weirs along the river are closed off leaving a small volume of residual flow in the river. Over-pumping would allow advantage to be taken of the residual flow left below the Farmoor and Swinford intakes, to pump some of this residual flow into the distributaries to maintain a minimum flow or level. The proposed operation at the entry to each distributary would involve over-pumping from the River Thames into the distributary or ensuring flow was maintained into the distributary through the existing weir structure. The pumped water, would simply be pumped into the top of the distributary in each case or allowed to flow into the distributary by controlling the sluice or weir setting to ensure the minimum required flow entered the distributary. In this way, the over-pumped water is available to help maintain a minimum flow along the sensitive distributaries from the River Thames.

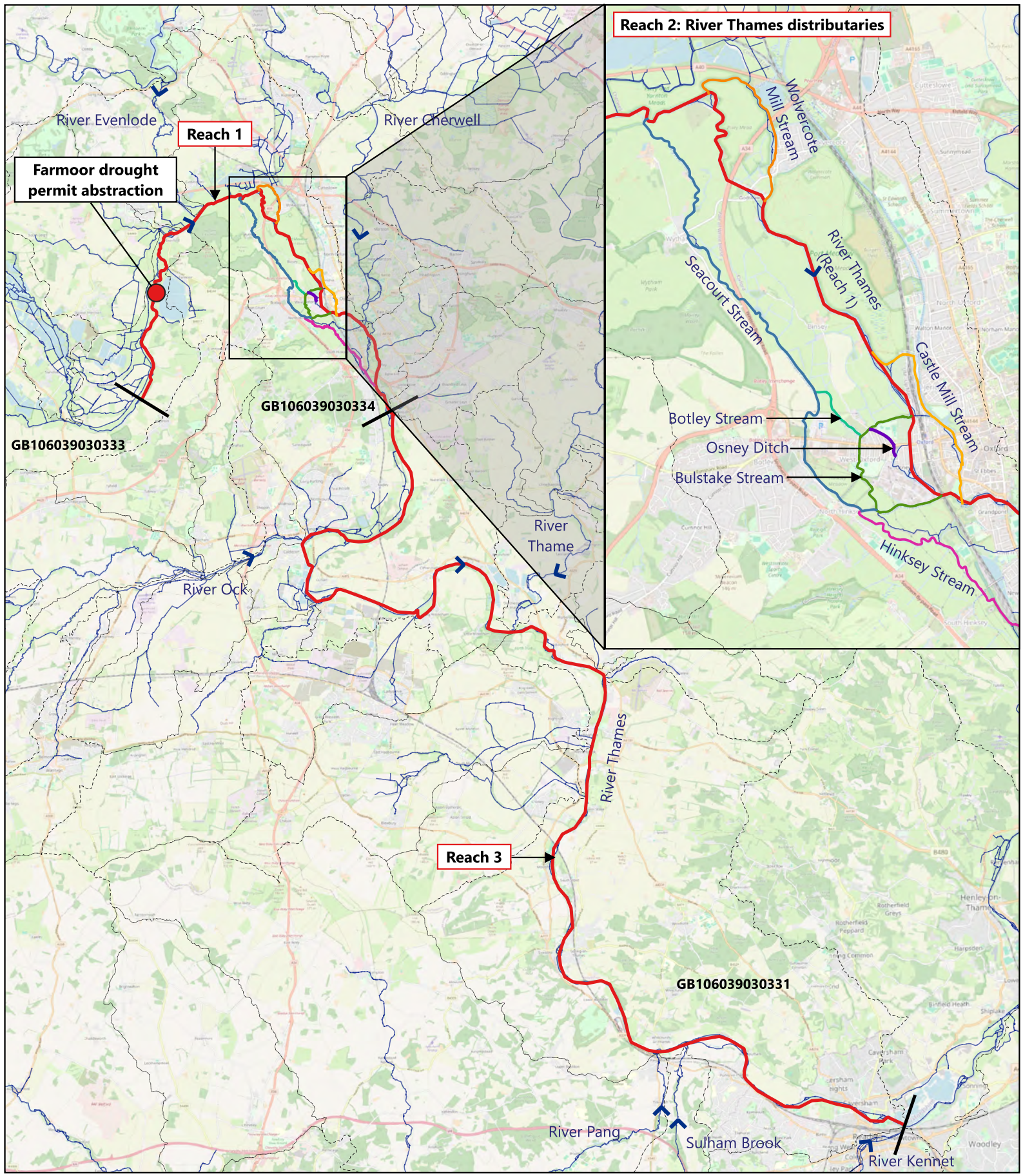
The main aims of the over-pumping as part of the Farmoor drought permit would be as follows:

1) To provide sufficient water into the Seacourt Stream to maintain a minimum ecological flow to maintain the ecology. For the Seacourt Stream the required minimum flow into the stream would be 120 l/sec. This flow could be provided by setting the weir controlling flow into the Seacourt Stream to the appropriate level to ensure this flow into the stream, with a pumping solution also installed, in case it is needed, to ensure this volume of water could be pumped into the Seacourt Stream if levels fall too low to guarantee flow over the weir.
2) To provide sufficient water into the Wolvercote Stream to maintain a minimum ecological flow to maintain the ecology. For the Wolvercote Stream the required minimum flow into the stream would be 25-50 l/sec. For the Wolvercote Stream, it is anticipated that the required flow will be provided as a result of the setting of the Kings weir such that levels are maintained to allow a minimum flow into the Wolvercote Stream.
3) To provide sufficient water into the Osney Stream to maintain a minimum ecological flow to maintain the ecology. For the Osney Stream the required minimum flow into the stream would be 25-50 l/sec. This flow could be maintained by retaining the settings of the undershot sluice and if levels are maintained in the River Thames by the existing weir settings at the next downstream weir there will always be enough water to ensure flow through the undershot sluice.
4) To provide sufficient water into the Castle Mill Stream to maintain a minimum ecological flow to maintain the ecology. For the Castle Mill Stream the required minimum flow into the stream would be 25-50 l/sec. This flow could be maintained by retaining the settings of the Castle Mill existing structures which ensure that there is flow into the Wareham Stream from the Castle Mill Stream and this flow then returns to the Castle Mill Stream further downstream. If levels are maintained in the Castle Mill Stream by the existing weir settings at the next downstream weir there will always be enough water at the offtake from the Castle Mill Stream to ensure flow into the Wareham Stream. A pumping solution will be prepared in case it is needed.
5) To provide sufficient water into the Bulstake Stream to maintain a minimum ecological flow to maintain the ecology. For the Bulstake Stream the required minimum flow into the stream would be 25-50 l/sec. This flow would be provided by a pumping solution installed to ensure this volume of water could be pumped into the Bulstake Stream and is likely to be needed for the duration of the period that the Drought Permit is in use.

These Watercourses and their associated ecology are dependent on receiving flow from the River Thames.

Over-pumping, where required, would be initiated by different triggers for each distributary, as agreed with the Environment Agency. These triggers would be informed by hydrological monitoring and walkovers undertaken pre-drought permit and during drought permit implementation.

These measures are included as conditions on the drought permit and the assessment made is with these measures in place.



N

Legend

- Drought Permit abstraction
- River Reaches
- Reach divides
- WFD River Waterbody Catchments
- Watercourses
- Flow direction

River Thames distributaries (Reach 2)

- Bulstake Stream
- Botley Stream
- Seacourt Stream
- Hinksey Stream
- Wolvercote Mill Stream
- Castle Mill Stream
- Osney Ditch

Project title:
Thames Water Drought Plan Environmental Assessment

Figure 4-1:
Farmoor Drought Permit Overview Map

NGR: SU551945 | **Scale:** 1:190,000

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4.2 POTENTIALLY IMPACTED REACHES

The zone of influence associated with each drought option is defined through hydrological effects. Within the overall zone of influence, reaches are then defined on a hydrological basis. Section 3.4 of 'the Methodology' sets out this approach in detail. **Table 4-2** provides details of these reaches, which are illustrated in **Figure 4-1**.

Table 4-2 Farmoor drought permit reach details

Reach	Watercourse	Reach start	Reach end
Reach 1	River Thames	Northmoor Lock	Sandford Lock
Reach 2	Thames Distributaries	Seacourt Stream	Sandford Lock
Reach 3	River Thames	Sandford Lock	River Pang (Caversham Lock)

4.3 WFD WATER BODIES IN STUDY AREA

The study area and focus of the environmental assessment covers the WFD waterbodies listed in **Table 4-3**. The WFD waterbodies are also illustrated on **Figure 4-1**.

Table 4-3 WFD waterbodies considered in the assessment

Reach	WFD Waterbody
Reach 1 and 2	Thames (Leach to Evenlode) (GB106039030333) Thames (Evenlode to Thame) (GB106039030334)
Reach 3	Thames (Wallingford to Caversham) (GB106039030331)

5. PHYSICAL ENVIRONMENT EFFECTS

This section provides a characterisation of the physical environment within the zone of influence (as defined in **Section A3** of **Appendix A**) and includes the following information for each reach:

1. Reach overview.
2. River flow effects, in support of hydro-ecology.
3. River habitats.
4. Water quality.
5. Environmental pressures to flow and water quality.

An assessment of likely changes from drought option implementation for each reach within the zone of influence is then provided.

Potential impacts on the physical environment due to the Farmoor drought permit are summarised below in **Table 5-1**. Full details are provided in **Appendix A**.

Table 5-1 Summary of potential changes to the physical environment from implementation of the Farmoor drought permit

River Reach (Impact)	Reach 1 *River Thames from Northmoor Lock to Sandford Lock*	Reach 2 *Thames Distributaries*	Reach 3 *River Thames from Sandford Lock to River Pang (Caversham Lock)*
River flow effects in support of hydro-ecology	• Drought permit river flow effects only at river flows less than 346 Ml/d (prior to Farmoor Reservoir abstraction). In low flow years, flows are lower than this for a sustained period of time, potentially lasting the full six-month period of a drought permit. • Potential change from dates with notably low flow for the season to exceptionally low flow for the season, for sustained periods (month or months) across the duration of the drought permit. • River flows less than 46.38 Ml/d would not be reduced further by a drought permit.	• Supported flow routing into Seacourt Stream, Wolvercote Mill Stream, Osney Stream, Castle Mill Stream and Bulstake Stream through the Drought Permit maintains a minimum flow in all distributaries • Flow increases from R. Evenlode enhances flow variability into Seacourt Stream above minimum flow. • Drought permit river flow effects only at river flows less than 346 Ml/d (prior to Farmoor Reservoir abstraction). In low flow years, flows are lower than this for a sustained period of time, potentially lasting the full six month period of a drought permit. • Potential change from dates with notably low flow for the season to exceptionally low flow for the season, for sustained periods (month or months) across the duration of the drought permit. • River flows less than 46.38 Ml/d would not be reduced further by a drought permit.	• Drought permit river flow effect only seen at river flows less than 136.38 Ml/d (prior to Farmoor Reservoir abstraction). Such flows are either irregular or for a sustained period of time, depending on the environmental drought. • Potential change from dates with notably low flow for the season to exceptionally low flow for the season, for short periods at a time (days) across the duration of the drought permit. • Potential increase in severity of exceptionally low flow for the season, for sustained periods (month or months) across the duration of the drought permit.
River habitats	**Moderate risk:** • Moderate risk of changes in flow velocity in the level controlled mainstem River Thames at times when drought permit in use; noting the effects are at times of very low velocity. • Minor risk of reduced control of water level in the mainstem River Thames from flow reduction, noting the channel is maintained as deep. • Minor risk to channel connectivity including flow through fish passes at weirs along the reach. • Minor, temporary and reversible increase in sediment dynamics (e.g. fine sediment deposition) from lower velocities.	**Uncertain risk**: • Uncertain risk of changes in flow velocity for those distributaries where water levels are controlled • Uncertain risk of changes in velocity and level for those distributaries that are not level controlled. • Minor, temporary and reversible increase in sediment dynamics (e.g. fine sediment deposition) from lower velocities. • In addition, the drought permit may also result in a greater loss, or extended drying, of wetted perimeter than might otherwise be expected under the current hydrological regime.	**Minor risk:** • Minor risk of changes in flow velocity in the level controlled mainstem River Thames at times when drought permit in use; noting the effects are at times of very low velocity. • Minor, temporary and reversible increase in sediment dynamics (e.g. fine sediment deposition) from lower velocities.
Water Quality	**High risk:** • High risk, specifically with regard to Soluble Reactive Phosphorus (SRP) associated with reduced flushing rates. • Low risk, with regard to dissolved oxygen, associated with increase in residence time. • No general risk to ammonia.	**High risk:** • High risk, specifically with regard to SRP associated with reduced flushing rates. • Low risk, with regard to dissolved oxygen, associated with increase in residence time. • No general risk to ammonia.	**High risk:** • High risk, specifically with regard to SRP • No risk associated with dissolved oxygen in the main stem or of ammonia.

River Reach (Impact)	Reach 1 *River Thames from Northmoor Lock to Sandford Lock*	Reach 2 *Thames Distributaries*	Reach 3 *River Thames from Sandford Lock to River Pang (Caversham Lock)*
Additional abstraction pressures	**No risk**	**No risk**	**No risk**
Specific water quality pressures	**High risk:** • One high risk discharge (Cassington STW) • One uncertain risk discharge (Swinford WTW), added at request of EA	**High risk:** • Risk of transfer of effects of water quality pressures in Reach 1 into this reach.	**Medium risk:** • Three medium risk discharges (Oxford, Abingdon and Didcot) STWs pose a risk to water quality (specifically with regard to ammonia and SRP).

6. RECEPTORS ASSESSMENT

Potential impacts on environmental receptors due to the Farmoor drought permit are summarised below in **Table 6-1**. Full details are provided in **Appendix B**.

Table 6-1 Summary of potential impacts to environmental receptors as a result of the Farmoor drought permit

Receptor	Reach 1	Reach 2	Reach 3
Statutory Designated Sites			
Oxford Meadows SAC	Negligible	N/A	N/A
Cassington Meadows SSSI	Negligible	N/A	N/A
Pixey and Yarnton Meads SSSI	Negligible	N/A	N/A
Wolvercote Meadows SSSI	Negligible	N/A	N/A
Port Meadow with Wolvercote Common and Green SSSI	Negligible	N/A	N/A
Iffley Meadows SSSI	Negligible	N/A	N/A
Wytham Ditches and Flushes SSSI	N/A	**Moderate**	N/A
Hartslock SSSI	N/A	N/A	Negligible
Non-Statutory Designated Sites and NERC Habitats			
Thames Island (Skinner's Weir Island) SNCI	Minor	N/A	Negligible
Swinford Toll Brook Meadow SNCI	Negligible	N/A	N/A
Pasture by A34 Thames Bridge SNCI	Negligible	N/A	N/A
Binsey Green SNCI	Negligible	N/A	N/A
Kennington Pool SNCI	N/A	Negligible	N/A
Bypass Swamp SNCI	Minor	N/A	N/A
Fiddler's Elbow Marsh SNCI	Minor	N/A	N/A
Heyford Hill Lane Pasture SNCI	Negligible	N/A	N/A
South Stoke Marsh (south) SNCI and South Stoke Marsh (north) SNCI	N/A	N/A	Negligible
Monastic Fish Ponds, South Stoke SNCI	N/A	N/A	Negligible
Whitchurch on Thames Wet Meadow SNCI	N/A	N/A	Negligible
Floodplain and grazing marshes	Negligible	N/A	Negligible
Lowland fen	Negligible	N/A	Negligible
Reedbed	Negligible	N/A	Negligible
NERC and Notable Species Receptors			
Depressed River mussel	Minor	Minor	Minor
Fine-lined pea mussel	Minor	Minor	Minor
Brown / sea trout	Moderate	Moderate	Minor
European eel	Minor	Minor	Minor
Brook lamprey	Minor	Minor	Minor
Bullhead	Minor	Minor	Minor
Barbel	Minor	Minor	Minor
Ranunculus sp.	Minor	Minor	N/A
WFD Status Receptors			
Macroinvertebrates	Minor	Minor	Minor
Fish	Moderate	Moderate	Minor
Macrophytes	Minor	Minor	Minor
Diatoms	Minor	Minor	Minor

Receptor	Reach 1	Reach 2	Reach 3
INNS Receptors			
Macroinvertebrates	Negligible	Negligible	Negligible
Other receptors			
Navigation	Moderate	Moderate	Moderate
Angling	Minor	Minor	Minor
Designated bathing water sites	N/A	Negligible	Moderate

Where a significant effect on a Habitats site (SAC, SPA or Ramsar) is likely, either alone or in-combination with other plans or projects, and is not directly connected with, or necessary for the management of the site, a HRA has been undertaken to determine whether the drought option would adversely affect the integrity of the Habitats sites, either alone or in-combination with other plans and projects, taking into account available mitigation measures. Where sites have been identified as potentially impacted, these have been included for full assessment in **Appendix B** and **Appendix D**. No Likely Significant Effect (LSE) on the integrity of a Habitats site(s) are anticipated from the implementation of the Farmoor drought permit

7. ENVIRONMENTAL MONITORING PLAN (EMP) AND MITIGATION

The Environment Agency's 2025 DPG requires Thames Water to set out a monitoring plan following assessment of the sensitivity and impacts associated with drought options, as indicated in **Figure 3-1**. In particular the DPG indicates that any drought plan should be accompanied by an EMP that sets out:

- ongoing baseline monitoring to inform sensitivity and impact assessments.
- the monitoring that will be implemented to reduce uncertainty identified in the assessment of either the sensitivity of the environment or impacts on receptors considered in the detailed assessment.
- the in-drought and post-drought (recovery) monitoring that will be carried out to understand the actual impact of drought options.

As indicated in **Figure 3-1** the DPG also requires Thames Water to set out a mitigation plan following the assessments of potential impacts associated with each drought management action. In particular the DPG indicates that any drought plan should be accompanied by an EMP that sets out:

- mitigation measures to reduce adverse impacts on the environment of supply side drought options; and
- compensation measures for adverse effects that remain after mitigation measures have been applied.

The DPG requires that this information is set out as a separate document alongside, and linked to, each environmental assessment.

The assessments undertaken in this EAR confirm the receptors requiring consideration of mitigation and appropriate monitoring triggering mitigation. Thames Water's DP 2027 EMP provides a comprehensive description of the schedule of monitoring and trigger-based mitigation agreed as relevant and practicable based on the nature and timing of permit implementation. The mitigation and monitoring proposals will act as a safeguard that responds and is responsive to both predicted and unpredicted drought impacts.

The monitoring and mitigation recommendations have been developed through agreement with the Environment Agency. Consultation between Thames Water and the Environment Agency is ongoing, and the EMP will be updated as required to reflect future agreements.

The EMP also documents the baseline monitoring recommendations which have been identified as required following the completion of the environmental assessment. Baseline monitoring will ensure that sufficient baseline data is available to inform the sensitivity and impact assessment and to reduce any uncertainty in the assessment.

The Farmoor drought permit EMP is provided in **Appendix C**.

8. CUMULATIVE IMPACTS

8.1 INTRODUCTION

The focus of this EAR is the Farmoor drought permit. The assessment, as described in previous sections, has considered how the proposed drought permit may affect the environment in combination with the effects of existing licences and consents. In accordance with the DPG, and further to consultation with the Environment Agency during the development of **the Methodology**, the assessment has also considered the potential cumulative effects of Thames Water implementing other drought permits within a similar timeframe. Consideration has also been given to the potential for cumulative impacts of drought options implemented by neighbouring water companies. This is discussed further in **Section 8.2** and **8.3** below.

8.2 INTERACTION WITH OTHER THAMES WATER DROUGHT OPTIONS

At the time of the Farmoor drought permit application, the Gatehampton drought permit is also being considered for application by Thames Water. The assessment below considers the potential cumulative impacts of both drought permits being implemented simultaneously.

8.2.1 Interaction of Farmoor Drought Permit with Gatehampton Drought Permit

The Farmoor drought permit, independently of the Gatehampton drought permit, would experience river flow effects only at river flows less than 136.38Ml/d in the River Thames in the vicinity of the Gatehampton abstraction. The impacted reach extends from Sandford Lock (around 30km upstream of the Gatehampton abstraction) until Caversham Lock (around 30km downstream of the Gatehampton abstraction). The Farmoor drought permit is associated with a **minor** risk to river habitats in this reach. The Gatehampton drought permit is associated with **negligible** risk to river habitats. As a result, the cumulative impact as a result of both the Gatehampton and Farmoor drought permits corresponds to a **minor** risk to river habitats which is the same magnitude as for the Farmoor drought permit when considered on its own. Hence the cumulative impacts, for both schemes, would be the same as those considered for the Farmoor drought permit on its own.

8.3 INTERACTION WITH OTHER WATER COMPANIES' DROUGHT OPTIONS

The assessment of the potential for cumulative impacts of Thames Water's supply side and drought permit/order options with drought options listed in neighbouring water companies' drought plans was undertaken as part of the Thames Water draft Drought Plan 2027: Strategic Environmental Report - Environmental Report [5]. The SEA was informed by the most recent information available on the neighbouring water companies' drought plans.

The SEA considered the following neighbouring watering company DPs:

- Anglian Water (2022)
- Severn Trent (2022)
- Southern Water (2022)
- Wessex Water (2021)
- Bristol Water (2022)
- Essex and Suffolk Water (2022)
- South East Water (mid Kent) (2022)
- SES (2021)
- Affinity Water (2022)

The SEA did not identify any drought permit/order options in other water company drought plans that could result in cumulative effects with the Thames Water Farmoor drought permit.

[5] Thames Water Utilities Ltd (2026). Thames Water Draft Drought Plan 2027: *Strategic Environmental Report - Environmental Report* – Draft for Consultation, Prepared by Ricardo (May 2026).

APPENDICES

Appendix A Physical Environment

Appendix B Environmental Receptors Assessment

Appendix C Environmental Monitoring Plan and Mitigation

Appendix D Habitats Regulations Assessment

APPENDIX A – PHYSICAL ENVIRONMENT

A1 INTRODUCTION

This document is Appendix A: Physical Environment of the Farmoor drought permit Environment Assessment Report (EAR). With reference to the approach to undertaking environmental assessments shown as a process diagram in Figure 3-1 of the EAR, this appendix includes sub-sections describing detailed assessments setting out the zone of influence associated with the drought option, the baseline conditions, and the potential changes in the physical environment as a result of the drought option. This Appendix is summarised in Sections 4 and 5 of the EAR. The assessment presented here is used to inform the Receptors Assessment presented in Appendix B and summarised in Section 6 of the EAR.

This appendix assesses the potential impacts on the physical environment as a result of commencing the implementation of a maximum six-month duration Farmoor drought permit in the autumn and winter of 2026 through to the early spring of 2027; and subsequent effects post implementation.

Details regarding the approaches/methodologies used for assessing susceptibility and sensitivity to drought options and the assessment of the impacts associated with drought options are presented in Thames Water's Drought Plan 2027 Environmental Assessment Methodology'[1] ('**the Methodology**').

This appendix is set out in the following sections:

Section A.2 Drought option overview

Section A.3 Study area – this includes:

1. Reach setting, defining the zone of influence from hydrological information.
2. Timing of drought measure effects.

Section A.4 Physical environment effects – this includes for each reach:

1. Summary of potential changes in the physical environment.
2. Reach overview.
3. River flow (including baseflow) effects, in support of hydro-ecology.
4. River habitats, incorporating geomorphological features.
5. Water quality.
6. Environmental pressures to flow and water quality.

[1] Thames Water Utilities Ltd (2026). Thames Water Drought Plan 2027: Environmental Assessment Methodology Report – Prepared by Ricardo (V6 March 2026).

A2 DROUGHT OPTION OVERVIEW

With reference to the approach to undertaking environmental assessments shown as a process diagram in Figure 3-1 of the EAR, this section of Appendix A "identifies the supply side action". This is summarised in Section 4.1 of the EAR.

Licence details and proposed drought permit details are provided in

Table A2-1 below. The location of the abstraction is indicated in **main EAR Figure 4-1**. The drought permit option includes a revised abstraction rate to Farmoor Reservoir when naturalised flows in the River Thames derived for the Farmoor gauging station are below 377.3 Ml/d. This includes a greater range of river flows at which 300 Ml/d would be abstracted and a higher rate of reduced abstraction - in all cases with a minimum flow downstream of Farmoor flow gauging station of 46.38 Ml/d, which is lower than that licensed. Where river flows downstream of Farmoor flow gauging station are less than 46.38 Ml/d this would not be a change to licence conditions.

Table A2-1 Farmoor existing and proposed drought permit abstraction

Abstraction Water Source	NGR	Normal Abstraction	Proposed Drought Permit Abstraction	Benefit Ml/d
River Thames	SP 439 064	Thames Water are licensed to abstract 55,312 Ml/year at an abstraction rate not exceeding 300 Ml/d or 12.502 Ml/hour. The following conditions also apply: At any time when naturalised flow at Farmoor flow gauging station, downstream of the abstraction, is greater than 377.3 Ml/d, abstraction shall not exceed 300 Ml/d or 12.502 Ml/hour. Under these circumstances, there would be a residual flow of at least 77.3 Ml/d downstream of the abstraction. At any time when naturalised flow at Farmoor flow gauging station, downstream of the abstraction, is between 136.38 Ml/d and 377.3 Ml/d, abstraction shall not result in the residual flow being reduced below 77.3 Ml/d. Abstractions of at least 59.1 Ml/d would be possible. At any time when naturalised flow at Farmoor flow gauging station, downstream of the abstraction, is less than 136.38 Ml/d, abstraction shall not exceed 59,100 cubic meters per day (59.1 Ml/d) with a maximum hourly abstraction rate of 2,546 cubic meters per hour (2.55 Ml/hour).	Normal conditions apply other than: At any time when naturalised flow at Farmoor flow gauging station, downstream of the abstraction, is greater than 346.38 Ml/d, abstraction shall not exceed 300 Ml/d or 12.502 Ml/hour. Under these circumstances, there would be a residual flow of at least 46.38 Ml/d downstream of the abstraction. At any time when naturalised flow at Farmoor flow gauging station, downstream of the abstraction, is between 136.384 Ml/d and 346.38 Ml/d, abstraction shall not result in the residual flow being reduced below 46.38 Ml/d. Abstraction shall not exceed 90,000 cubic meters per day (90 Ml/d) with a maximum hourly abstraction rate of 3,750 cubic meters per hour (3.75 Ml/hour). At any time when naturalised flow at Farmoor flow gauging station, downstream of the abstraction is between 105.48 Ml/d and 346.384 Ml/d abstraction shall not allow flow at the gauging station to reduce below 46.38 Ml/d. Abstraction shall not exceed 59,100 cubic meters per day (59.1 Ml/d) with a maximum hourly abstraction rate of 2,546 cubic meters per hour (2.55 Ml/hour). At any time when naturalised flow at Farmoor flow gauging station, downstream of the abstraction, is less than 105.48 Ml/d, abstraction shall not exceed 59.1 Ml/d with a maximum hourly abstraction rate of 2.55 Ml/hour.	Up to 30

Surface water is abstracted from the River Thames and transferred to the pumped storage Farmoor Reservoir. Stored water is treated at Farmoor water treatment works (WTW) or Swinford WTW for treatment and public water supply to the SWOX WRZ.

It should be noted that licence flow conditions are based on the naturalised flow. Naturalised flows in this context are adjusted flow records that approximate the flows that would occur in the absence of river regulation and abstraction. The naturalised flow at Farmoor referred to in the abstraction licence is effectively a partially naturalised flow that only takes account of the Thames Water abstraction immediately upstream of the Farmoor gauging station. The naturalised flow for the Farmoor licence is calculated as the measured flow at the gauging station plus the abstraction at the Thames Water Farmoor intake.

As part of the Farmoor drought permit implementation, over-pumping of water from the River Thames into selected distributaries is proposed to help maintain a minimum flow (or level) in the sensitive distributaries. The principle of the proposed over-pumping operation is as follows: as the River Thames downstream of the upper two licensed Farmoor abstraction intakes is effectively made up of a series of ponds (or pounds) when the locks and weirs along the river are closed off leaving a small volume of residual flow in the river. Over-pumping would allow advantage to be taken of the residual flow left below the Farmoor and Swinford intakes, to pump some of this residual flow into the distributaries to maintain a minimum flow or level. The proposed operation at the entry to each distributary would involve over-pumping from the River Thames into the distributary or ensuring flow was maintained into the distributary through the existing weir structure. The pumped water, would simply be pumped into the top of the distributary in each case or allowed to flow into the distributary by controlling the sluice or weir setting to ensure the minimum required flow entered the distributary. In this way, the over-pumped water is available to help maintain a minimum flow along the sensitive distributaries from the River Thames.

The main aims of the over-pumping as part of the Farmoor drought permit would be as follows:

1) To provide sufficient water into the Seacourt Stream to maintain a minimum ecological flow to maintain the ecology. For the Seacourt Stream the required minimum flow into the stream would be 120 l/sec. This flow could be provided by setting the weir controlling flow into the Seacourt Stream to the appropriate level to ensure this flow into the stream, with a pumping solution also installed, in case it is needed, to ensure this volume of water could be pumped into the Seacourt Stream if levels fall too low to guarantee flow over the weir.
2) To provide sufficient water into the Wolvercote Mill Stream to maintain a minimum ecological flow to maintain the ecology. For the Wolvercote Mill Stream the required minimum flow into the stream would be 25-50 l/sec. Flow into the Wolvercote Stream would be maintained by the setting of Kings Weir to ensure levels are maintained in the main River Thames to ensure the required minimum flow down the Wolvercote Stream.
3) To provide sufficient water into the Osney Stream to maintain a minimum ecological flow to maintain the ecology. For the Osney Stream the required minimum flow into the stream would be 25-50 l/sec. This flow could be maintained by retaining the settings of the undershot sluice and it if levels are maintained in the River Thames by the existing weir settings at the next downstream weir there will always be enough water to ensure flow through the undershot sluice. An over-pumping solution is included for contingency.
4) To provide sufficient water into the Castle Mill Stream to maintain a minimum ecological flow to maintain the ecology. For the Castle Mill Stream the required minimum flow into the stream would be 25-50 l/sec. This flow could be maintained by retaining the settings of the Castle Mill existing structures which ensure that there is flow into the Wareham Stream from the Castle Mill Stream and this flow then returns to the Castle Mill Stream further downstream. If levels are maintained in the Castle Mill Stream by the existing weir settings at the next downstream weir there will always be enough water at the offtake from the Castle Mill Stream to ensure flow into the Wareham Stream. A pumping solution could be prepared if needed.
5) To provide sufficient water into the Bulstake Stream to maintain a minimum ecological flow to maintain the ecology. For the Bulstake Stream the required minimum flow into the stream would be 25-50 l/sec. This flow would be provided by a pumping solution installed to ensure this volume of water could be pumped into the Bulstake Stream and is likely to be needed for the duration of the period that the Drought Permit is in use.

These Watercourses and their associated ecology are dependent on receiving flow from the River Thames.

Over-pumping, where required, would be initiated by different triggers for each distributary, as agreed with the Environment Agency.

These measures are included as conditions on the drought permit and the assessment made in this appendix is of these measures in place.

A3 STUDY AREA

With reference to the approach to undertaking environmental assessments shown as a process diagram in **Figure 3-1** of the EAR, this section of Appendix A "determines the zone of influence of the drought action". This is summarised in **Section 4.2** of the EAR.

The zone of influence associated with the drought option is defined through hydrological effects. Within the overall zone of influence, reaches are then defined on a hydrological basis. 'The Methodology' sets out this approach in detail in Section 3.4. The zone of influence and individual reaches for assessment of impacts are set out in **Section A3.1** below. Information on the likely timings of the drought permit are set out in **Section A3.2** below.

A3.1 ZONE OF INFLUENCE OF THE DROUGHT OPTION

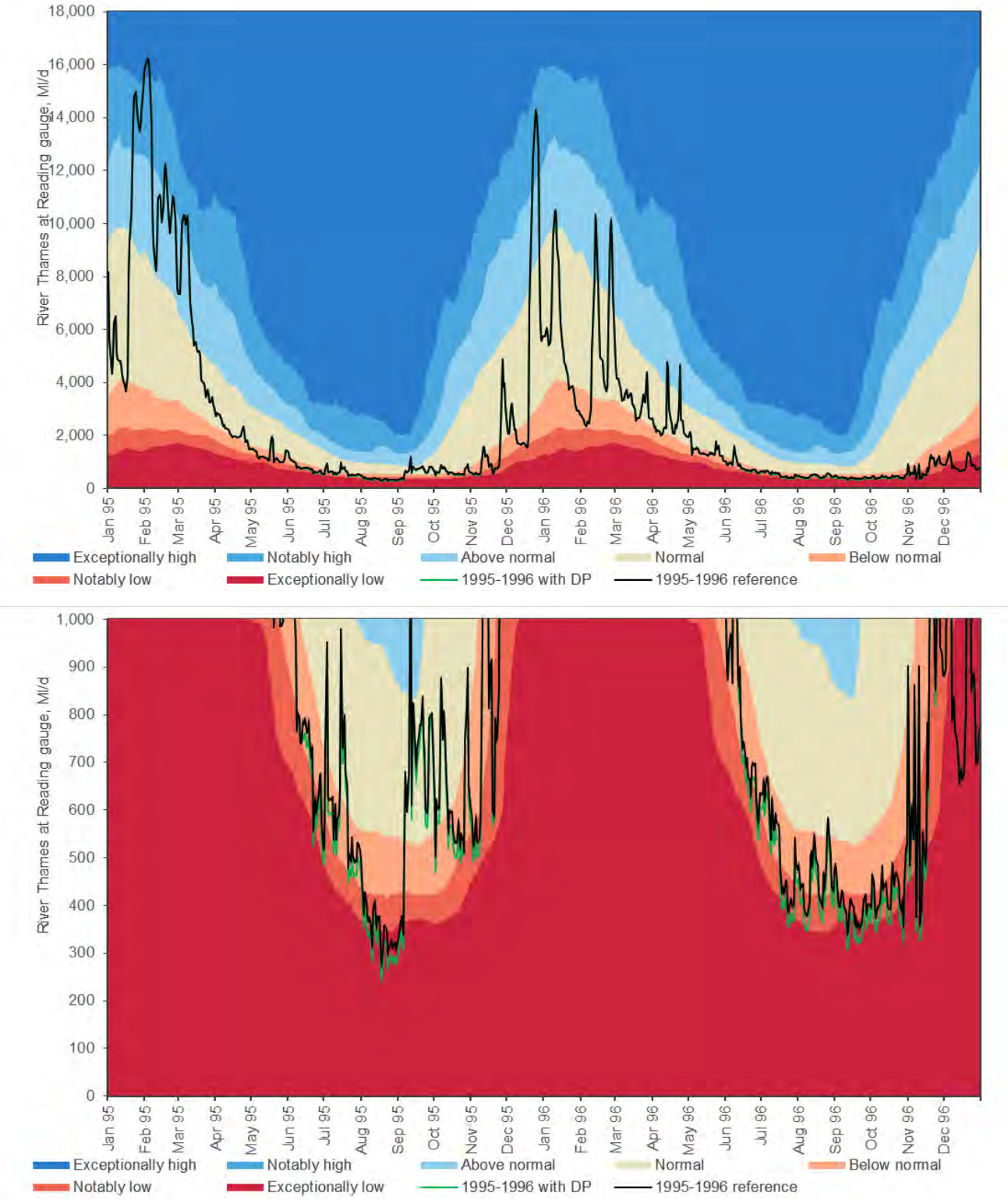
As set out in **Section A.2**, the conditions of the Farmoor abstraction normal operating licence will be relaxed to allow for up to an additional 30 Ml/d each day to be abstracted at very low river flow conditions. The rate of abstraction will be determined by the amount of flow recorded at Farmoor gauging station in order to maintain a residual flow in the River Thames downstream of the abstraction.

The hydrological zone of impact of the drought permit was considered as part of the screening and scoping exercise[2] and has subsequently been reviewed and refined further following discussions and consultation with the Environment Agency and Natural England in 2012 and updated in 2016, and remains as included in the Drought Permit application of 2022. The end of the hydrological zone of influence has been identified as Caversham Lock, Reading, locally upstream of the River Kennet confluence. A review of the Thames at Reading flow data for the period 1992[3]-2024 derived seasonal flow bands, from which to assess the extent of hydrological change with a drought, as set out in Section 3.4.2 of **the Methodology**. 1995-96 is an illustrative period on **Figure A3-1**, which includes the lowest flows and most prolonged low flows in the reviewed period. The Thames at Reading data do not associate a Farmoor Drought Permit with notable change in the number of days in each flow band, but does illustrate some lower flow in the *exceptionally low* flow band. The proportion reduction in flow for the Thames at Reading is not considered to associate with changes in the water levels as managed for navigation, and the velocity change leading habitat change is considered minimal. As such the end of the zone of influence of the drought permit is reviewed as appropriate.

[2] Thames Water Utilities Ltd (2012). Drought Plan: SWOX Resource Zone - Drought Permit Environmental Assessments Scoping Report. Draft Final. Prepared by Cascade Consulting, 7 March 2012.

[3] Start of period as used by Environment Agency for the Thames Area Water Situation Report for the Thames at Farmoor.

Figure A3-1 Review of River Thames at Reading flows to evidence the end of the zone of influence of the Drought Permit, full range and focus on lower flows



At its tidal limit, at Teddington Weir, the River Thames has a catchment size of 9,940 km^2 and a length of just over 270 km. At Farmoor, the river has a catchment size of 1,607 km^2, a length of 93 km and is classed as lowland. This section of the Thames is characterised by a sinuous plan form and low gradient which passes through a lowland area composed of grassland and urban areas. Anthropogenic impacts on the channels are high with many reinforced and re-sectioned banks and the presence of numerous locks and weirs which act

as flow control structures and aids to navigation. Pinkhill Lock is approximately 1 km downstream of the main Farmoor abstraction.

Review of hydrological information has been used together with an examination of physical habitat characteristics of the area surrounding the Farmoor abstraction to identify potentially impacted river reaches for this study. Following the approach set out in **the Methodology**, three potential impacted river reaches have been identified (see Error! Reference source not found.):

- Reach 1 covers the River Thames, from Northmoor Lock until Sandford Lock
- Reach 2 covers the distributaries of the River Thames in Oxford
- Reach 3 covers the River Thames, from Sandford Lock until Caversham Lock.

Table A3-1 Farmoor drought permit reach details

Reach name	Watercourse	Reach start	Reach end	Reach length
Reach 1	River Thames	Northmoor Lock	Sandford Lock	22.9 km
Reach 2	Thames distributaries	n/a	n/a	**n/a**
Reach 3	River Thames	Sandford Lock	Caversham Lock	64.7 km

The study area and focus of this environmental assessment of the Farmoor drought permit, covers the following waterbodies, as set out in Error! Reference source not found.:

- Thames (Leach to Evenlode) (GB106039030333)
- Thames (Evenlode to Thame) (GB106039030334)
- Thames (Wallingford to Caversham) (GB106039030331).

A3.2 TIMING OF DROUGHT MEASURE EFFECTS

A water resources drought scenario for the SWOX water resources zone could lead to triggers for drought action being breached in the spring or early summer and would result in Thames Water implementing demand management measures which are a prerequisite for implementation of any drought permit options. Therefore, the likely early onset of drought permits would be in April or May. As a Drought Permit would be limited to a maximum of six months it is likely a permit would run from April to September or May to October i.e. spanning the summer months. In view of this likelihood of drought occurrence generally being over the summer period a focus for environmental reporting on Drought Permit impacts is focussed on the summer period and the recovery of impacts beyond the April to September period.

An alternative water resources drought scenario for the SWOX water resources zone could see water resources in a severe drought breach triggers in late autumn or early winter where there is slow or delayed return to more normal meteorological patterns. In such circumstances a Drought Permit could commence in October (or another autumn or winter month), running for a maximum six months which would mean it running for October to March i.e. spanning the winter months. In view of this alternative likelihood of Drought Permit occurrence over the winter period an alternative focus for environmental reporting on Drought Permit impacts is focussed on the winter period and any consequent impacts on the following summer and beyond to the normal autumnal recovery period.

These two Drought Permit scenarios are general patterns and either could commence earlier or later than indicated. The assessment presented here is also suitable for interpretation of physical environmental effects for a Drought Permit commencing at any time of year and subsequent effects post implementation.

Whilst the current drought permit assessments have been completed for six months, the requirement to extend the assessment period will be reviewed for subsequent DPs in consultation with the Environment Agency. It should be noted that DP 2027 is for the period 2027 to 2032 and does not include the effects of likely future climate change or population growth.

A3.3 SELECTION OF ILLUSTRATIVE YEARS

The methodology for hydro-ecological assessment of watercourses impacted by surface water drought options has been used in the assessment of this option, as documented in the Methodology. For Reach 1 the Thames at Farmoor flow data for the period 1992[4]-2024 has been reviewed. Flow bands have been prepared using the gauge data. Gauge data have been naturalised by adding on Thames Water's measured daily abstraction rate. Naturalised flow data have been used to derive maximum daily abstraction rate without a drought permit, and reference condition river flows at Farmoor gauging station. The naturalised flow data have also been used to derive maximum daily abstraction rate with a drought permit, and with drought permit river flows at Farmoor gauging station. These data identify the period January 1995 to December 1996 as an illustrative year and also January to December 2011 as an illustrative year in. A review of the naturalised flow data for Eynsham from NRFA (1951-2017) identify 2011 as the year (in the Farmoor gauge period 1992-2024) with the most dates lower than the flow rate of 377 Ml/d, below which a drought permit would influence river flows. Comparison between the illustrative periods of 1995/96 and 2011 identify drought permit effects for earlier into May and for later in November and into December in 2011, but lowest flows in 1995. The longer term Eynsham pattern also identifies that prior to 1992 there were naturalised flows lower than 377 Ml/d in December in 10 of the 41 calendar years (1952-1992), corroborating the 2011 illustrative example. In 1964/65 the Eynsham naturalised data describe an extended pattern into early January. In 1975/76 the Eynsham naturalised data describe naturalised flows less than 377 Ml/d in each month (but not continuously) from June 1975 to October 1976. The full Eynsham naturalised flows does not identify flows lower than 377 Ml/d start within a calendar year any earlier than May (as illustrated in 2011). Since the closure of the Eynsham gauge in 2017 there are no years with a different seasonal or more severe drought pattern than those described through the illustrative examples for 1995/96 and 2011.

A3.4 REVIEW OF ANTECEDENT CONDITIONS

In line with **the Methodology**, the river flow effects, in support of hydro-ecology, are evidenced through the flow banding approach as set out in **Section A4**.

Gauge data for the Thames at Farmoor[5] (**Figure A3-2**) and Thames at Sutton Courtenay[6] (**Figure A3-3**) are included here to provide current context of the antecedent conditions of 2026 leading to the drought permit application. A drought permit would be in place from the date it is granted, for the following six months. **Figure A3-2** and **Figure A3-3** also show the flow bands[7] covering that period of autumn, winter and early spring.

Review of antecedent conditions from 1 January 2026 at Farmoor gauge, located downstream of the reservoir intake shows the pattern of below normal seasonal flows since the end of April. Since then, flows have remained below normal or lower for the season, except for several separate brief periods of flow increase to normal, the most recent for three days at the end of June. Due to these occasional periods of flow increase, the seasonal flow pattern in 2026 is not one of continuous decrease in flow. The fluctuations in flow have resulted in a pattern that includes eight dates of exceptionally low flow for the season to 12 September 2026, with the longest continuous period totalling three days. Thames Water abstraction rates have been included in the representation of naturalised flows (i.e. flows without abstraction) on the figure.

[4] Start of period as used by Environment Agency for the Thames Area Water Situation Report for the Thames at Farmoor.

[5] Data from Hydrology Data Explorer for the Thames at Farmoor gauge, daily average flow. Accessed 17 August 2026. Note data for 30 June to 15 August 2026 are listed by the Environment Agency as unchecked. Data quality for all other dates are listed as complete and good quality.

[6] Data from Hydrology Data Explorer for the Thames at Sutton Courtenay gauge, daily average flow. Accessed 17 August 2026. Note data for the period from 30 June 2025 are listed by the Environment Agency as unchecked. Data quality for all other dates are listed as complete and good quality.

[7] Period of data used for flow banding at both gauges is from 1992, as used by Environment Agency for the Thames Area Water Situation Report for the Thames at Farmoor.

Figure A3-2 Review of measured River Thames at Farmoor flows in the antecedent period from 1 January 2026: full range and focus on lower flows.

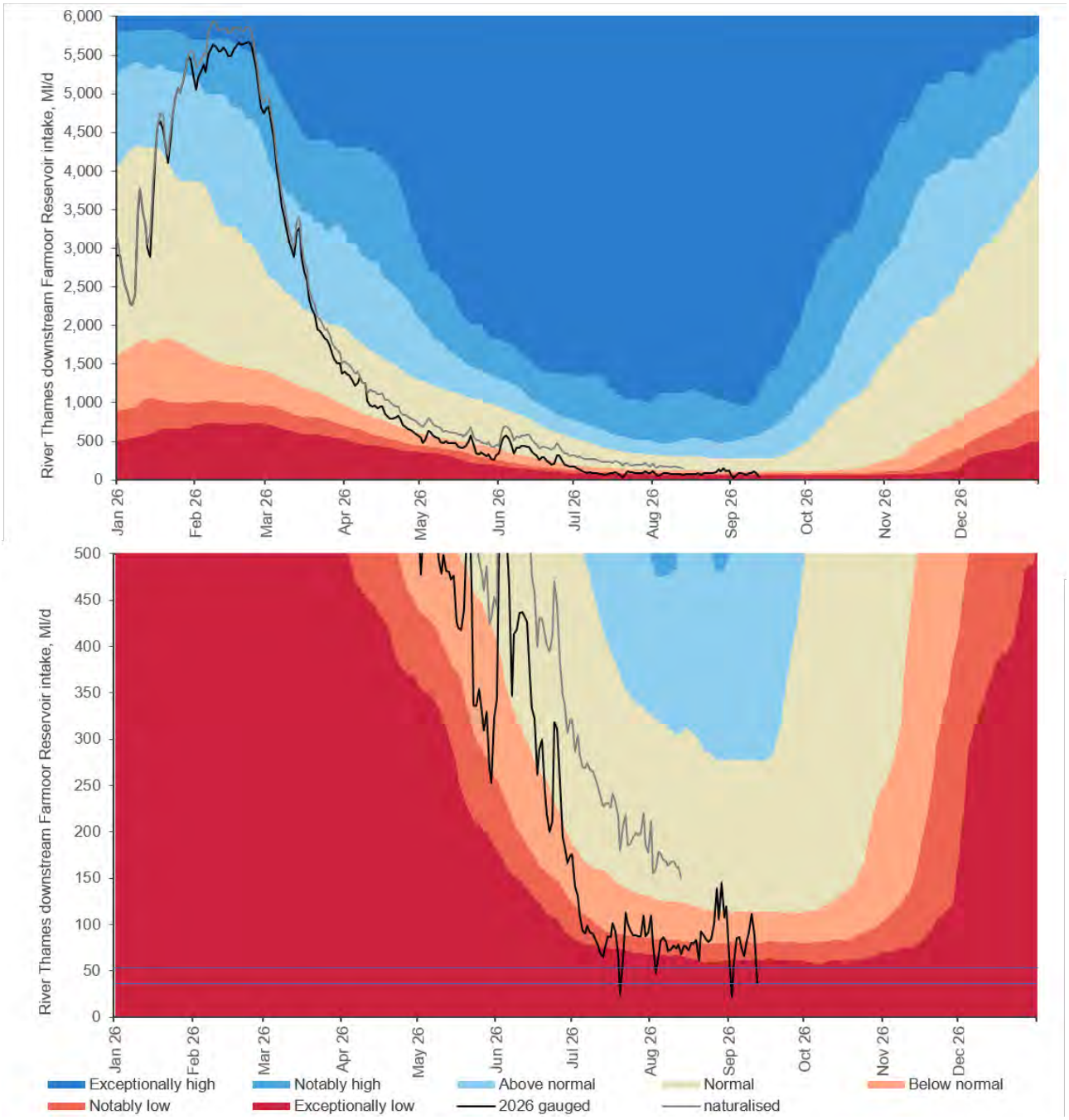
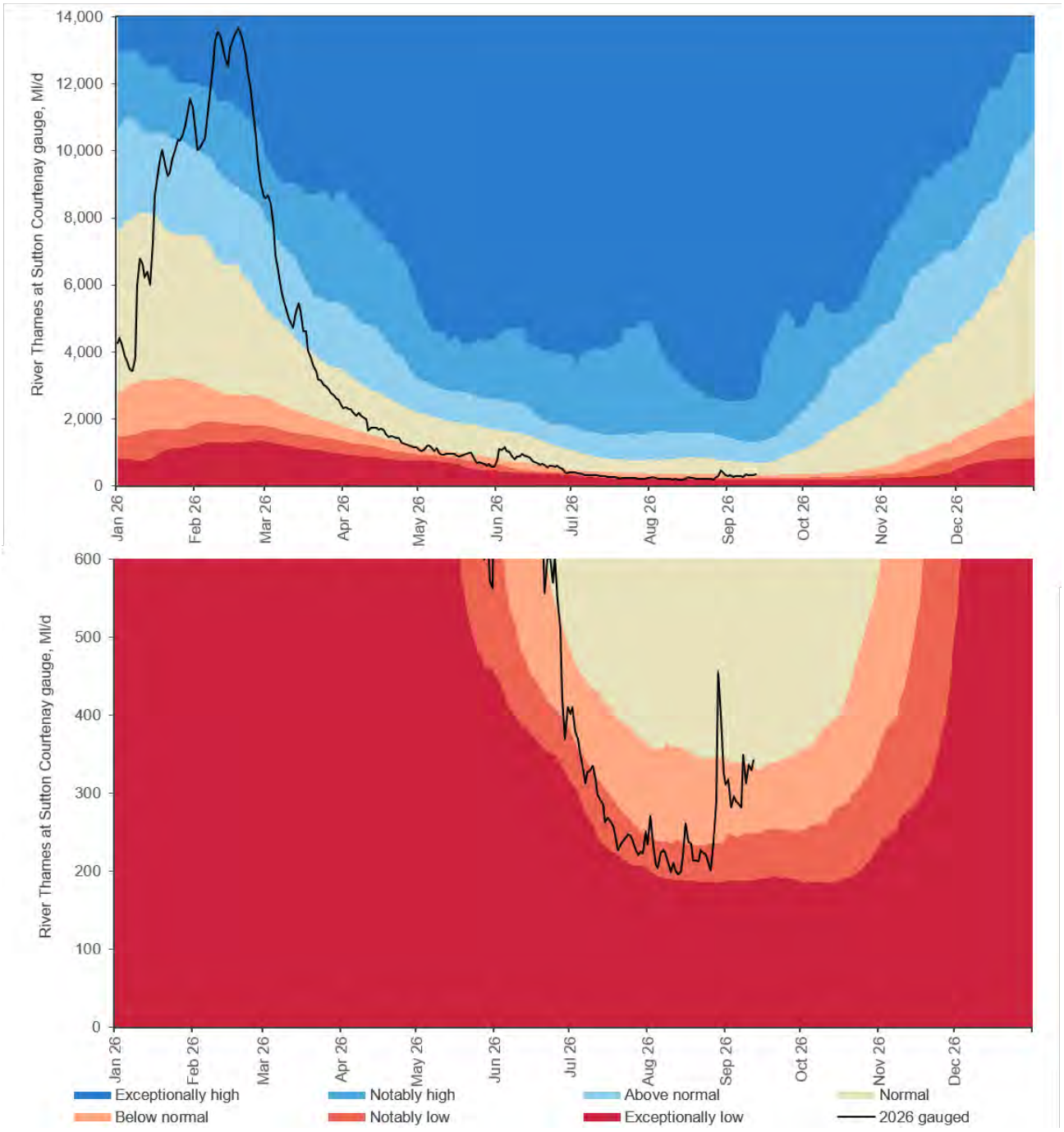


Figure A3-3 Review of measured River Thames at Sutton Courtenay flows in the antecedent period from 1 January 2026: full range and focus on lower flows.



Review of antecedent conditions from 1 January 2026 at Sutton Courtenay gauge, located downstream on the River Thames, shows the pattern of below normal seasonal flows since the end of April. Since then, flows have fluctuated between normal and notably low for the season. Due to these periods of flow increase, the seasonal flow pattern in 2025 is not one of continuous decrease in flow. The fluctuations in flow have resulted in a pattern that includes 46 dates of notably low flow for the season from late May, and no dates of exceptionally low flow for the season[8]. In general, the 2026 conditions in the River Thames at Sutton Courtenay gauge are

[8] It is noted that the bands calculated for this Drought Plan for the Thames at Sutton Courtenay gauge do not exactly match those shown by CEH on the Water Resources Portal (https://ukwrp.ceh.ac.uk/). The Water Resources Portal bands are positioned at lower flows than those derived here, as they are compiled from data starting 1973 and include exceptionally low flow periods in 1975, 1976 and 1990 which are outside the period used here. As such there are no dates with exceptionally low flow shown on the Water Resources Portal for 2026 to 17/08/2026.

not as unseasonably low as they are upstream at Farmoor. This indicates that the zone of influence of the drought permit set out in **Section A3.1** is conservative for the 2026 conditions.

The 2026 situation is consistent with the planned-for water resources drought scenario for the SWOX water resources zone which see water resources in a severe drought breach triggers in late autumn or early winter where there is slow or delayed return to more normal meteorological patterns. In the planned-for scenario, a Drought Permit would commence in October (or other autumn or winter month), running for a maximum six months which would mean it running for October to March i.e. spanning the winter months. In view of this Drought Permit occurrence over the winter period the focus for environmental reporting on Drought Permit impacts is focussed on the winter period and any consequent impacts on the following summer and beyond to the normal autumnal recovery period. Due to this consistency, the autumn-winter drought permit assessment is considered valid for use in informing the impacts of a 2026 drought permit application at Farmoor.

A4 PHYSICAL ENVIRONMENT EFFECTS

With reference to the approach to undertaking environmental assessments shown as a process diagram in **Figure 3-1** of the EAR, this section of Appendix A "sets out the likely changes in the level/flow regime due to this action" and also "sets out the likely changes in water quality and geomorphology due to this action". This assessment is used to "summarise the potential changes in the physical environment" as set out in **Section 5** of the EAR.

This section provides a characterisation of the physical environment within the zone of influence (as defined above in **Section A3**) and includes the following information for each reach:

1. Reach overview.
2. River flow effects, in support of hydro-ecology.
3. River habitats.
4. Water quality.
5. Environmental pressures to flow and water quality.

An assessment of likely changes from drought option implementation for each reach within the zone of influence is then provided. Points of interest referred to throughout the text in **Section A4** are indicated in Error! Reference source not found..

'The Methodology' provides details of the approach in Section 3.4. The approach has been developed to ensure compliance with the Environment Agency's 2025 Drought Plan Guideline (DPG)[9] and the Environment Agency's "Environmental Assessment for Water Company Drought Plans" supplementary guidance.

It is noted that for the situation of 2026, Drought Permit effects on the physical environment would be from commencement of a Drought Permit (likely September 2026) for six months through autumn, winter and into early spring of 2027. Any impacts relating to summer conditions are also potentially relevant to late onset of autumn return to higher flows and have been included in this assessment on that basis.

[9] Environment Agency (2025) Water Company Drought Plan Guideline, March 2025

A4.1 REACH 1: RIVER THAMES FROM NORTHMOOR LOCK UNTIL SANDFORD LOCK

A4.1.1 Summary of potential changes in the physical environment as a result of drought options

An overall summary of potential changes in flow effects on hydro-ecology and consequent effects on the physical environment of Reach 1 as a result of a Farmoor drought permit is presented in **Table A4-1**.

Table A4-1 Summary of potential changes in the physical environment of Reach 1 as a result of Farmoor drought permit

Physical environment aspect reviewed	Assessment of risk from implementation of drought options
River flow effects in support of hydro-ecology	• Drought permit river flow effects only at river flows less than 377 Ml/d (prior to Farmoor Reservoir abstraction). In low flow years, flows are lower than this for a sustained period of time, potentially lasting the full six-month period of a drought permit. • Potential change from dates with notably low flow for the season to exceptionally low flow for the season, for sustained periods (month or months) across the duration of the drought permit. • River flows less than 46.38 Ml/d would not be reduced further by a drought permit.
River habitats *Moderate risk*	• Moderate risk of changes in flow velocity in the level controlled mainstem River Thames at times when drought permit in use; noting the effects are at times of very low velocity. • Minor risk of reduced control of water level in the mainstem River Thames from flow reduction, noting the channel is maintained as deep. • Minor risk to channel connectivity including flow through fish passes at weirs along the reach. • Minor, temporary and reversible increase in sediment dynamics (e.g. fine sediment deposition) from lower velocities.
Water quality *High risk*	• High risk, specifically with regard to SRP associated with reduced flushing rates. • Low risk, with regard to dissolved oxygen, associated with increase in residence time. • No general risk to ammonia.
Additional abstraction pressures *No risk*	• The drought permit is not considered to pose a significant risk to any other abstractors in this reach.
Specific water quality pressures *High risk*	• One high risk discharge (Cassington STW) • One uncertain risk discharge (Swinford WTW), added at request of EA.

A4.1.2 Reach overview

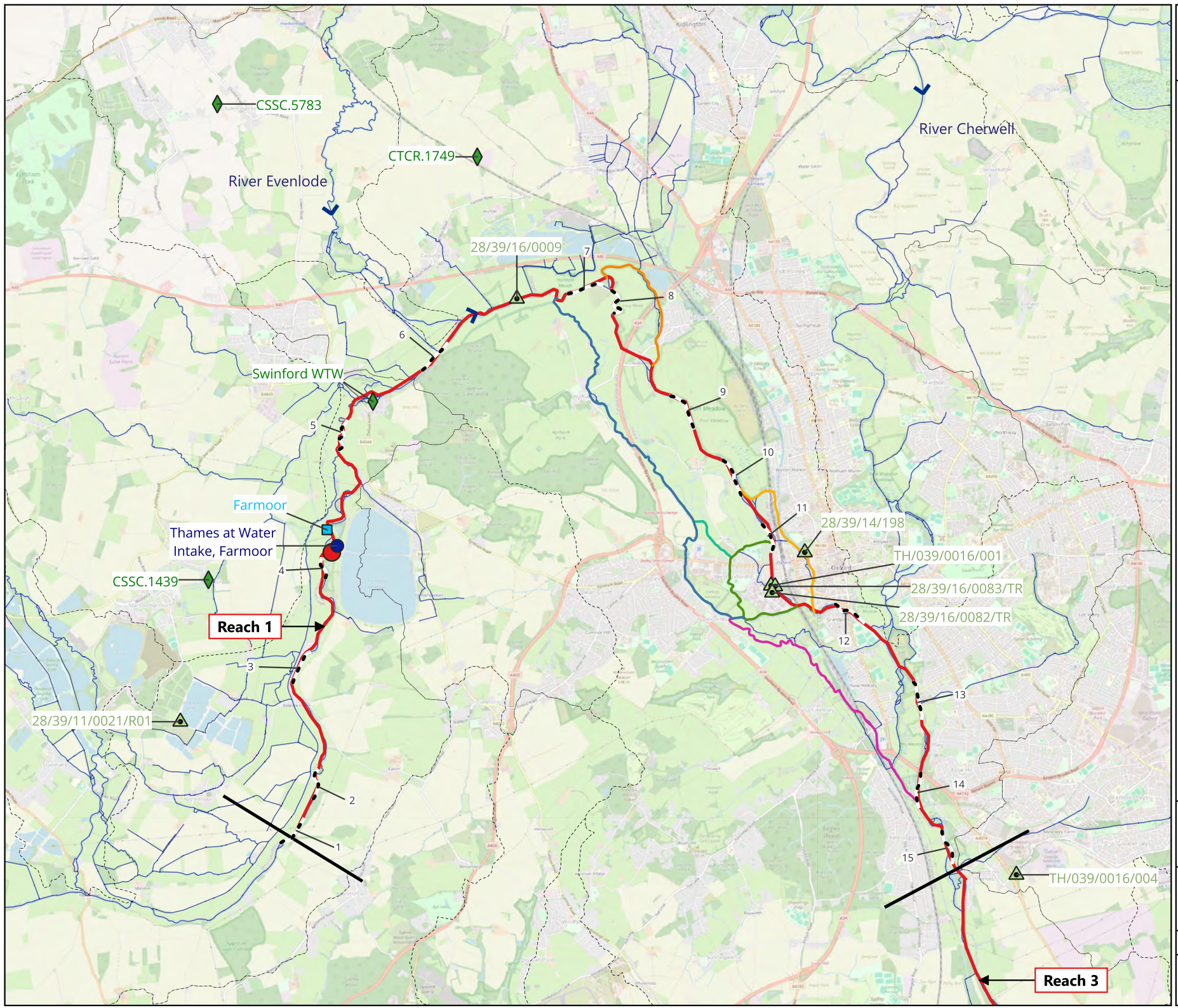
Details of the reach are evidenced through geomorphological information obtained from a series of walkover surveys undertaken for Thames Water by Ricardo in 2014 as part of the 2013 DP EMP using Ricardo's in-house assessment methodology called CHEW and bolstered, where necessary, using extant aerial imagery and OS map data. Within hydrological Reach 1, there are 15 CHEW survey sites.

Reach 1, located on Error! Reference source not found.**.** The River Thames elevation falls from 61.9m AOD to 53.6m AOD, over the 22.9 km length of the reach, an average slope of 0.02°. The elevation change is achieved by eight locks along the reach. The reach is level controlled. The highly managed nature (e.g., weirs, locks, bank reinforcement and re-sectioning) of the reach results in smooth flow and an overall lack of geomorphic diversity. The river channel flows through a mixture of grasslands, rough pasture, managed woodlands and agricultural land in the upper part of the reach. Towards the middle of the reach, the river transitions from semi-rural to largely urbanised, and flows through the city of Oxford, and parkland is common towards the lower end of the reach. The reach has several bifurcations (CHEW reaches 7, 10, 11) and a complex pattern of anastomosing channels forming the Oxford Watercourses.

The River Thames is sinuous, and the degree of sinuosity noticeable increases in CHEW reaches 4 and 8. Large areas of floodplain are located within CHEW reaches 6 and 9. At the time of walkover survey, there were no significant in-channel depositional features, however, small berms were present in CHEW Reaches 1 (vegetated) and 8 (unvegetated). Twelve vegetated islands are located around Oxford and many contain anthropogenic structures. The banks were predominantly steep and composed of earth. However, banks were also frequently artificial in urbanised zones and areas managed for boat mooring (e.g. CHEW reaches 3, 10, 11, 12). In some locations banks were shallower due to poaching and foot path erosion (e.g. CHEW Reach 5). At the time of walkover survey, the in-channel substrate was largely not visible throughout the reach, however in CHEW Reach 2, the substrate was blanketed by silt.

Riparian tree cover is not continuous throughout the reach, with the upper reach (CHEW Reaches 1, 2, 6) dominated by woodlands and planted trees common in the lower part of the reach (CHEW Reaches 11, 12). At the time of walkover survey, limited in-channel macrophytes were observed (e.g, CHEW Reaches 12, 15), however, CHEW Reach 5 contained shallow marginal macrophytes with limited emergent macrophytes. RHS reaches 7 and 8 contained shallow marginal macrophytes and some overhanging trees.

Within the reach, two major tributaries flow into the River Thames: the River Evenlode and River Cherwell.



Legend

- Drought Permit abstraction
- River Reaches
- Reach divides
- WFD River Waterbody Catchments
- Watercourses
- Flow direction
- Flow gauge
- Water quality
- Significant water quality pressure
- Significant abstraction (surface water)
- CHEW survey

Project title:
Thames Water Drought Plan Environmental Assessment

Figure A4-1:
Farmoor Drought Permit Physical Environment Map: Reach 1

NGR: SP479069 | **Scale:** 1:70,000

© OpenStreetMap contributors OpenStreetMap® is open data, licensed under the Open Data Commons Open Database License (ODbL) by the OpenStreetMap Foundation (OSMF).

A4.1.3 River flow effects

In line with **the Methodology** for hydro-ecological assessment of watercourses impacted by surface water drought options, the river flow effects, in support of hydro-ecology, are evidenced through the flow banding approach. Illustrative years are as described in Section A3.3 above.

Drought Permit abstraction only affects river flow at times when natural river flow is below 377 Ml/d. Noting 300 Ml/d abstraction is licensed at all flows except at low river flows, reducing to 59.1 Ml/d at lower river flows, Drought Permit abstraction does not reduce river flows that are lower than 46.38 Ml/d.

In the 1995 illustrative year (**Figure A4-2)**, there is a period of 160 days from mid-June to mid-November with natural river flows less than 377 Ml/d. There is a period of 9 days in late August where licensed abstraction is illustrated to reduce flows below 46.38 Ml/d and there would be no further flow reduction from a drought permit. Between mid-June and mid-August a drought permit is illustrated to reduce flow by up to 30 Ml/d, and to no lower than 46.38 Ml/d, and this includes 23 dates where notably low flows for the season are illustrated to be reduced to exceptionally low flows for the season, with all other dates in this period exceptionally low for the season already. Similarly, between early September and mid-November a drought permit is illustrated to reduce flow by up to 30 Ml/d, and to no lower than 46.38 Ml/d, and this includes 57 dates where notably low flows for the season are illustrated to be reduced to exceptionally low flows for the season.

In the 1996 illustrative year (**Figure A4-2)**, there is a period of 166 days from mid-June to late-November with natural river flows less than 377 Ml/d. In this period a drought permit is illustrated to reduce flow by up to 30 Ml/d, and to no lower than 46.38 Ml/d. Between mid-July and mid-September there are 120 dates where a drought permit is illustrated to reduce flows from notably low flows for the season to exceptionally low flows for the season.

In the 2011 illustrative year (**Figure A4-3)**, there is a period of 201 days from mid-May to mid-December with natural river flows less than 377 Ml/d. In this period a drought permit is illustrated to reduce flow by up to 30 Ml/d, and to no lower than 46.38 Ml/d. Between mid-July and mid-November there are 126 dates where a drought permit is illustrated to reduce flows from notably low flows for the season to exceptionally low flows for the season.

In summary, a drought permit affects river flow only at river flows less than 377 Ml/d (prior to Farmoor Reservoir abstraction). In illustrative low flow years flows lower than this are sustained for a period of time. In some circumstances river flow may be so low that abstraction under license is to less than 46.38 Ml/d, and in such circumstances a drought permit would not further lower the low.

Figure A4-2 Review of River Thames at Farmoor flows to contextualise river flow changes from a Drought Permit for hydro-ecology, showing 1995/96) full range and focus on lower flows.

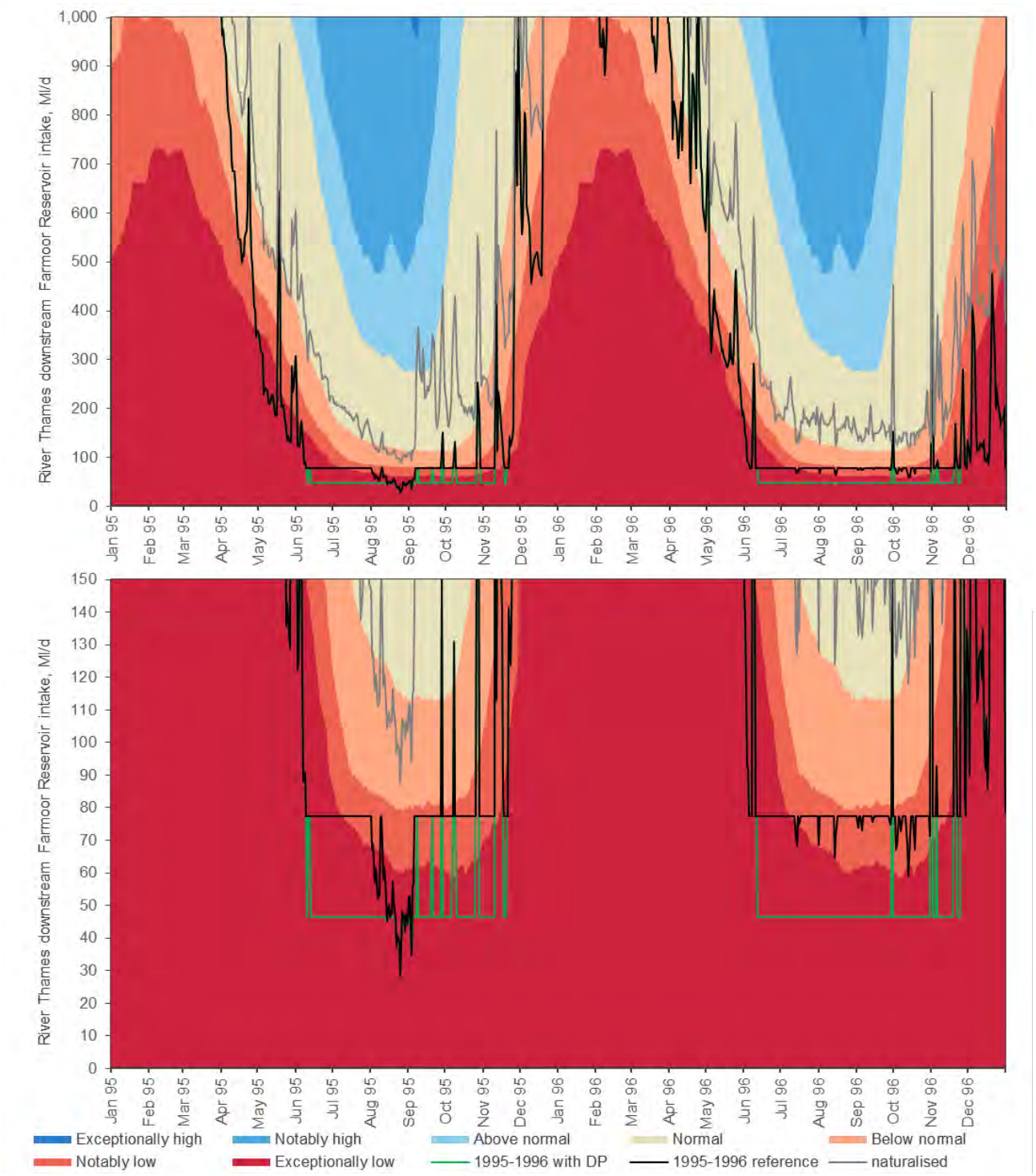
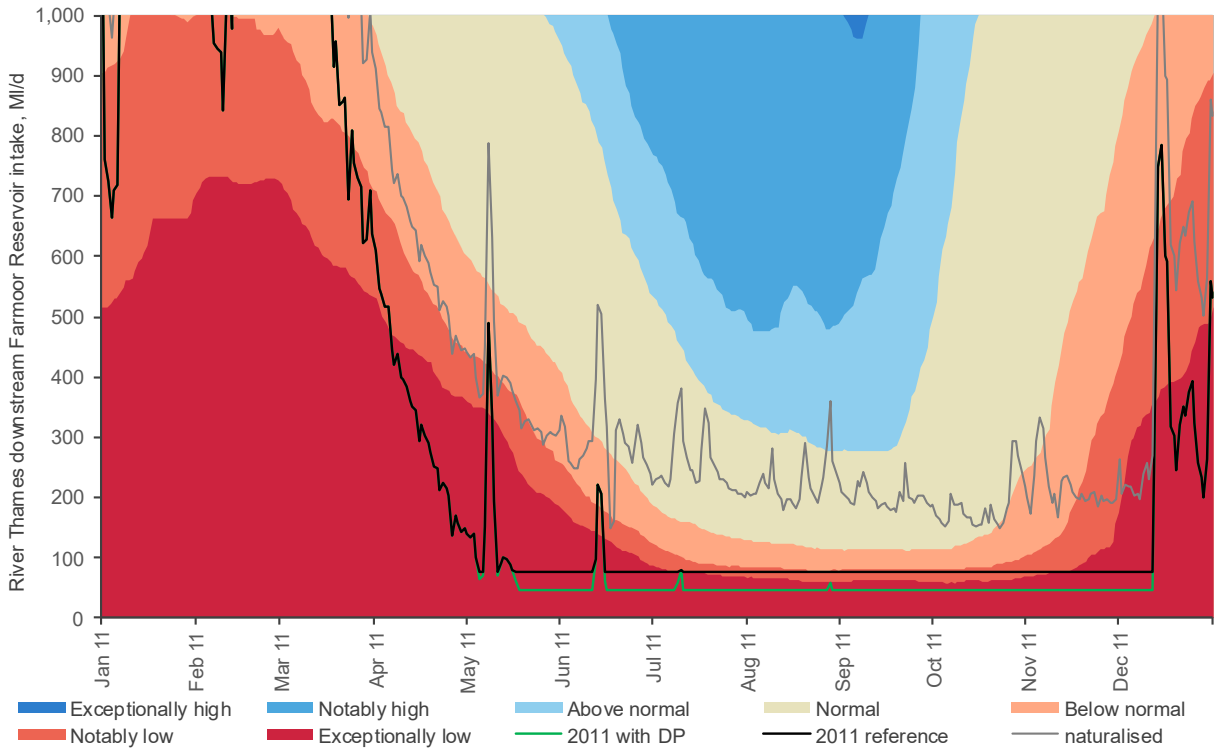


Figure A4-3 Review of River Thames at Farmoor flows to contextualise river flow changes from a Drought Permit for hydro-ecology, showing 2011) with focus on lower flows.



A4.1.4 River habitats

Reach 1 is likely to predominantly support relatively low energy environments, indicated by the shallow steepness of the valley and considering the level of control as a result of the presence of a number of locks. The surrounding land-use along the reach is mixed, with the suburban/urban areas of Oxford having a significant impact on the watercourse and designated and improved grasslands also extensively present. The substrate of the watercourse has not been fully identified. Although large natural substrates are likely to be absent, trash present in the suburban/urban sections of the reach may provide some habitat variation.

The reach has been significantly modified and the uniformity of flow results in a lack of significant in-channel features, although the vegetated islands may provide some shelter for fish and invertebrates. The banks along the reach were overall, steep, resulting in a lack of significant shallow marginal habitats.

Riparian tree cover was variable within the reach, with higher coverage in the upper reach, upstream of Oxford (CHEW Reaches 1, 2, 6) including submerged tree roots in some locations. The presence of riparian tree cover will provide significant habitat opportunities, in the form of cover for fish, as well as providing some allochthonous energy[10]. At the time of walkover survey, upstream of Oxford, some marginal silt habitat was identified (CHEW reaches 5, 7). However, downstream of Oxford, limited coverage of planted trees (CHEW Reach 12) will not provide significant shading due to the managed nature of the footpaths the trees line. Downstream of Oxford, limited submerged tree roots were observed, which would limit shelter for fish and invertebrates.

The coverage of macrophytes varied throughout the reach, with the turbidity of the water limiting the observation of submerged macrophytes. The upper reach has some coverage of emerged macrophytes (CHEW Reach 3). However, downstream of Oxford, the artificial nature of the reach limits macrophyte coverage.

[10] The importance of this, however, is limited as lowland watercourses typically depend more on the input of energy from upstream

The two tributaries that join the main River Thames in this reach, the River Evenlode and River Cherwell, are likely to provide significant additional habitat to the River Thames, in particular for fish (see Error! Reference source not found.).

The presence of a number of a number of lock and weir complexes in Reach 1. Although these have fish passes, they have the potential to impact on the movement of mobile species, particularly during periods of low flow (see Error! Reference source not found.).

In line with 'the Methodology', the river habitats of Reach 1 have been assessed for the Farmoor drought permit for the key features in **Table A4-2**.

Table A4-2 Assessment of risk to river habitats in Reach 1 as a result of Farmoor drought permit

Key feature	Risk category				Notes
	Major	Moderate	Minor	Negligible	
Changes in flow hydraulics		Moderate			Reduction in flow velocity in the level controlled mainstem River Thames at times when drought permit in use; noting the effects are at times of very low velocity.
Sediment dynamics			Minor		Reductions in velocity could lead to temporary and reversible increase in sediment dynamics (e.g. fine sediment deposition rates and locations).
Connectivity			Minor		Minor risk of reduced control of water level in the mainstem River Thames from flow reduction, although limited effect on connectivity across weirs on the mainstem River Thames. Reduction in flow through fish passes at weirs along the reach.
Variability in usable habitat			Minor		Minor risk of reduced control of water level in the mainstem River Thames from flow reduction, noting the channel is maintained as deep.
Habitat maintenance				Negligible	Due to the incipient drought conditions at the time of implementation general habitat maintenance is expected to be limited to non-operative.
Channel morphology				Negligible	No changes in channel morphology are expected due to the drought conditions.
Bank and bed processes				Negligible	No changes in bank and bed processes are expected due to the drought conditions.

The overall risk to river habitats on Reach 1 from the drought option is therefore assessed as **moderate** for either of a summer or winter drought permit application.

A4.1.5 Water quality

The risks to water quality are evidenced through measured data from the one Environment Agency water quality monitoring site that is present in Reach 1 (Error! Reference source not found.**)**: River Thames (Thames at Water Intake, Farmoor). To further inform the baseline, continuous sampling has also been undertaken at one Thames Water monitoring site in Reach 1 (Thames at Farmoor intake).

The average pH over the ten-year review period (Environment Agency data) was 8.1 and the 98th percentile water temperature from 30-minute data over a four-year review period (Thames Water data) was 21.4°C in the upper areas of Reach 1 (River Thames).

Dissolved oxygen saturation

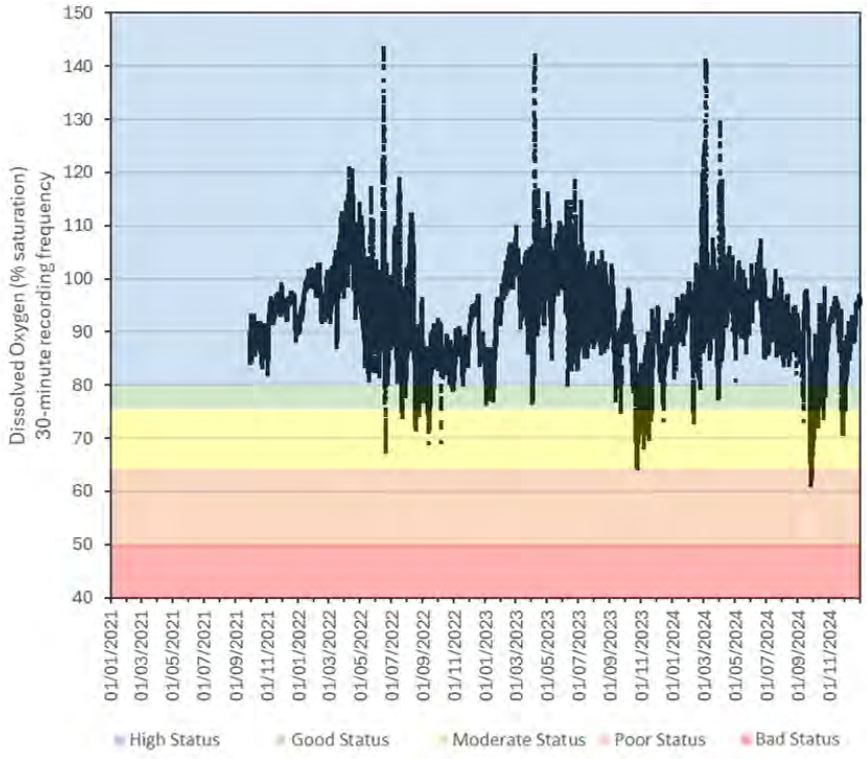
Dissolved oxygen saturation was reviewed and Thames Water data are presented in **Figure A4-4** for upper areas of Reach 1 against the relevant WFD standards for a lowland high alkalinity river[11].

30-minute dissolved oxygen saturation measurements at Thames at Farmoor were mostly consistent with the WFD standard to support good status for fish and invertebrates (75%). A strong seasonal signature is apparent

[11] The River Basin Districts Typology, Standards and Groundwater threshold values (Water Framework Directive) (England and Wales) Directions 2015. ISBN 978-0-85521-192-9.

with considerable supersaturation during summer months and lowest values in September and October. Considerable diurnal variability is also recorded.

Figure A4-4 Dissolved oxygen saturation, in River Thames (Thames at Farmoor), Incorporating Appropriate WFD Status Bands for spot sampling data

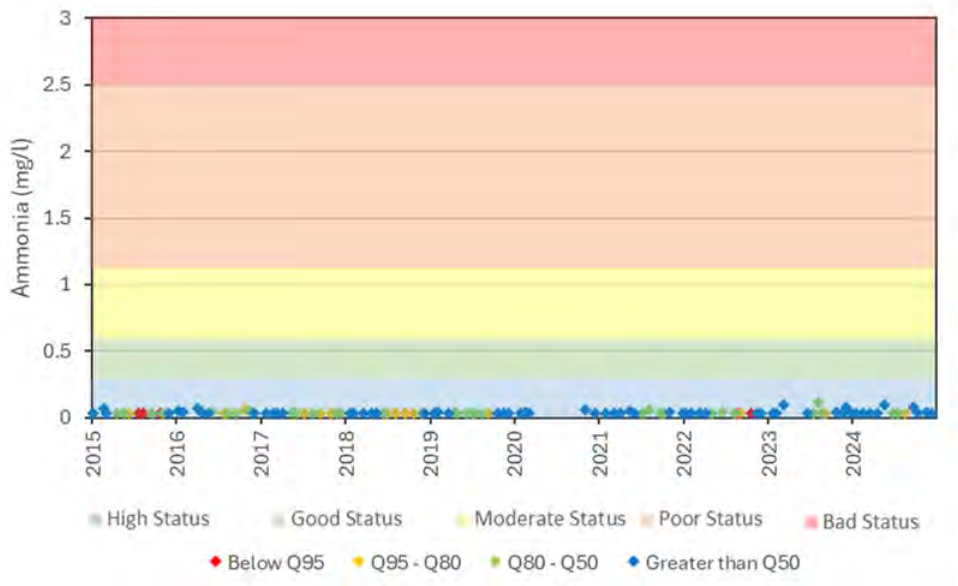


Total ammonia concentration

Total ammonia concentration was reviewed and Environment Agency data are presented in **Figure A4-5** for middle areas of Reach 1 against the relevant WFD standards for a lowland high alkalinity river[12].

[12] The River Basin Districts Typology, Standards and Groundwater threshold values (Water Framework Directive) (England and Wales) Directions 2015. ISBN 978-0-85521-192-9.

Figure A4-5 Total Ammonia in River Thames (Thames at Water Intake, Farmoor), Incorporating Appropriate WFD Status Bands



Total ammonia concentrations at Thames at Water Intake, Farmoor were all consistent with the WFD standard to support High status for fish and invertebrates (0.3 mg/l). No association between total ammonia concentration and river flows were apparent at the nearby Farmoor gauging station.

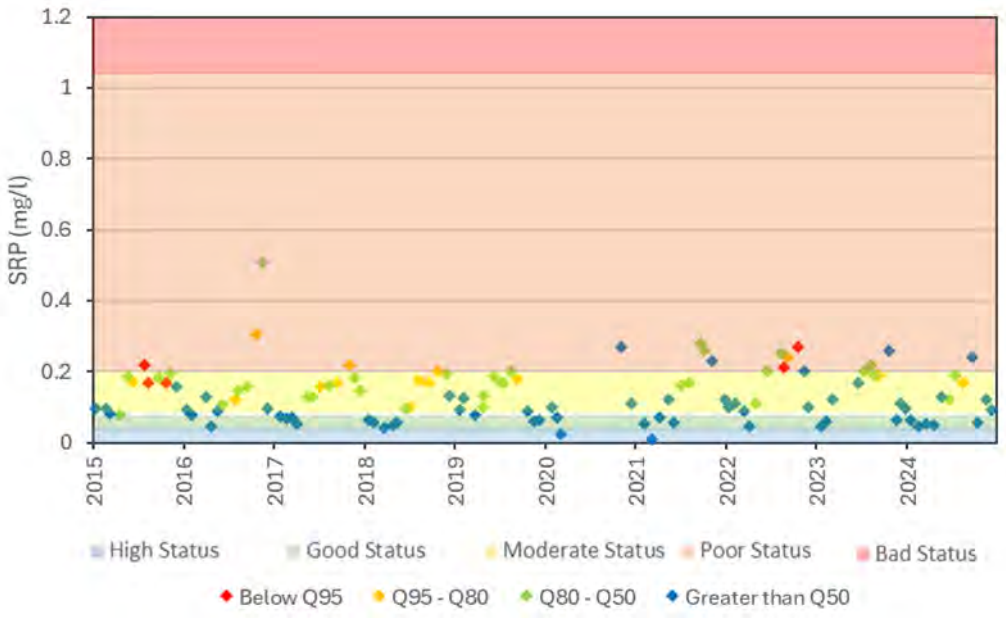
SRP Concentration

Soluble Reactive Phosphorus (SRP) concentration was reviewed and Environment Agency data are presented in **Figure A4-6** for upper areas of Reach 1 against the site specific relevant WFD standards provided by the Environment Agency for a lowland high alkalinity river[13].

SRP concentrations at Thames at Water Intake, Farmoor were variable and not consistent with the WFD standard to support good status for diatoms and macrophytes (0.08 mgP/l). A trend was noted between river flows and SRP concentration with lower flows associated with elevated SRP. Seasonality was also noted with higher concentrations in summer/autumn and lower concentration in winter/spring.

[13] The River Basin Districts Typology, Standards and Groundwater threshold values (Water Framework Directive) (England and Wales) Directions 2015. ISBN 978-0-85521-192-9.

Figure A4-6 SRP concentration in River Thames (Thames at Water Intake, Farmoor), Incorporating Appropriate WFD Status Bands



A summary description of the potential risks to water quality in Reach 1 as a result of drought options is presented in **Table A4-3**.

Table A4-3 Potential risks to water quality in Reach 1 as a result of Farmoor drought permit

	Oxygen	Total ammonia	SRP
General quality	30-minute dissolved oxygen saturation (%) values were predominantly consistent with 'Good WFD status (75%), seasonally moderate or even poor. Strong seasonality apparent with supersaturation and considerable diurnal variability.	Ammonia concentrations were consistent with High WFD status (0.3 mg/l) throughout the monitoring period. No seasonality or association with differing flows is apparent.	SRP concentrations were variable and not consistent with Good WFD status (0.08 mgP/l). Strong seasonality and flow association is apparent.
Summary	Low risk associated with increase in residence time	No general risk.	High risk associated with reduced flushing rates

A4.1.6 Environmental pressures to flow and water quality

The risks from environmental pressures to flow and water quality are evidenced through information received from the Environment Agency on permitted abstractions and discharges in Reach 1.

Flow pressures (other abstractions)

An overview of abstractions is given below based on information received from the Environment Agency. It was agreed during the consultation process in preparing the EARs that for DP completion, licensed abstractions less than 0.5 Ml/d only need to be identified within the reports and do not require assessment (see 'the Methodology'). Any significant pressures (abstractions of over 0.5 Ml/d) are shown on **Table A4-4** as shaded in grey and shown on Error! Reference source not found..

Table A4-4 Surface water abstractions, Reach 1

Name	Licence Number	Abstraction source (GW only)	Holder	Use	Peak daily abstraction limit and licence conditions
Surface water abstractions					
	TH/039/0016/004	n/a	The Low Carbon Hub CIC	Production of Energy	2203.2 Ml/d
	TH/039/0016/001	n/a	Osney Lock Hydro Limited	Production of Energy	345.6 Ml/d
River Thames (Mill Race) At Osney Mill, Oxford (SW3)	28/39/16/0083/TR	n/a	W H Munsey Limited	Transfer Between Sources (Post Water Act 2003)	276.5 Ml/d. Constrained when flows in the River Thames at Farmoor gauging station are below 475.2 Ml/d
	28/39/11/0021/R01	n/a	Hanson Quarry Products Europe LTD	Industrial, Commercial and Public Services	2.6 Ml/d
Worcester College, Oxford	28/39/14/198	n/a	Worcester College	Industrial, Commercial and Public Services	0.7 Ml/d
University Field Station, Wytham, Oxford - R.Thames (SW1)	28/39/16/0009	n/a	Oxford University	Spray Irrigation - Direct	0.60 Ml/d
Osney Yard, Oxford (SW2)	28/39/16/0082/TR	n/a	The Environment Agency	Transfer Between Sources (Pre Water Act 2003)	0.60 Ml/d
The Wytham Estate, Wytham	28/39/16/0020	n/a	Oxford University	Agriculture	0.05 Ml/d

There are seven surface water abstraction licences greater than 0.5 Ml/d within proximity of Reach 1.

Water Quality Pressures

Discharges put pressure on water quality during a drought as lower than normal river flows mean that there is less water available to dilute discharges such as final effluent from STWs. Discharges that impact the oxygen balance, ammonia and SRP concentration in the river reaches have been reviewed. Any local discharges may be considered as beneficial as they contribute more flow to rivers however they may also pose risks to water quality (noting that only abstractions are considered as flow pressures in the section above). A summary of water quality pressures from discharges is provided in **Table A4-5** below. The Farmoor drought permit is predicted to decrease river flow by 30 Ml/d. A reduction in river flow will lead to a reduction in dilution and subsequent changes in the concentrations of selected variables (e.g. BOD, SRP, etc.).

Table A4-5 Summary of Significant Water Quality Pressures in Impacted River Reaches of the Farmoor Drought Permit (Reach 1)

Consent number, holder, use	Consent conditions*	Risk to water quality
CTCR.1749, Cassington STW, Sewage Disposal Works - Water Company	4.0 Ml/d DWF 7 mg/l Ammonia (N) 95%ile (27 mg/l Ammonia (N)) 20 BOD ATU 95%ile (Max 56 BOD ATU 95%ile)	High risk
Swinford WTW	1.0 Ml/d (maximum) No conditions for ammonia, BOD or phosphorus	Uncertain

* Note that not all STWs have water quality consents relating to ammonia or total phosphorous (depends on size and location of STW). Consents are set with respect to total phosphorous rather than SRP.

Final effluent from consented STWs may present specific water quality pressures locally downstream. Under dry weather flow conditions and consented limits, Cassington STW increases River Thames Biochemical Oxygen Demand (BOD) concentrations by approximately 1.14 mg/l (not accounting for baseline BOD concentrations in the river). The WFD standard for high status for BOD in the River Thames is 4 mg/l. Reducing the dilution of STW effluent would increase the influence that BOD load in the STW effluent would have on load in the river. Not accounting for baseline BOD concentrations in the river, the BOD concentration in the river due to Cassington STW would increase by 44% (to 2.06 mg/l), as a result of the drought permit. The additions from this STW therefore present a medium risk to the in-river oxygen balance.

Under dry weather flow conditions and consented limits Cassington STW increases River Thames total ammonia concentrations by approximately 0.40 mg/l (not accounting for baseline total ammonia concentrations in the river). The WFD standard for high status for total ammonia in the River Thames is 0.3 mg/l. Reducing the dilution of STW effluent would increase the influence that total ammonia load in the STW effluent would have on load in the river. Not accounting for baseline total ammonia concentrations in the river, the total ammonia concentration in the river due to Cassington STW would increase by 44% (to 0.72 mg/l[14]) as a result of the drought permit. The discharge from this STW therefore present a high risk to the in-river total ammonia balance.

Under dry weather flow conditions and consented limits Cassington STW increases River Thames SRP concentrations by approximately 0.11 mg/l (not accounting for baseline SRP concentrations in the river). The WFD standard for high status for SRP in the River Thames is 0.05 mg/l. Reducing the dilution of STW effluent would increase the influence that SRP load in the STW effluent would have on load in the river. Not accounting for baseline SRP concentrations in the river, the SRP concentration in the river due to Cassington STW would increase by 44% (to 0.21 mg/l) as a result of the drought permit. The discharge additions from this STW therefore present a high risk to the in-river SRP balance.

Cassington STW is therefore assessed as presenting a **high** risk to water quality in Reach 1 during implementation of the Farmoor drought permit, associated with total ammonia and SRP concentrations.

The EA has also requested that Swinford water treatment works (WTW) discharge be include, with uncertain water quality risks.

Other potential water quality pressures

In this section, the influence of discharges that are released into watercourses just upstream of where they flow into the impacted reaches.

Five non-STW discharge permits were identified for discharges into tributaries which flow into Reach 1 of the Farmoor drought permit, mostly associated with trade effluent and domestic septic tanks. All five had no consented limits regarding DWF, and all are considered negligible relative to low flows in this reach of the River Thames.

Table A4-6 Summary of Significant Water Quality Pressures in Tributaries of the River Thames

Consent number, holder, use	Consent conditions*	Risk to water quality
CSSC.1439, Stanton Harcourt STW, Sewage Disposal Works - Water Company	0.76 Ml/d DWF 45 BOD ATU 95%ile	Low risk
CSSC.5783, Church Hanborough STW, Sewage Disposal Works - Water Company	1.5 Ml/d DWF 3 mg/l Ammonia (N) 95%ile (Max Summer 14 mg/l, Max Winter 20 mg/l 95%ile) 13 BOD ATU 95%ile (Max 50 BOD ATU 95%ile)	Low risk+

* Note that not all STWs have water quality consents relating to ammonia or total phosphorous (depends on size and location of STW). Consents are set with respect to total phosphorous rather than SRP.

[14] Based on consent conditions and low flow statistics (Q_{95}) with and without the drought permit in place

+ Risk from Church Hanborough in impacted reach likely to be low rather than medium due to significant dilution in major tributary (River Evenlode).

The overall risk from water quality pressures in the area of influence of the Farmoor drought permit is assessed as high in Reach 1 (associated with risk to total ammonia and SRP from Cassington STW).

Intermittent discharges

Intermittent discharges from combined sewer overflows (CSOs) may also contribute to a reduction in water quality during an environmental drought. CSOs relieve strain on the sewers during storm events by temporarily diverting water into nearby watercourses to prevent sewer flooding. As there is usually a time lag between discharges from CSOs and rises in river levels during a storm event, the potential exacerbation of low flows by the drought permit may decrease the amount of water immediately available to dilute CSO discharges, leading to a temporary reduction in river water quality if a storm event occurs during implementation of the drought permit.

A4.2 REACH 2: RIVER THAMES DISTRIBUTARIES FROM SEACOURT STREAM UNTIL SANDFORD LOCK

A4.2.1 Summary of potential changes in the physical environment as a result of drought options

An overall summary of potential changes in flow effects on hydro-ecology and consequent effects on the physical environment of Reach 2 as a result of a Farmoor drought permit is presented in **Table A4-6**.

Table A4-7 Summary of potential changes in the physical environment of Reach 2 as a result of Farmoor drought permit

Physical environment aspect reviewed	Assessment of risk from implementation of drought options
River flow effects in support of hydro-ecology	• Supported flow routing into Seacourt Stream, Wolvercote Mill Stream, Osney Stream, Castle Mill Stream and Bulstake Stream through the Drought Permit maintains a minimum flow in all distributaries • Flow increases from R. Evenlode enhances flow variability into Seacourt Stream above minimum flow. • Drought permit river flow effects only at river flows less than 377 Ml/d (prior to Farmoor Reservoir abstraction). In low flow years, flows are lower than this for a sustained period of time, potentially lasting the full six month period of a drought permit. • Potential change from dates with notably low flow for the season to exceptionally low flow for the season, for sustained periods (month or months) across the duration of the drought permit. • River flows less than 46.38 Ml/d would not be reduced further by a drought permit.
River habitats *Risk uncertain*	• Uncertain risk of changes in flow velocity for those distributaries where water levels are controlled • Uncertain risk of changes in velocity and level for those distributaries that are not level controlled. • Minor, temporary and reversible increase in sediment dynamics (e.g. fine sediment deposition) from lower velocities. • In addition, the drought permit may also result in a greater loss, or extended drying, of wetted perimeter than might otherwise be expected under the current hydrological regime.
Water quality *High risk*	• High risk, specifically with regard to SRP associated with reduced flushing rates. • Low risk, with regard to dissolved oxygen, associated with increase in residence time. • No general risk to ammonia.
Additional abstraction pressures *No risk*	• The drought permit is not considered to pose a significant risk to any other abstractors in this reach.
Specific water quality pressures *High risk*	• Risk of transfer of effects of water quality pressures in Reach 1 into this reach.

A4.2.2 Reach overview

Details of the reach are evidenced through geomorphological information obtained from a series of walkover surveys undertaken for Thames Water by Ricardo in 2014 as part of the 2013 DP EMP using Ricardo's in-house assessment methodology called CHEW and bolstered, where necessary, using extant aerial imagery and OS map data. Within hydrological Reach 2, there are nine CHEW survey sites.

Reach 2, located on **Figure A4-7.** It comprises the complex anastomosing network of distributaries of the River Thames. This includes the Seacourt Stream and those that branch from the Seacourt Stream or River Thames and reconnect with the River Thames on the true right side of the river. It also includes the Wolvercote Mill

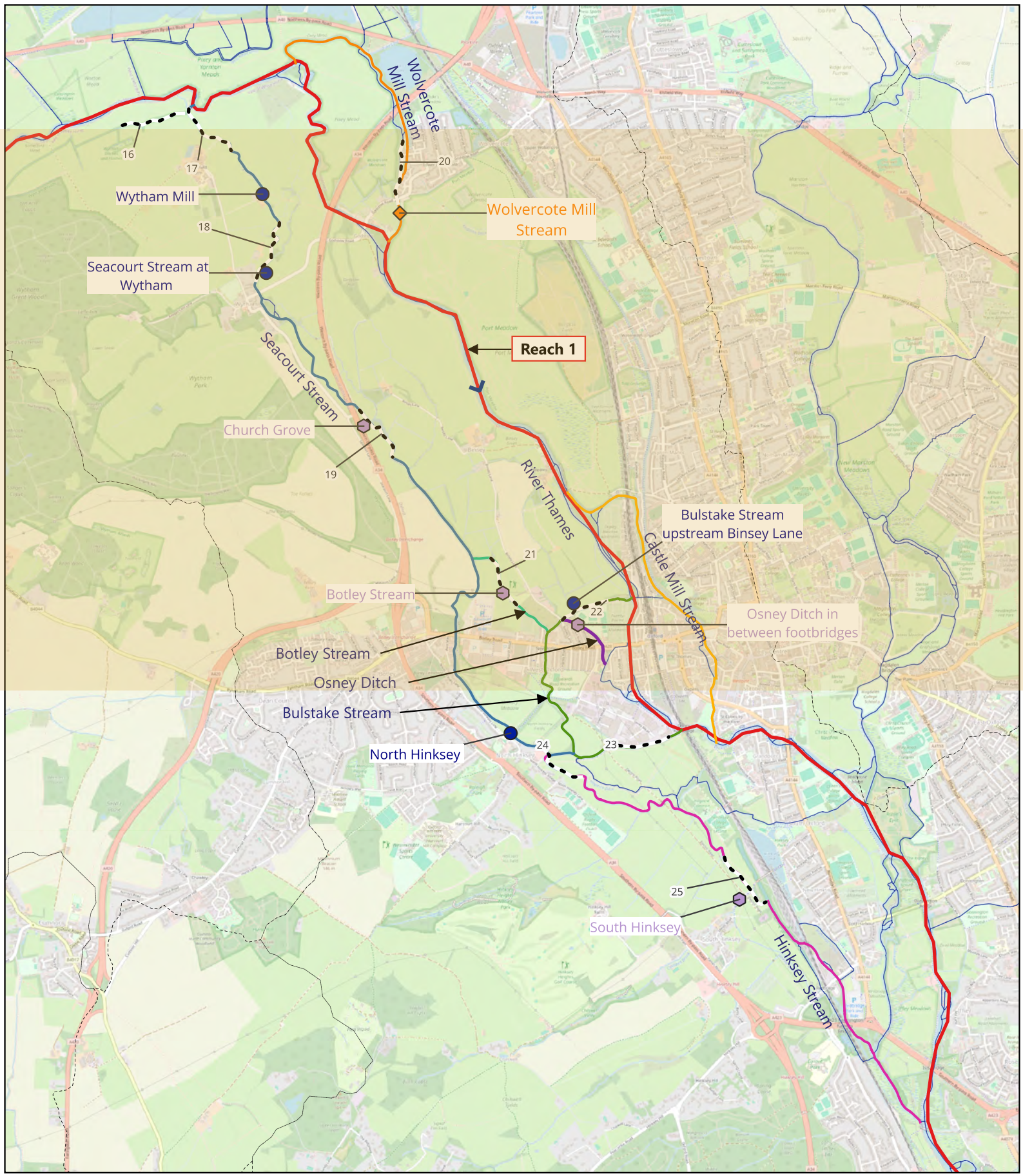
Stream and the Castle Mill Stream that branch from and reconnect with the River Thames on the true left side of the river.

The main channels in Reach 2 are:

- The Seacourt Stream, , the Botley Stream, and the Hinksey Stream; the Bulstake Stream and the Osney Stream. These distributary channels vary in size from a few hundred meters to 17 km in length, the largest channels are Seacourt Stream and Bulstake Stream. The watercourses are surrounded by a mixture of unimproved grassland and pasture, parkland and urbanised areas. There is a large golf course located at CHEW Reach 21. The watercourse is managed with weirs, culverts, re-sectioning and reprofiling. The watercourse has been re-sectioned and reinforced, with some sub-sections supplied with water by sluices from the River Thames (CHEW survey Reaches 17, 18, 19).
- The 2.3 km Wolvercote Mill Stream, a bifurcation from the River Thames commencing above Kings Weir, and re-joining just below Godstow Lock. There is an additional weir mid-way along the reach
- The 5.5 km Castle Mill Stream, a bifurcation from the River Thames below Port Meadow, re-joining the River Thames at Oxpens Meadow below Osney Lock. There is an additional 0.5 km loop from the Castle Mill Stream, the Wareham Stream.

Flow was generally smooth; however, ponding had occurred in RHS Reach 16 behind a culvert. Bed substrate, where visible, was primarily gravel and pebbles and may contain a silt blanket (e.g., CHEW survey Reaches 18 and 24). The banks were predominantly composed of earth and range from shallow to steep. Poaching was present in CHEW survey Reaches 18 and 19. Visible in-channel features are limited, and there were some side bars and mid-channel bars.

Riparian tree cover varies significantly along the distributaries from bare to continuous tree cover on both banks. At the time of walkover survey, in-channel macrophytes, both submergent and emergent are common and significant in some sub-sections (CHEW survey Reaches 16, 17, 21, 25) and some marginal available silt habitats were observed (CHEW survey Reaches 18, 24, 25). Submerged tree roots/ overhanging trees are located along the majority of the watercourse.



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Legend

- Drought Permit abstraction
- River Reaches
- Reach divides
- WFD River Waterbody Catchments
- Watercourses
- Flow direction

Reach 2: River Thames distributaries

- Bulstake Stream
- Botley Stream
- Seacourt Stream
- Hinksey Stream
- Wolvercote Mill Stream
- Castle Mill Stream
- Osney Ditch

- CHEW survey
- Water quality
- Flow-habitat and water quality
- Bathing water site

Project title:
Thames Water Drought Plan Environmental Assessment

Figure A4-7:
Farmoor Drought Permit Physical Environment Map: Reach 2

NGR: SP496063 **Scale:** 1:35,000

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A4.2.3 River flow effects

With a drought permit a minimum flow of 120 l/sec[15] would be maintained from the River Thames into the Seacourt Stream by over-pumping. The Seacourt Stream provides continuation flow into the Hinksey Stream and Botley Stream, and some of the flow into the Bulstake Stream. At this time there is no information on the normal range of flows into the Seacourt Stream and whether 120 l/sec is outside this range. This precautionary assessment assumes that such flow is less than normal range. At conditions where drought permit conditions are utilised (with reference to **Figure A4-2** some flow additional flow and flow variability may be provided by flow accretion from the River Evenlode.

With a drought permit a minimum flow of 25-50 l/sec[16] would be maintained from the River Thames into the Wolvercote Mill Stream by over-pumping. At this time there is no information on the normal range of flows into the Wolvercote Mill Stream and whether 25-50 l/sec is outside this range. This precautionary assessment assumes that such flow is less than normal range.

With a drought permit a minimum flow of 25-50 l/sec would be maintained from the River Thames into the Osney Stream by use of the undershot sluice supported by over-pumping. At this time there is no information on the normal range of flows into the Osney Stream and whether 25-50 l/sec is outside this range. This precautionary assessment assumes that such flow is less than normal range.

With a drought permit a minimum flow of 25-50 l/sec would be maintained from the River Thames into the Castle Mill Stream, and support flow in the Wareham Stream. This would be by changing settings at existing structures, supported by over-pumping. At this time there is no information on the normal range of flows into the Castle Mill Stream and whether 25-50 l/sec is outside this range. This precautionary assessment assumes that such flow is less than normal range.

With a drought permit a minimum flow of 25-50 l/sec would be maintained from the River Thames into the Bulstake Stream by over-pumping. At this time there is no information on the normal range of flows into the Bulstake Stream and whether 25-50 l/sec is outside this range. This precautionary assessment assumes that such flow is less than normal range.

To provide baseline information on the flow-habitat baseline of the Oxford watercourses, the Environmental Monitoring Plan has included a network of sites, as shown in **Figure A4-7**Error! Reference source not found.. At representative sites, survey has included information on wetted depth, wetted width and flow velocity for surveyed flows on dates and flows shown in **Table A4-8**. The survey in October 2017 was recorded as at 35 Ml/d flow into the Seacourt Stream, some 75% more flow than that maintained by the minimum flow with a drought permit in place. These surveys were under low river flow conditions in the River Thames, with the Farmoor gauging station reading 131 Ml/d (daily average) on 5/10/2023 and 105 Ml/d (daily average) on 6/10/2017. Other surveys are at considerably higher flow rates both in the River Thames and into the Seacourt Stream. The Seacourt Stream (Wytham site) is summarised (in **Table A4-8**) as slow and shallow at 35 Ml/d, and fast and deep at higher flows. At the Wytham Mill site, the Seacourt Stream is summarised (in **Table A4-9**) as slow and deep at 33 Ml/d, and remains slow and deep at higher flows. The Bulstake Stream was only surveyed under higher flows when it was summarised (in **Table A4-10**) as fast and deep. The North Hinksey site is summarised (in **Table A4-11**) as slow and assumed deep under lower flow conditions in the Seacourt Stream, and slow and deep under higher flows.

At times when the natural river flows at Farmoor are less than 136.38 Ml/d (see Reach 1) the Drought Permit condition trigger would be in force with over-pumping to maintain a minimum flow of 120 l/sec from the River Thames into the Seacourt Stream and an ecological minimum flow from the Seacourt Stream into each of the Bulstake Stream and Osney Stream. The ecological minimum flow for the Bulstake Stream and Osney Stream are each identified as likely in the order of 25-50 l/sec.

Drought Permit abstraction only affects river flow at times when natural river flow is below 377 Ml/d. Noting 300 Ml/d abstraction is licensed at all flows except at low river flows, reducing to 59.1 Ml/d at lower river flows, Drought Permit abstraction only reduces river flows that are less than 77.3 Ml/d and do not reduce river flows that are lower than 46.38 Ml/d.

[15] Note 120 l/sec is equivalent to 10.4 Ml/d

[16] Note 25-50 l/sec is equivalent to 2.16-4.32 Ml/d

In the 1995 illustrative year, there is a period of 160 days from mid-June to mid-November with natural river flows less than 377 Ml/d. There is a period of 9 days in late August where licensed abstraction is illustrated to reduce flows below 46.38 Ml/d and there would be no further flow reduction from a drought permit. Between mid-June and mid-August a drought permit is illustrated to reduce flow by up to 30 Ml/d, and to no lower than 46.38 Ml/d, and this includes 23 dates where notably low flows for the season are illustrated to be reduced to exceptionally low flows for the season, with all other dates in this period exceptionally low for the season already. Similarly, between early September and mid-November a drought permit is illustrated to reduce flow by up to 30 Ml/d, and to no lower than 46.38 Ml/d, and this includes 57 dates where notably low flows for the season are illustrated to be reduced to exceptionally low flows for the season.

On these dates the Drought Permit condition trigger would be in force for the maintenance of 120 l/sec into Seacourt Stream and 25-50 l/s into each of the Wolvercote Mill Stream, Osney Stream, Castle Mill Stream and Bulstake Stream to maintain a minimum flow into each of the streams and those connected to them.

In the 1996 illustrative year, there is a period of 166 days from mid-June to late-November with natural river flows less than 377 Ml/d. In this period a drought permit is illustrated to reduce flow by up to 30 Ml/d, and to no lower than 46.38 Ml/d. Between mid-July and mid-September there are 120 dates where a drought permit is illustrated to reduce flows from notably low flows for the season to exceptionally low flows for the season. On these dates the Drought Permit condition trigger would be in force for the maintenance of 120 l/sec into Seacourt Stream and 25-50 l/s into each of the Wolvercote Mill Stream, Osney Stream, Castle Mill Stream and Bulstake Stream to maintain a minimum flow into each of the streams and those connected to them.

In the 2011 illustrative year, there is a period of 201 days from mid-May to mid-December with natural river flows less than 377 Ml/d. In this period a drought permit is illustrated to reduce flow by up to 30 Ml/d, and to no lower than 46.38 Ml/d. Between mid-July and mid-November there are 126 dates where a drought permit is illustrated to reduce flows from notably low flows for the season to exceptionally low flows for the season. On these dates the Drought Permit condition trigger would be in force for the maintenance of 120 l/sec into Seacourt Stream and 25-50 l/s into each of the Wolvercote Mill Stream, Osney Stream, Castle Mill Stream and Bulstake Stream to maintain a minimum flow into each of the streams and those connected to them.

Table A4-8 Flow-habitat baseline survey data in Reach 2 at the Seacourt Stream at Wytham site (SP477089)

Flow-habitat variable	06/10/2017	06/04/2020	05/05/2023	18/10/2023
Flow (Ml/d)	35	85	272	280
Wetted width (m)	7.05	9.50	10.53	10.9
Wetted width with depth greater than 0.1m (m)	5.64	9.50	10.53	10.9
Maximum depth (m)	0.34	0.68	1.26	1.24
Mean velocity (m/s)	0.18	0.19	0.28	0.33
Maximum velocity (m/s)	0.23	0.49	0.52	0.53

Table A4-9 Flow-habitat baseline survey data in Reach 2 at the Seacourt Stream at Wytham Mill site (SP476094)

Flow-habitat variable	06/10/2017	06/04/2020	05/05/2023	18/10/2023
Flow (Ml/d)	33	93	116	111
Wetted width (m)	8.05	9.00	11.03	7.14
Wetted width with depth greater than 0.1m (m)	6.44	9.00	11.03	7.14
Maximum depth (m)	0.57	0.54	1.23	1.14
Mean velocity (m/s)	0.12	0.28	0.15	0.21
Maximum velocity (m/s)	0.16	0.37	0.28	0.31

Table A4-10 Flow-habitat baseline survey data in Reach 2 at the Bulstake Stream upstream Binsey Lane site (SP499065)

Flow-habitat variable	05/10/2017	06/04/2020	09/05/2023	18/10/2023
Flow (Ml/d)	No survey	59	89	59
Wetted width (m)	No survey	6.66	7.68	7.42
Wetted width with depth greater than 0.1m (m)	No survey	6.66	7.68	7.42
Maximum depth (m)	No survey	0.62	0.55	0.34
Mean velocity (m/s)	No survey	0.20	0.3	0.37
Maximum velocity (m/s)	No survey	0.22	0.39	0.48

Table A4-11 Flow-habitat baseline survey data in Reach 2 at the North Hinksey site (SP494055)

Flow-habitat variable	05/10/2017	06/04/2020	09/05/2023	18/10/2023
Flow (Ml/d)	n/a	43	80	20
Wetted width (m)	8.60	5.04	9.43	8.04
Wetted width with depth greater than 0.1m (m)	n/a	5.04	9.43	8.04
Maximum depth (m)	n/a	0.58	1.17	0.73
Mean velocity (m/s)	0.04	0.21	0.12	0.05
Maximum velocity (m/s)	0.05	0.28	0.22	0.1

A4.2.4 River habitats

As evidenced by the EMP baseline surveys, Reach 2 is likely to predominantly support relatively low energy environments, indicated by the shallow steepness of the channel. The surrounding land-use along the reach is mixed, with the suburban/urban areas of Oxford having a significant impact on the watercourse and designated and improved grasslands also extensively present. At the time of walkover survey, the substrate of the watercourse has not been fully identified but some gravel/pebble substrate was observed from CHEW surveys in the Oxford Watercourses and the EA advise that there are pockets of coarser bed sediments and shallower bed profiles at various locations including on the Bulstake, Stream, Osney Stream and Hinksey Stream.

In contrast to Reach 1, CHEW Reaches 17 – 19 in the Seacourt Stream contained a greater diversity in bank profile, relatively higher coverage of shallow marginal macrophytes and marginal silt habitats.

Riparian tree cover was variable within the reach and within Oxford Watercourses (CHEW Reach 20, 24, 25) including submerged tree roots in some locations. The presence of riparian tree cover will provide significant habitat opportunities, in the form of cover for fish, as well as providing some allochthonous energy[17].

The presence of a number of a number of water level control structures in Reach 2 have the potential to impact on the movement of mobile species, particularly during periods of low flow.

In line with ‘the Methodology’, the river habitats of Reach 2 have been assessed for the Farmoor drought permit for the key features in **Table A4-12**.

[17] The importance of this, however, is limited as lowland watercourses typically depend more on the input of energy from upstream

Table A4-12 Assessment of risk to river habitats in Reach 2 as a result of Farmoor drought permit

Key feature	Risk category				Notes
	Major	Moderate	Minor	Negligible	
Changes in flow hydraulics	Uncertain				Maintenance of a minimum ecological flow in the Seacourt Stream, Wolvercote Mill Stream, Osney Stream, Castle Mill Stream and Bulstake Stream and connected watercourses would reduce the risk of changes to water level in the distributaries. Risk of changes in flow velocity outside known envelopes for those distributaries where water levels are controlled, even with maintenance of ecological minimum flows Risk of changes in velocity and level outside known envelopes for those distributaries that are not level controlled.
Sediment dynamics			Minor		Noting the maintenance of minimum ecological flows, reductions in velocity could lead to temporary and reversible increase in sediment dynamics (e.g. fine sediment deposition rates and locations).
Connectivity	Uncertain				Noting the maintenance of minimum ecological flows, given the water-level managed nature of the reaches connectivity risks associate with water level management risk and are outside known envelopes.
Variability in usable habitat	Uncertain				Noting the maintenance of minimum ecological flows, the short term and localised changes in usable habitat, notably in those distributaries with flow-variable habitat, noting the risks are outside known envelopes.
Habitat maintenance	Uncertain				Noting the maintenance of minimum ecological flows, there remains potential for some loss, or extended drying, of wetted perimeter than might otherwise be expected under the current hydrological regime, noting the risks are outside known envelopes.
Channel morphology				Negligible	No changes in channel morphology are expected due to the drought conditions.
Bank and bed processes				Negligible	No changes in bank and bed processes are expected due to the drought conditions.

The overall risk to river habitats on Reach 2 from the drought option is therefore assessed as uncertain noting the minimum maintained flow from the River Thames to the Seacourt Stream, Wolvercote Mill Stream, Osney Stream, Castle Mill Stream and Bulstake Stream and connected watercourses is seen as a benefit at times when flow management may be challenging without a drought permit.

A4.2.5 Water quality

The risks to water quality are evidenced through measured data from a network of Thames Water sites established through the Environmental Monitoring Plan baseline monitoring programme for water quality monitoring in Reach 2 (see **Figure A4-7**).

The average pH over the surveyed sites was 8.1, consistent with the mainstem River Thames in Reach 1. Insufficient water temperature data are available to summarise from.

Dissolved oxygen saturation

Dissolved oxygen saturation was reviewed and Thames Water data are presented in **Table A4-13** for sites throughout Reach 2.

Dissolved oxygen saturation measurements in the Oxford Watercourses were generally consistent with the WFD standard to support good status for fish and invertebrates (75%). Exceptions include the South Hinksey site which is routinely poorer in quality and most sites on the 6 October 2017 survey, under lowest surveyed flows into the Seacourt Stream.

Table A4-13 Dissolved oxygen saturation, in River Thames Distributaries

Site	NGR	06/10/2017	24/10/2019	10/04/2022	09/05/2023	03/10/2023
Seacourt Stream at Wytham	SP477089	74.5	82.4	91.6	n/a	86.2
North Hinksey	SP494055	58.5	68.1	81.4	88.3	77.4
Wytham Mill	SP476094	79.1	89.8	93.4	87.9	86.4
Church Grove	SP484078	92.2	84.2	91.7	n/a	84.1
Bulstake Stream upstream Binsey Lane	SP499065	80.8	91.1	84.0	93.2	91.0
Botley Stream	SP494066	79.3	82.5	87.9	87.8	82.4
South Hinksey	SP511044	41.7	68.3	90.3	n/a	68.1
Osney Ditch in between footbridges	SP503064	90.3	80.7	93.7	94.5	88.8

Total ammonia concentration

Total ammonia concentration was reviewed and Thames Water data are presented in **Table A4-14** for sites throughout Reach 2. Recorded values were mostly less than limit of detection.

Table A4-14 Total Ammonia (mgN/l), in River Thames Distributaries

Site	NGR	06/10/2017	24/10/2019	10/04/2022	09/05/2023	03/10/2023
Seacourt Stream at Wytham	SP477089	n/a	<0.03	<0.2	<0.2	<0.2
North Hinksey	SP494055	n/a	<0.03	<0.2	<0.2	<0.2
Wytham Mill	SP476094	n/a	0.08	<0.2	<0.2	<0.2
Church Grove	SP484078	n/a	<0.03	<0.2	<0.2	<0.2
Bulstake Stream upstream Binsey Lane	SP499065	n/a	<0.03	<0.2	<0.2	<0.2
Botley Stream	SP494066	n/a	<0.03	<0.2	<0.2	<0.2
South Hinksey	SP511044	n/a	<0.03	<0.2	<0.2	<0.2
Osney Ditch in between footbridges	SP503064	n/a	<0.03	<0.2	<0.2	<0.2

SRP Concentration

SRP concentration was reviewed and Thames Water data are presented in **Table A4-15** for sites throughout Reach 2. SRP concentrations were generally within the WFD standards to support Moderate-Good status for diatoms and macrophytes acknowledging that the River Thames in Reach 1 shows a strong seasonal pattern and regularly poorer quality.

Table A4-15 SRP (µgP/l), in River Thames Distributaries

Site	NGR	06/10/2017	24/10/2019	10/04/2022	09/05/2023	03/10/2023
Seacourt Stream at Wytham	SP477089	n/a	100	135	76	136
North Hinksey	SP494055	n/a	110	123	60	148
Wytham Mill	SP476094	n/a	110	129	65	138
Church Grove	SP484078	n/a	93	136	67	132
Bulstake Stream upstream Binsey Lane	SP499065	n/a	100	115	61	153
Botley Stream	SP494066	n/a	130	125	67	151
South Hinksey	SP511044	n/a	91	139	55	139
Osney Ditch in between footbridges	SP503064	n/a	150	107	69	147

Summary

A summary description of the potential risks to water quality in Reach 2 as a result of drought options is presented in **Table A4 16.**

Table A4-16 Potential risks to water quality in Reach 2 as a result of Farmoor drought permit

	Oxygen	Total ammonia	SRP
General quality	Limited spot sampling showed generally Good dissolved oxygen saturation, with some sites of poorer quality and some association with low flow.	Limited spot sampling showed total ammonia mostly less than limit of detection.	Limited spot sampling showed SRP concentrations were generally consistent with Moderate or Good WFD status noting Reach 1 which provides supporting flow is regularly poorer quality.
Summary	Low risk, noting minimum maintained flow, with risk associated with increase in residence time.	No general risk	High risk associated with reduced flushing rates.

Bathing water quality

There is one designated bathing water site in Reach 2 (**Figure A4-7**): Wolvercote Mill Stream. For 2026 the site is classified as Poor bathing water quality and for the 2026 bathing season has a "bathing not advised" notice in place [18].

Potential impacts of drought permit implementation on this receptor will be considered in **Appendix B**, and any monitoring and mitigation outlined in **Appendix C**.

A4.2.6 Environmental pressures to flow and water quality

The risks from environmental pressures to flow and water quality are evidenced through information received from the Environment Agency on permitted abstractions and discharges in Reach 2.

Flow pressures (other abstractions)

An overview of abstractions is given below based on information received from the Environment Agency. It was agreed during the consultation process in preparing the EARs that for DP completion, licensed abstractions less than 0.5 Ml/d only need to be identified within the reports and do not require assessment (see '**the Methodology**'). No significant pressures (abstractions of over 0.5 Ml/d) were identified in Reach 2.

Water Quality Pressures

Discharges put pressure on water quality during a drought as lower than normal river flows mean that there is less water available to dilute discharges such as final effluent from STWs. Discharges that impact the oxygen balance, ammonia and SRP concentration in the river reaches have been reviewed. Any local discharges may be considered as beneficial as they contribute more flow to rivers however they may also pose risks to water quality (noting that only abstractions are considered as flow pressures in the section above). 15 discharge permits have been identified that discharge into distributaries of the River Thames and are potentially impacted by the Farmoor drought permit. These are descriptive permits with no limit on dry weather flow (DWF), associated with storm sewer overflows, septic tanks, pumping stations and trade effluent discharges. These consented discharges are considered negligible relative even to low flows in the zone of influence.

Intermittent discharges

Intermittent discharges from combined sewer overflows (CSOs) may also contribute to a reduction in water quality during an environmental drought. CSOs relieve strain on the sewers during storm events by temporarily diverting water into nearby watercourses to prevent sewer flooding. As there is usually a time lag between discharges from CSOs and rises in river levels during a storm event, the potential exacerbation of low flows by the drought permit may decrease the amount of water immediately available to dilute CSO discharges, leading to a temporary reduction in river water quality if a storm event occurs during implementation of the drought permit.

[18] Environment Agency. 2026 Bathing Water Profile for Wolvercote Mill Stream. Available at: https://environment.data.gov.uk/bwq/profiles/profile.html?site=ukj1402-11946 (Accessed: 25 August 2026).

A4.3 REACH 3: RIVER THAMES FROM SANDFORD LOCK TO CAVERSHAM LOCK

A4.3.1 Summary of potential changes in the physical environment as a result of drought options

An overall summary of potential changes in flow effects on hydro-ecology and consequent effects on the physical environment of Reach 3 as a result of a Farmoor drought permit is presented in **Table A4-17**.

Table A4-17 Summary of potential changes in the physical environment of Reach 3 as a result of Farmoor drought permit

Physical environment aspect reviewed	Assessment of risk from implementation of drought options
River flow effects in support of hydro-ecology	• Drought permit river flow effect only seen at river flows less than 136.38 Ml/d (prior to Farmoor Reservoir abstraction). Such flows are either irregular or for a sustained period of time, depending on the environmental drought. • Potential change from dates with notably low flow for the season to exceptionally low flow for the season, for short periods at a time (days) across the duration of the drought permit. • Potential increase in severity of exceptionally low flow for the season, for sustained periods (month or months) across the duration of the drought permit.
River habitats *Minor risk*	• Minor risk of changes in flow velocity in the level controlled mainstem River Thames at times when drought permit in use; noting the effects are at times of very low velocity. • Minor, temporary and reversible increase in sediment dynamics (e.g. fine sediment deposition) from lower velocities. Minor risk to channel connectivity including flow through fish passes at weirs along the reach.
Water quality *High risk*	• High risk, specifically with regard to SRP • No risk associated with dissolved oxygen or ammonia in the main stem
Additional abstraction pressures *No risk*	• The drought permit is not considered to pose a significant risk to any other abstractors in this reach.
Specific water quality pressures *Medium risk*	• Three medium risk discharges (Oxford, Abingdon and Didcot STWs pose a risk to water quality (specifically with regard to ammonia and SRP).

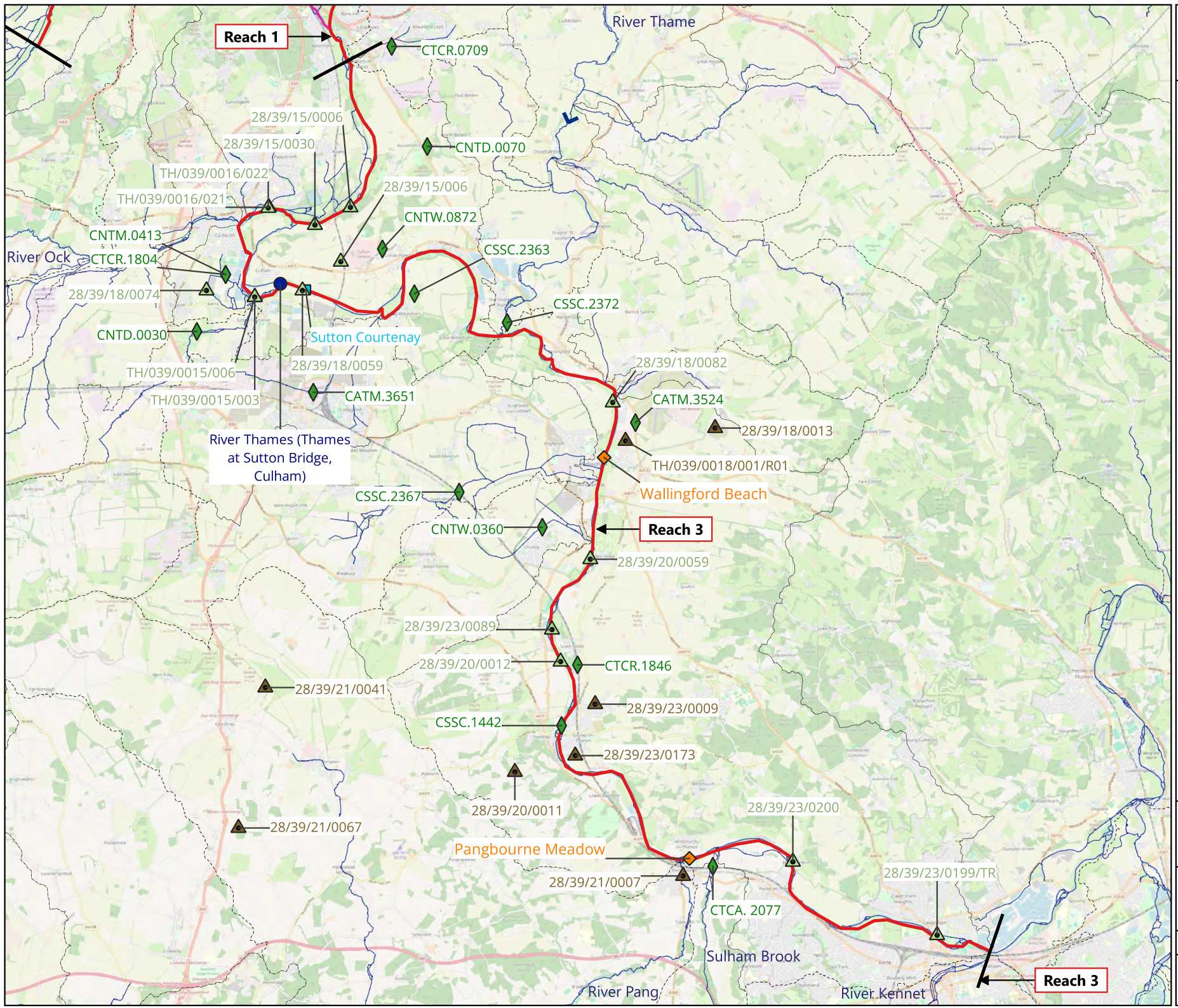
A4.3.2 Reach overview

Reach 3, located on **Figure A4-8.** The River Thames elevation declines from 53.6m AOD to 36.6m AOD over the 64.7 km length of the reach, an average slope of 0.02º. The elevation change is achieved by ten locks. The river flow type was smooth due to this management. The river is generally surrounded by floodplain and shallow valley slopes until Moulsford when the reach flows through a narrower shallow valley until Mapledurham. The reach is surrounded by grassland, tilled land, woodland and urban areas (Abingdon and Reading).

The River Thames is sinuous with frequent straight sections; the width generally increases downstream. There are 28 vegetated islands in this reach, most created by river cuts or as part of lock complexes. At the time of walkover survey, no in-channel deposition features were observed although features are known to the EA through their management of river navigation. Riparian tree cover is scattered to continuous with Lock Wood and Little Wittenham Wood providing large extents of tree cover.

Several distributaries (up to 4 km in length) of the River Thames are located around Abingdon at the confluence of the River Thames with the River Ock. At the time of walkover survey, flow, where observed, was smooth. The banks are comprised of earth but are resectioned and reinforced in the urban areas. Riparian tree cover was present in most of the distributaries and ranges between semi-continuous to continuous. Tree cover decreases in urban areas. As there is significant riparian vegetation identification of in-channel features was very difficult and no in-channel features could be identified on any of the distributaries.

The River Ock, River Thame and River Pang join the Thames in this reach (see **Figure A4-8)**. The tributaries are unlikely to be a major source of sediment to the Thames in a period of drought as their flows will be low and therefore not capable of moving large amounts of sediment. However, sediments may accumulate in tributaries, especially immediately behind weirs, which could cause influxes of sediment to the River Thames in case of sudden high flows. As the River Thames is level-controlled in this reach, reduction in river flow due to the drought permit would not impact wetted width and depth or channel stability. Reduction in velocity will lead to increased potential for the deposition of any fine sediment in transport (including in affected distributaries).



N

Legend

- Drought Permit abstraction
- River Reaches
- Reach divides
- WFD River Waterbody Catchments
- Watercourses
- Flow direction
- Flow gauge
- Water quality
- Significant water quality pressure
- Significant abstraction (groundwater)
- Significant abstraction (surface water)
- Bathing water site

Project title:
Thames Water Drought Plan Environmental Assessment

Figure A4-8:
Farmoor Drought Permit Physical Environment Map: Reach 3

NGR: SU520994 **Scale:** 1:150,000

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A4.3.3 River flow effects

In line with **the Methodology**, the river flow effects, in support of hydro-ecology, are evidenced through the flow banding approach. For Reach 3 the Thames at Sutton Courtenay flow data for the period 1992[19]-2024 has been reviewed. Flow bands have been prepared using the gauge data. Gauge data have been naturalised by adding on Thames Water's measured daily abstraction rate with the assessment of maximum daily abstraction rate without and with a drought permit as applied in Reach 1. These data are shown for the period January 1995 to December 1996 as an illustrative year in **Figure A4-9** and 2011 as an illustrative year in **Figure A4-10**.

Drought Permit abstraction only affects river flow at times when natural river flow is below 377 Ml/d at Farmoor gauging station.

[19] Start of period as used by Environment Agency for the Thames Area Water Situation Report for the Thames at Farmoor.

Figure A4-9 Review of River Thames at Sutton Courtenay flows to contextualise river flow changes from a Drought Permit for hydro-ecology, showing 1995/96) full range and focus on lower flows

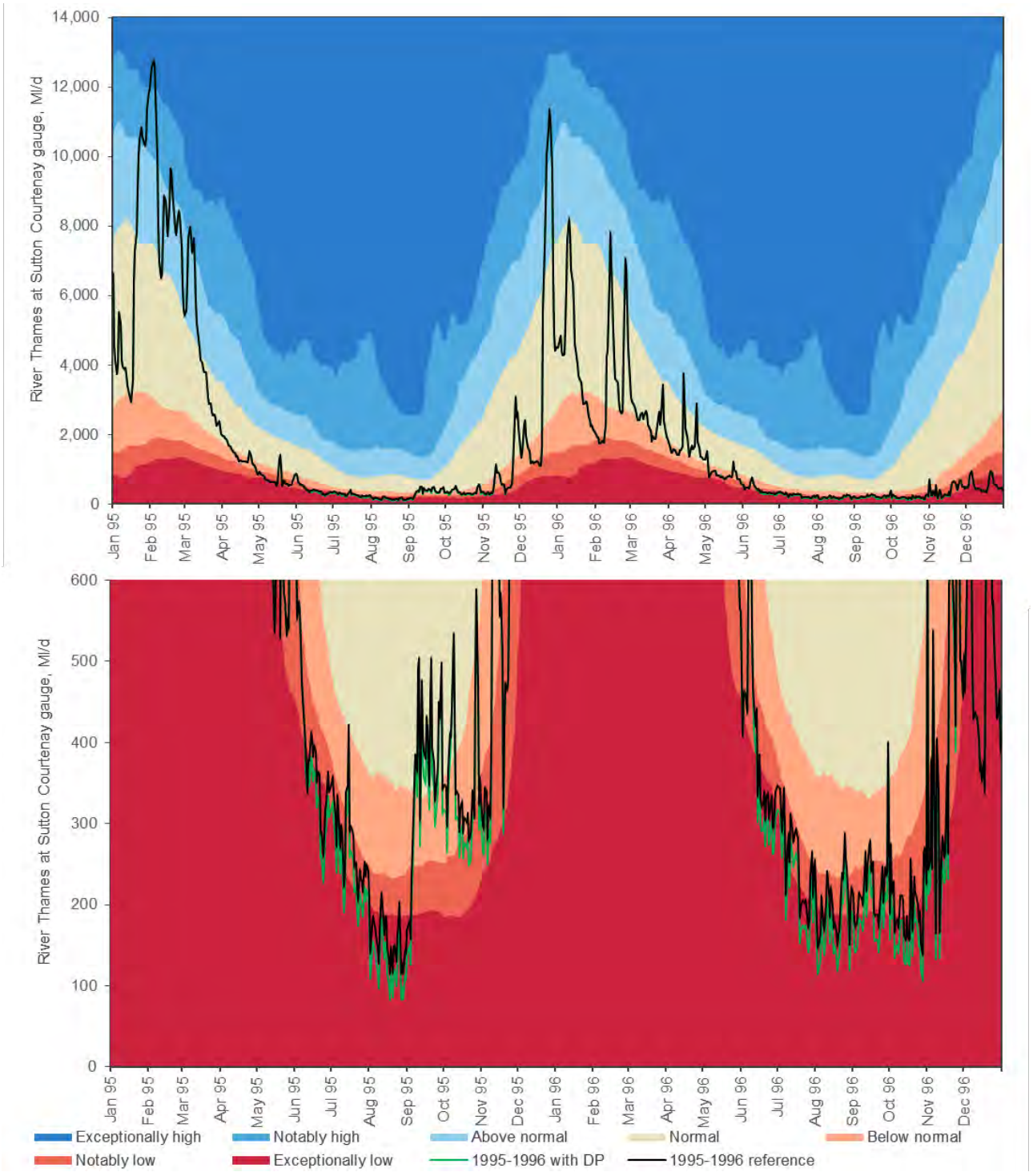
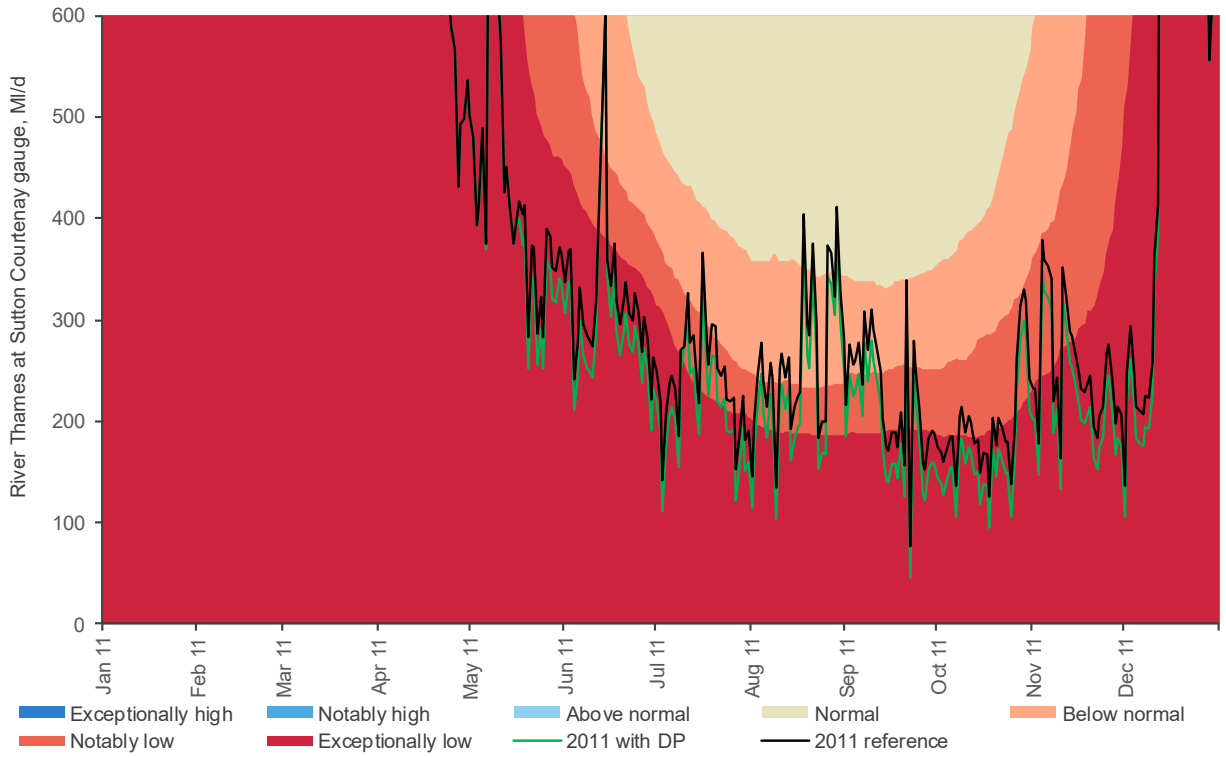


Figure A4-10 Review of River Thames at Sutton Courtenay flows to contextualise river flow changes from a Drought Permit for hydro-ecology, showing 2011 with focus on lower flows



As set out in Reach 1, in the 1995 illustrative year, there is a continuous period of 35 days with natural river flows less than 377 Ml/d. All these dates when Drought Permit abstraction would reduce flow are dates with exceptionally low flow for the season, with a reduction in flow of up to 30 Ml/d, to a minimum flow of 83 Ml/d.

As set out in Reach 1, in the 1996 illustrative year, there are 20 days across 5 months with natural river flows less than 377 Ml/d, none longer than 3 days. These dates are at times with notably low or exceptionally flow for the season and Drought Permit abstraction of up to 30 Ml/d more would reduce flow within the band for the season.

As set out in Reach 1, in the 2011 illustrative year, there are 20 days across 5 months with natural river flows less than 377 Ml/d, none longer than 3 days. These dates are at times with notably low or exceptionally flow for the season and Drought Permit abstraction of up to 30 Ml/d more would reduce flow within the band for the season.

In summary, a drought permit affects river flow only at river flows less than 377 Ml/d (prior to Farmoor Reservoir abstraction). Such flows are either irregular or for a sustained period of time, depending on the environmental drought. Through consideration of the seasonal flow pattern a drought permit reduces flow but retains the same flow band for the season. A drought permit potentially increases the severity of exceptionally low flow for the season, for sustained periods (month or months) across the duration of the drought permit.

A4.3.4 River habitats

Reach 3 is, like Reach 1, likely to predominantly support relatively low energy environments, indicated by the shallow steepness of the valley and considering the level of control as a result of the presence of a number of locks. The surrounding land use is generally comprised of natural habitats, notably improved grassland and tilled land; however a number of suburban/urban developments are present along the reach (e.g., Wallingford, Reading). As a result of the high level of human activity, the watercourse in the reach has been subject to significant modification that has led to extensive reinforcement and re-sectioning of banks.

The reach contains some significant areas of natural habitat, notably the presence of islands, which are as a result of river cuts or associated with lock complexes. These island habitats will provide some additional natural bankside habitat and, in the suburban/urban areas with significant reinforcement provide significant habitat

opportunities in the form of cover for fish or natural banks for burrowing species. The presence of riparian woodland was identified as scattered to continuous, with Lock Wood and Little Wittenham Wood providing significant riparian woodland habitat which will provide additional habitat opportunities such as cover for fish and an input of allochthonous energy[20]. The substrate of the watercourse has not been identified, however it is likely to be dominated by finer substrates owing to the low energy environment present. Although large natural substrates are likely to be absent, trash present in the suburban/urban sections of the reach may provide some habitat variation.

The distributaries of the River Thames provide significant variation in the habitat availability within the reach. Therefore, although the predominant flow types are likely to comprise low energy environments, there will be variation in the flow structure throughout with higher energy habitats forming discrete habitat areas. The variability of tree cover will provide differing habitat opportunities, with cover provided for fish species and allochthonous energy input for macroinvertebrates. The habitat is likely to be of greater significance, particularly to mobile species such as fish, as a result of the lower habitat quality in the River Thames.

The three tributaries that join the main River Thames in this reach, the River Ock, River Thame and River Pang, are likely to provide significant additional habitat to the River Thames, in particular for fish (see **Figure A4-8**). The presence of a number of a number of lock and weir complexes in Reach 3 have the potential to impact on the movement of mobile species, particularly during periods of low flow.

In line with 'the Methodology', the river habitats of Reach 3 have been assessed for the Farmoor drought permit for the key features in **Table A4-18**.

Table A4-18 Assessment of risk to river habitats in Reach 3 as a result of the Farmoor drought permit

Key feature	Risk category				Notes
	Major	Moderate	Minor	Negligible	
Changes in flow hydraulics			Minor		Reduction in flow velocity in the level controlled mainstem River Thames at times when drought permit in use; noting the effects are at times of very low velocity.
Sediment dynamics			Minor		Reductions in velocity could lead to temporary and reversible increase in sediment dynamics (e.g. fine sediment deposition rates and locations).
Connectivity			Minor		Given the water-level managed nature of the reach connectivity risks would be restricted to above and below locks. Reduction in flow through fish passes at weirs along the reach
Variability in usable habitat			Minor		Short term and localised changes in usable habitat, restricted to those distributaries with flow-variable habitat
Habitat maintenance				Negligible	Due to the incipient drought conditions at the time of implementation general habitat maintenance is expected to be limited to non-operative.
Channel morphology				Negligible	No changes in channel morphology are expected due to the environmental drought conditions.
Bank and bed processes				Negligible	No changes in bank and bed processes are expected due to the environmental drought conditions.

The overall risk to river habitats on Reach 3 from the drought option is therefore assessed as **minor** for permit either of a summer or winter drought permit application.

[20] The importance of this, however, is limited as lowland watercourses typically depend more on the input of energy from upstream