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Thames Water Final Drought Plan 2022

Habitats Regulations Assessment - Screening Report

Report for Thames Water Utilities Ltd

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ED13714 | Issue number 6 | Date 17/08/2022

Customer:

Thames Water Utilities Ltd

Customer reference:

FA1300 Professional Services – Early work Drought Plan development work

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Date:

17/08/2022

Ref: ED13714

Cover Photo: River Darent near Sevenoaks

Ricardo is certified to ISO9001, ISO14001, ISO27001 and ISO45001

Issue Log

Issue	Date	Author	Content/changes
Issue 1	11 January 2021	Ricardo	Original first draft issued to Thames Water
Issue 2	29 March 2021	Ricardo & Thames Water	Updated with comments from Thames Water for submission
Issue 3	17 December 2021	Ricardo	Updated with statutory consultee comments
Issue 4	17 January 2022	Ricardo & Thames Water	Updated with comments from Thames Water for submission
Issue 5	25 March 2022	Ricardo	Revised draft report finalised for submission
Issue 6	23 August 2022	Ricardo	Report finalised for submission

Executive summary

Water companies are required to prepare and maintain statutory Drought Plans (DPs) at least every five years from the date the previous DP was published, and as part of this process, must ensure the DP meets the requirements of the Habitats Regulations 2017, as amended.

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

Thames Water Utilities Ltd (Thames Water) has completed the first stage of the HRA process, screening, on its final DP 2022 options list. The screening stage identified whether any drought options have the potential to cause a Likely Significant Effect (LSE) on the integrity of a Habitats site(s).

Due to uncertainties regarding the potential LSEs of the West Berkshire Groundwater Scheme (WBGWS) on the River Lambourn SAC and the Kennet and Lambourn Floodplain SAC, this drought option was taken through to Stage 2 Appropriate Assessment which concluded that there would be. no adverse effects on site integrity a from the implementation of the WBGWS. No LSEs were identified for all other drought options in Thames Water's final DP 2022, when considered alone on Habitats site(s).

In-combination effects were assessed between drought options of Thames Water's final DP 2022, with its Water Resource Management Plan (WRMP)19, the Environment Agency's DPs, the Thames and Severn River Basin Management Plan, other water company WRMPs and DPs and other major infrastructure projects available at this time. No in-combination LSEs between drought options and with other plans and projects were identified on Habitat site(s).

A summary of the conclusions of the Stage 1 Screening and Stage 2 Appropriate Assessment is presented in **Table A**.

Table A: Summary of HRA Stage 1 Screening and Stage 2 Appropriate Assessment Conclusions.

Drought Option	Is scheme likely to have a significant effect on Habitats site(s) alone?	Effect in-combination with existing consents?	Effect in-combination with other drought options?	Appropriate Assessment required?	Adverse effects on site integrity?
Demand Management					
Media/water efficiency campaign	No	No	No	No	N/A
Leakage reduction	No	No	No	No	N/A
Temporary use Ban	No	No	No	No	N/A
Drought Order to ban Non-Essential Use	No	No	No	No	N/A
Emergency Drought Order	No	No	No	No	N/A
Supply Side Options					
London WRZ					
North London Artificial Recharge Scheme	No	No	No	No	N/A
Thames Gateway Water Treatment Works (TGWTW)	No	No	No	No	N/A
Chingford Artificial Recharge Scheme (CHARS)	No	No	No	No	N/A
Reduction in lowest residual flow on the Lower Thames	No	No	No	No	N/A

Drought Option	Is scheme likely to have a significant effect on Habitats site(s) alone?	Effect in-combination with existing consents?	Effect in-combination with other drought options?	Appropriate Assessment required?	Adverse effects on site integrity?
Control Diagram at Teddington Weir from 300Ml/d to 200Ml/d					
Earlier reduction in residual flow at Teddington Weir on the Lower Thames Control Diagram	No	No	No	No	N/A
East London Resource Development (ELRED)	No	No	No	No	N/A
Stratford Box	No	No	No	No	N/A
Old Ford	No	No	No	No	N/A
West Berkshire Groundwater Scheme (WBGWS)	Yes	No	No	Yes	No
Drought permit/order					
London WRZ					
Sundridge 1	No	No	No	No	N/A
Sundridge 2	No	No	No	No	N/A
Lower Thames	No	No	No	No	N/A
Crayford	No	No	No	No	N/A
Horton Kirby (Aquifer Storage & Recovery)	No	No	No	No	N/A
Eynsford	No	No	No	No	N/A
Wansunt	No	No	No	No	N/A
Increase in M2 annual licence	No	No	No	No	N/A
Waddon	No	No	No	No	N/A
SWOX Water Resource Zone					
Baunton 1	No	No	No	No	N/A
Baunton 2	No	No	No	No	N/A
Latton	No	No	No	No	N/A
Meysey Hampton	No	No	No	No	N/A
Farmoor	No	No	No	No	N/A
Axford 1	No	No	No	No	N/A
Axford 2	No	No	No	No	N/A
Bibury	No	No	No	No	N/A
Gatehampton	No	No	No	No	N/A
Ogbourne emergency boreholes	No	No	No	No	N/A
Oxford Canal - Banbury	No	No	No	No	N/A
Childrey Warren	No	No	No	No	N/A
Ogbourne	No	No	No	No	N/A
Kennet Valley Water Resource Zone					
Fobney Emergency Boreholes	No	No	No	No	N/A
Pangbourne	No	No	No	No	N/A
Playhatch	No	No	No	No	N/A

Drought Option	Is scheme likely to have a significant effect on Habitats site(s) alone?	Effect in-combination with existing consents?	Effect in-combination with other drought options?	Appropriate Assessment required?	Adverse effects on site integrity?
Fobney Direct	No	No	No	No	N/A
Guildford Water Resource Zone					
Albury	No	No	No	No	N/A
Shalford	No	No	No	No	N/A
SWA Water Resource Zone					
Pann Mill	No	No	No	No	N/A
Henley Resource Zone					
Harpsden/Sheeplands	No	No	No	No	N/A

Table of Contents

Table of Figures

Table of Tables

Glossary

Abbreviation	Definition
CHARS	Chingford Artificial Recharge Scheme
CJEU	Court of Justice of the European Union
DP	Drought plan
DPG	Drought plan guideline
EAR	Environmental Assessment Report
ELRED	East London Resource Development (ELRED)
EMP	Environmental Monitoring Plan
HRA	Habitats Regulations Assessment
LSE	Likely Significant Effect
NERC	Natural Environment and Rural Communities
REE	Ricardo Energy and Environment
RSA	Restoring sustainable abstraction
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SPA	Special Protection Area
pSAC	Possible/ proposed Special Area of Conservation
pSPA	Potential Special Protection Area
SSSI	Site of Special Scientific Interest
SWA	Slough/Wycombe/Aylesbury
SWOX	Swindon and Oxfordshire
TGWTW	Thames Gateway Water Treatment Works
Thames Water	Thames Water Utilities Ltd
UKWIR	UK Water Industry Research
WBGS	West Berkshire Groundwater Scheme
WRMP	Water Resources Management Plan
WRZ	Water Resource Zone

1 Introduction

1.1 Background and purpose of report

Water companies in England and Wales are required to prepare and maintain Statutory Drought Plans (DPs) under Sections 39B and 39C of the Water Industry Act 1991, as amended by the Water Act 2003 and subsequently 2014, which set out the short operational steps a company will take before, during and after a drought.

Thames Water Utilities Ltd's (Thames Water) current Final DP 2017 covers the period 2017-2022. Thames Water has updated its DP 2022 to align with updated guidance including that provided in the Environment Agency's Drought Plan Guideline (DPG)[1], published in December 2020 (DPG2020), which specifies that a water company must ensure that its DP meets the requirements of The Conservation of Habitats and Species Regulations 2017, as amended. The DPG2020 also includes an updated draft of the supplementary guidance on the environmental assessment for water company drought planning (published in July 2020). The DPG2020 indicates that the planned submission date for all draft DPs will be March 2021 and final plans to be published by April 2022. The DPG2020 refers to guidance relating to Habitats Regulations Assessment (HRA) that can be used which includes the UK Water Industry Research (UKWIR) report 'Strategic Environmental Assessment and Habitat Regulations Assessment - Guidance for Water Resources Management Plans and Drought Plans'[2]. The UKWIR report recommends that all DPs should be subject to the first stage of HRA, i.e. screening for Likely Significant Effects (LSEs).

The requirement for a HRA is established through Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and Flora (the Habitats Directive). Following the UK leaving the European Union (EU), the European Union (Withdrawal) Act 2018 (as amended[3]) retains existing EU law i.e. the Habitats and Birds Directives. The Directive is transposed into national legislation by The Conservation of Habitats and Species Regulations 2017, as amended, referred to as the Habitats Regulations[4]. It is this legislation, rather than the Directive, that now governs the HRA process within the UK. However, the amendments require that competent authorities continue to comply with and refer to all caselaw preceding 31 December 2020, unless or until modified by domestic appeals and legislation. Under Regulations 63 and 105, any plan or project which is likely to have a significant effect on a Habitats site (either alone or in-combination with other plans or projects) and is not directly connected with, or necessary for the management of the site, must be subject to an appropriate assessment to determine the implications for the site in view of its conservation objectives.

There have been material changes to the Thames Water DP HRA since 2017. Hoddesdon Transfer Scheme (River Lee Flow Augmentation) has been removed as a supply side option from the London Water Resource Zone (WRZ). Compton 1 and Compton 2, Blewbury, Sor Brook and New Ground have been removed as drought options.

1.2 Requirement for Habitats Regulations Assessment

The responsibility for undertaking the HRA lies with Thames Water as the Plan making authority.

HRA Guidance for the appraisal of Plans[,5] summarises the Habitats Regulations. Regulation 63 states that the Plan making authority (in this case Thames Water) shall adopt, or otherwise give effect to, the Plan only after having ascertained that it will not adversely affect the integrity of a Habitats site, subject to Regulation 64 or 105 of the Habitats Regulations.

Regulation 64 of the Habitats Regulations states:

[1] Environment Agency (2020) Water Company Drought Plan Guideline, December 2020 (Version 1.2).
[2] UKWIR (2021) Environmental Assessments for Water Resources Planning (21/WR/02/15).
[3] Amended by the European Union (Withdrawal Agreement) Act 2020.
[4] Amended by The Conservation of Habitats and Species (Amendment) (EU Exit) Regulation 2019.
[5] Tyldesley, D. & Chapman, C. (2013) The Habitats Regulations Assessment Handbook, November 2021 edition UK. DTA Publications Limited.

(1) If the competent authority is satisfied that, there being no alternative solutions, the plan or project must be carried out for imperative reasons of overriding public interest (which, subject to paragraph (2), may be of a social or economic nature), it may agree to the plan or project notwithstanding a negative assessment of the implications for the Habitats site or the European offshore marine site (as the case may be).

(2) Where the site concerned hosts a priority natural habitat type or a priority species, the reasons referred to in paragraph (1) must be either—

(a)reasons relating to human health, public safety or beneficial consequences of primary importance to the environment; or

(b)any other reasons which the competent authority, having due regard to the opinion of the European Commission, considers to be imperative reasons of overriding public interest.

Regulation 105 of the Habitats Regulations states:

(1) Where a land use plan—

> *(a) is likely to have a significant effect on a Habitats site or a European offshore marine site (either alone or in-combination with other plans or projects), and*
>
> *(b) is not directly connected with or necessary to the management of the site,*

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

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

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

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

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

> *(6) This regulation does not apply in relation to a site which is—*
>
> *(a)a Habitats site by reason of regulation 8(1)(c), or*

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

1.3 Approach to HRA

Independent best practice[6] encourages the use of a four stage process to allow navigation of the tests described in the Habitats Regulations. This four-stage process consists of the following:

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

1. Firstly, a screening process is undertaken to identify whether each drought option in Thames Water's DP (either alone or in-combination with other plans or projects) is likely to have significant effects on Habitats sites.
2. Where a significant effect is likely (noting the precautionary principle), an Appropriate Assessment will then be undertaken of the drought option to determine whether this would adversely affect the integrity of the Habitats site(s), either alone or in-combination with other plans and projects, taking into account available mitigation measures.
3. Where significant adverse effects are identified at the Appropriate Assessment stage, alternative options would be examined to avoid any potential significant effects on the integrity of the Habitats site as Stage 3 of the HRA.
4. Stage 4 comprises an assessment of compensatory measures where, in the light of an assessment of Imperative Reasons of Overriding Public Interest, it is deemed that the Plan should proceed.

The HRA has been undertaken in accordance with currently available guidance**Error! Bookmark not defined.**78910 and has been based on a precautionary approach as required under the Habitats Regulations. It has followed the staged HRA approach, commencing with the Stage 1 screening of all options contained within the DP.

The assessment refers to the LSE of an option on one or more Habitats sites, including Special Protection Areas (SPAs) and Special Areas of Conservation (SACs) (also known as National Site Network).

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

For ease of reference through the HRA process, these designations are collectively referred to as Habitats sites, despite Ramsar designations being made at the international level.

The purpose of the screening stage is to determine whether any part of the plan in question (in this case the final DP 2022) is likely to have a significant effect on any Habitats site. This is judged in terms of the implications of the plan for a site's conservation objectives, which relate to its 'qualifying features' (i.e. those Annex I habitats, Annex II species, and Annex I bird populations[11], or Ramsar criterion, for which it has been designated). Significantly, HRA is based on a rigorous application of the precautionary principle. Where uncertainty or doubt remains, an impact should be assumed, triggering the requirement for Appropriate Assessment of that scheme.

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

This document reports the HRA Screening of Thames Water's final DP 2022, i.e. Stage 1 as identified above. HRA Screening identifies whether the drought options contained within Thames Water's final

[7] Court of Justice for the European Union's ruling on People Over Wind and Sweetman ('Sweetman II') vs Coillte Teoranta, Case C-323/17.
[8] UK Government (2019). Guidance on the use of Habitats Regulations Assessment.
[9] UK Government (2019). Conservation of Habitats and Species Regulations (Amendment) (EU Exit).
[10] Natural England (2020). Guidance on how to use Natural England's Conservation Advice Packages in Environmental Assessments.
[11] Annexes are contained within the relevant EC Directive.

DP 2022 will have LSEs on Habitats sites and as such, determines the requirement for Appropriate Assessment.

In April 2018[12] there was an important judgment in the Court of Justice of the European Union (CJEU) which ruled that Article 6(3) of the Habitats Directive must be interpreted as meaning that mitigation measures should be assessed within the framework of an Appropriate Assessment and that it is not permissible to take account of mitigation measures at the screening stage. Considering this judgement, the implications have been taken into account as part of the HRA screening process in support of the final DP 2022.

Thames Water have also undertake a Strategic Environmental Assessment (SEA) of their final DP 2022. The SEA has been undertaken in parallel with the HRA assessment and is reported separately.

1.4 Thames Water Supply System and Drought Planning

Thames Water supplies water to around 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. 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.[13]. However, 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, groundwater derived baseflow within rivers and available water stored in reservoirs.

Thames Water sets out how it will maintain planned levels of service in its WRMP. The WRMP is based on a "twin-track" approach of demand management measures together with timely development of new sources of supply in order to ensure a positive supply/demand balance at Thames Water's chosen level of service. For the purposes of supply-demand planning, water companies must plan for a dry year demand. This is the demand that would be expected during dry, hot conditions. The amount of water resources available to maintain water supply during drought periods, with a given frequency of demand restrictions or supply interruptions, is termed "water available for use". Within a given WRZ, the difference between water available for use and the dry year demand plus an allowance for planning uncertainties (Target Headroom) is referred to as the supply demand balance. Should the dry year demand plus Target Headroom exceed water available for use then there is a shortfall or deficit in the supply demand balance. The greater the deficit, the greater the risk that demand restrictions would need to be introduced more frequently than the company's stated Levels of Service and ultimately the greater the risk to security of supply.

With the aim of maintaining security of supply, which ultimately means minimising the need for emergency drought measures, a DP sets out how a water company will manage supply and demand during the course of a drought.

For water resource and drought planning purposes, the Thames Water water supply area is divided into six WRZs reflecting the different characteristics of the supply areas and associated risks associated with meeting demand within the Thames Water area (see **Figures 1.1** and **1.2**). Note that North London Artificial Recharge Scheme, Chingford Artificial Recharge Scheme and West Berkshire Groundwater Scheme are not included in the London Water Resource Zone figure.

The largest of these zones is the London WRZ, which covers the Greater London area, followed by Swindon and Oxfordshire (SWOX). The water resources for both of these zones are largely based on abstraction from the River Thames, with the abstracted water stored in reservoirs. The other zones to the west of London are Kennet Valley (including Reading and Newbury); Henley; Slough/Wycombe/Aylesbury (SWA) and Guildford. These latter four zones are largely reliant on groundwater abstraction although there are significant abstractions directly from local rivers, notably

[12] Court of Justice for the European Union's ruling on People Over Wind and Sweetman ('Sweetman II') vs Coillte Teoranta, Case C-323/17.
[13] Average abstraction rate, 2010-2015.

the River Kennet in Reading and the River Wey near Guildford. The Thames Water DP describes these WRZs from a drought perspective as follows:

1.4.1 London and SWOX Water Resource Zones

The water resources for London and SWOX WRZs are derived from a combination of river abstraction, raw water reservoir storage and groundwater sources. For both zones, the critical element in the system is the level of reservoir storage, which in turn is dependent upon river flow and during drought this is primarily made up of the baseflow from the catchment's major aquifers.

1.4.2 Kennet Valley and Guildford Water Resource Zones

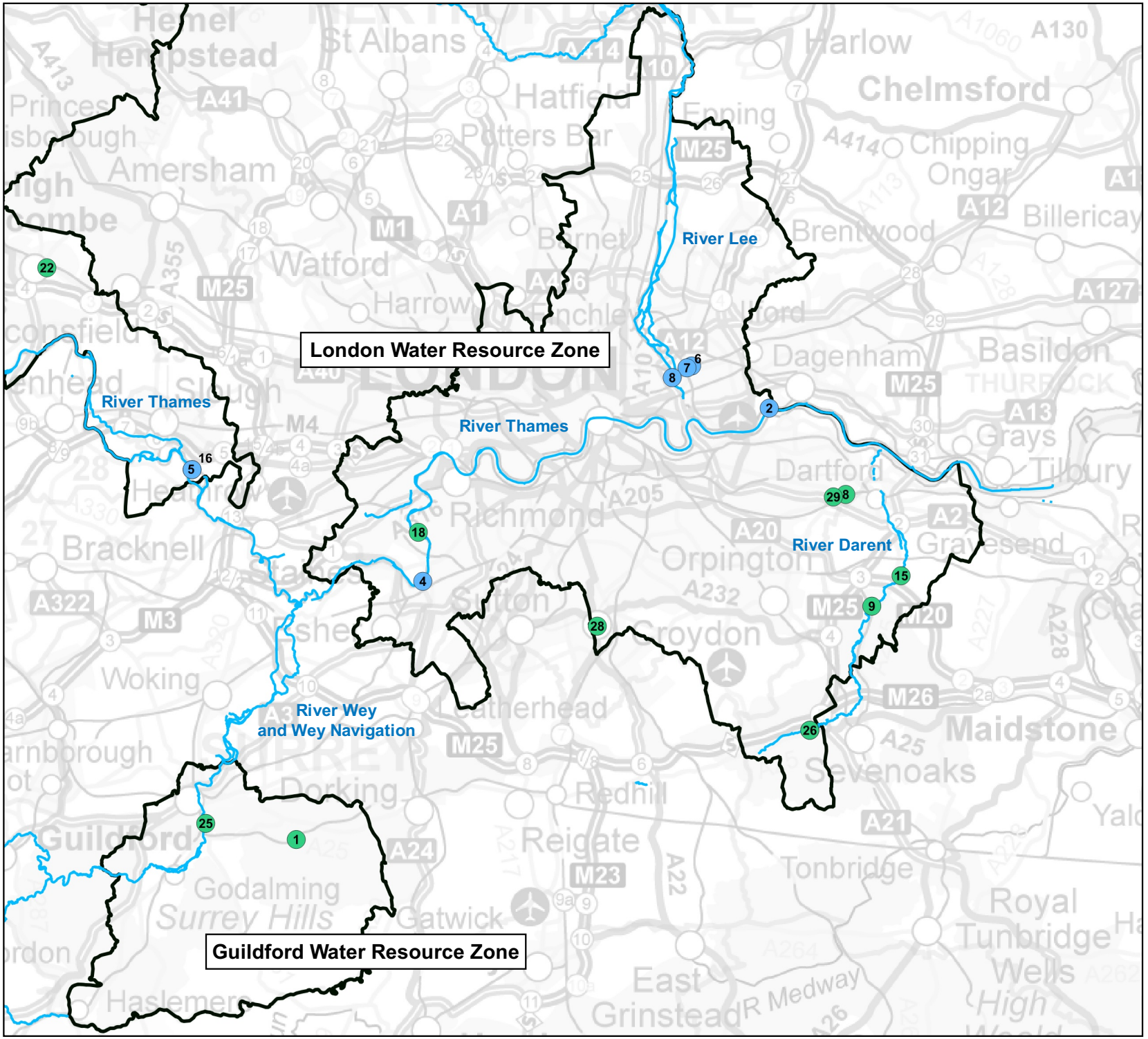
Although groundwater provides a major contribution in these zones, the critical drought elements are the surface water sources on the River Kennet and River Wey for Kennet Valley and Guildford zones, respectively. Consequently, the protocol for these zones consists of a trigger mechanism for implementing drought measures based on river flows receding to critical low levels.

Through the Environment Agency's Restoring Sustainable Abstraction (RSA) programme and requirements of European Directives, Thames Water has made sustainability reductions in the Kennet Valley. Thames Water will continue to investigate any requirements for potential sustainability reductions in the supply area.

1.4.3 SWA and Henley Water Resource Zones

These two zones are entirely supplied by groundwater sources, which historically have remained robust during drought. That is to say, the critical point at which source outputs decline below their deployable output has never been reached. The approach in these zones, therefore, is to track groundwater levels in key regional observation boreholes as well as the linked performance of selected groundwater sources in relation to their deployable output. Stonor Manor observation borehole has been chosen for tracking groundwater levels in the Chilterns and forms the basis for defining drought management guide levels for both the SWA and Henley zones.

Through the Environment Agency's RSA programme and requirements of European Directives, Thames Water has made sustainability reductions in the SWA WRZ. Thames Water will continue to investigate any requirement for potential sustainability reductions in the supply area.



Legend

Thames Water Drought Plan 2022
Drought Options

- Drought Permit / Order Option
- Supply Side Drought Option
- Thames Water Water Resource Zone
- Main Watercourses

Drought Permit / Order Options:

1	Albury	16	Increase in M2 annual licence
2	Axford 1	17	Latton
3	Axford 2	18	Lower Thames
4	Baunton 1	19	Meysey Hampton
5	Baunton 2	20	Ogbourne and Ogbourne EBH
6	Bibury	21	Oxford Canal - Banbury
7	Childrey Warren	22	Pann Mill
8	Crayford	23	Pangbourne
9	Eynsford	24	Playhatch
10	Farmoor	25	Shalford
11	Fobney Direct	26	Sundridge 1
12	Fobney Emergency Boreholes	27	Sundridge 2
13	Gatehampton	28	Waddon
14	Harpsden / Sheeplands	29	Wansunt
15	Horton Kirby (Aquifer Storage and Recovery)		

Supply Side Drought Options:

1	North London Artificial Recharge Scheme
2	Thames Gateway Water Treatment Works
3	Chingford Artificial Recharge Scheme (CHARS)
4	Reduction in lowest residual flow on the LTCD from 300Ml/d to 200Ml/d
5	Earlier reduction in residual flow on the LTCD
6	East London Resource Development (ELRED)
7	Stratford Box
8	Old Ford
9	West Berkshire Groundwater Scheme (WBGWS)

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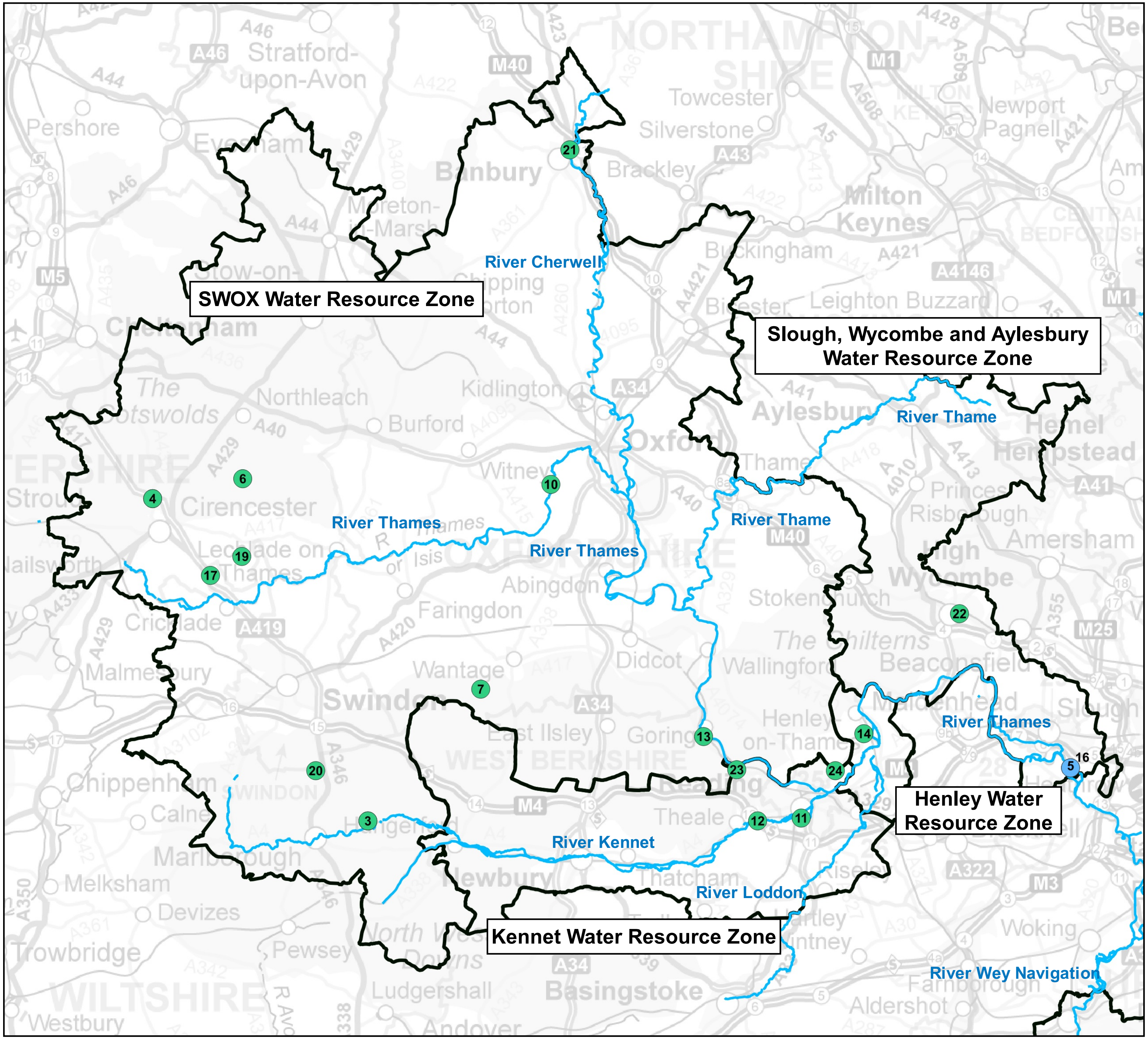
Habitats Regulations Assessment

Figure Title:
Habitats Regulations Assessment:
London and Guildford Water Resource Zones

Figure Number:	Date:
Figure 1.1	February 2022

N 0 7.5 15 km

Note: All locations are approximate



Legend

Thames Water Drought Plan 2022
Drought Options

- Drought Permit / Order Option
- Supply Side Drought Option
- Main Watercourses
- Thames Water Water Resource Zone

Drought Permit / Order Options:

1	Albury	16	Increase in M2 annual licence
2	Axford 1	17	Latton
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9	Eynsford	24	Playhatch
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13	Gatehampton	28	Waddon
14	Harpsden / Sheeplands	29	Wansunt
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Supply Side Drought Options:

1	North London Artificial Recharge Scheme
2	Thames Gateway Water Treatment Works
3	Chingford Artificial Recharge Scheme (CHARS)
4	Reduction in lowest residual flow on the LTCD from 300Ml/d to 200Ml/d
5	Earlier reduction in residual flow on the LTCD
6	East London Resource Development (ELRED)
7	Stratford Box
8	Old Ford
9	West Berkshire Groundwater Scheme (WBGWS)

Project Title:
Thames Water Drought Plan 2022
Habitats Regulations Assessment

Figure Title:
Habitats Regulations Assessment:
SWOX, Kennet Valley, Henley, SWA
Water Resource Zones

Figure Number:	Date:
Figure 1.2	February 2022

N 0 7.5 15 km

Note: All locations are approximate

1.5 Thames Water Drought Planning Process

1.5.1 Overview and Timetable

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 in accordance with the DP Regulations 2005 and the DP Direction 2020.

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'.

On 1 October 2010, Section 76 of the Water Industry Act 1991 was amended by the commencement of Section 36 of the Flood and Water Management Act 2010. The Water Use (Temporary Bans) Order 2010 also commenced on 1 October 2010 and provides definitions and clarifications on these activities.

The DP Direction 2020 states that all water company draft DPs should be sent to the Secretary of State prior to consultation before 1 April 2021. Water companies must then publish their DP as directed by Defra. A revised (final) DP must be published at least every 5 years from the date the previous DP was published.

Thames Water's current Final DP 2017 covers the period 2017-2022. Thames Water has published its final DP 2022. The period encompassed by the final DP 2022 is 2022 - 2027. The next revision of the DP would be published in 2027.

Only those drought options which are relevant to the period encompassed by the final DP 2022 are considered in the SEA and HRA process. To this end, environmental effects of the final DP 2022 options are considered within the context of the current licence operating conditions. Potential new sources (which Thames Water may bring online in the future), new drought options, or revisions to existing options which are only envisaged to become operational post 2027 have, therefore, been excluded from the SEA and HRA screening process. The same approach has also been taken with respect to in-combination plans, projects and programmes, in that only those that are likely to be effective in the period to 2027 were considered in the HRA and SEA. The HRA approach and methodology is discussed further in Section 2.

1.6 Thames Water Drought Options

The final DP 2022 proposes a number of options which would make more water available for supply than is available under normal licensed conditions. Drought options include demand side options (e.g. water use restrictions), continued utilisation of existing licensed water sources within Thames Water's resource base (referred to as supply side options) and drought permits/orders.

1.6.1 Demand Side Options

Demand side options are designed to reduce the demand for water and the options available to Thames Water are consistent across all resource zones (see **Table 1.1**).

Table 1.1 Demand Side Options (all water resource zones).

Measure	Description of Measure	Company Level of Service
Media /water efficiency campaign	Wide-scale media activity and advertising to encourage voluntary reduction in water usage	1
Leakage reduction	Increased leakage activity / Network pressure management	Not applicable
Temporary use ban	Temporary use ban	2
Drought Order to ban Non-Essential Use	Application to Defra to grant Non Essential Use Bans, as part of DD11 Ordinary Drought Order application	3
Emergency Drought Order	Application to Defra to grant an Emergency Drought Order to authorise water supply via temporary rota cuts or standpipes	4

The above measures include a sub-set of Thames Water's baseline demand management (leakage reduction, metering and water efficiency) in the WRMP. During the course of a drought, leakage reduction and water efficiency can, to some extent, be enhanced.

1.6.2 Supply Side Options

Thames Water categorise the full range of supply side measures into the following:

- Optimisation of existing sources
- Strategic drought water resource schemes
- Bulk supplies
- Drought permits/orders
- Recommissioning of disused sources
- *In extremis* options / "More before Level 4" measures.

Supply side measures are measures available to Thames Water to introduce during the course of a drought to increase the amount of water available for supply. Supply side drought options that do not require drought permits/orders are listed in **Table 1.2**. *In extremis* supply side management actions, also referred to as 'more before level 4' actions, may be considered during a drought to mitigate the need for Level 4 measures such as rota-cuts in an emergency situation. Thames Water is currently completing further consideration of such options to provide supply benefits to reduce the risk of reaching Level 4. At present these options are not well defined and therefore it is not possible to undertake an HRA assessment of these actions. Further work to define the feasibility and scope of these options is ongoing.

Table 1.2 Supply Side Drought Options (all sit in the London Water Resource Zone)

Option	Description	Trigger level
North London Artificial Recharge Scheme	The scheme is licensed for 275 Ml/d peak and 150 Ml/d average.	Drought Event Level 1
Thames Gateway Water Treatment Works (TGWTW)	There is an Operating Agreement governing use of the scheme. The TGWTW would take between 4-6 weeks to ramp up to full output. The scheme is maintained in a state of readiness at the beginning of the year and so it does not need to be increased to full output from zero output.	Drought Event Level 1 and naturalised Teddington flows below 3000 Ml/d for 10 days
Chingford Artificial Recharge Scheme (CHARS)	16Ml/d average, 16 Ml/d peak - CHARS is a water treatment works (WTW) using a number of the NLARS boreholes. It is not restricted to use under the NLARS Operating Agreement but can be used under any conditions, although its use is primarily to meet peak demands and drought demands.	Drought Event Level 1 and naturalised Teddington flows below 3000 Ml/d for 10 days
Reduction in lowest residual flow on the Lower Thames Control Diagram at Teddington Weir from 300Ml/d to 200Ml/d	100 Ml/d - increased abstraction from the River Thames, reducing residual flow over Teddington Weir.	Agreed between the Environment Agency and Thames Water during potentially severe drought.
Earlier reduction in residual flow at Teddington Weir on the Lower Thames Control Diagram	The gain in abstraction capability would be equal to the difference in reduction agreed at each stage on the Lower Thames Control Diagram, for the period when that flow band is operable.	Agreed between the Environment Agency and Thames Water during potentially severe drought.
East London Resource Development (ELRED)	ELRED comprises a number of groundwater abstraction locations along the route of the Channel Tunnel Rail Link which can be used to meet demand for water in London as well as contributing to the management of groundwater level rises. The licence held allows for abstraction of 18 Ml/d average and 20.57 Ml/d peak.	Drought Event Level 1 and naturalised Teddington flows below 3000 Ml/d for 10 days
Stratford Box	Stratford Box is a groundwater source in East London which is run at low level of baseload output in order to	Drought Event Level 1 and naturalised Teddington

Option	Description	Trigger level
	keep groundwater levels suppressed to protect Stratford International Station. The option available during a drought is to increase the output from 5 Ml/d to 8 Ml/d in aggregate with Edmeston Close. The groundwater level management is not carried out by Thames and is de-watering.	flows below 3000Ml/d for 10 days
Old Ford	Old Ford is a groundwater source in East London which abstracts from the chalk aquifer. The licence allows for the abstraction of 4.5 Ml/d average, 4.5 Ml/d peak to meet peak demands and demand during drought conditions.	Drought Event Level 1 and naturalised Teddington flows below 3000 Ml/d for 10 days
West Berkshire Groundwater Scheme (WBGWS)	Untreated groundwater is discharged into the Kennet and Pang tributaries of the River Thame to increase the flow to London reservoir abstraction points. A benefit of some 123 Ml/d reducing to 66 Ml/d in a prolonged drought is provided by the scheme.	Level 2 on the Lower Thames Control Diagram

1.6.3 Supply Side Drought Permit/Order Options

Potential drought permit/order sites are identified in **Table 1.3.**

Table 1.3 Supply Side Drought Permit/Order Options.

Water Source	Potential Drought Permits/Orders
London Water Resource Zone	
Sundridge 1	0 - 6.64 Ml/d - relax the annual average licence rate so that for the 6 months of the drought order, 8Ml/d could be abstracted each day (1,470 Ml over 6 months).
Sundridge 2	10.64 Ml/d -relax the annual average licence rate and increase the peak licence rate so that for the 6 months of the drought order, 12 Ml/d could be abstracted each day (sequential to Sundridge 1).
Lower Thames	100 – 200 Ml/d – to reduce the minimum pass-forward flow over Teddington Weir to 100 Ml/d or 0 Ml/d depending on agreement with the Environment Agency
Crayford	2.8 Ml/d - increase in abstraction beyond existing licence limit.
Horton Kirby (Aquifer Storage & Recovery (ASR))	5 Ml/d - the option would be to bring forward the Aquifer Storage and Recovery (ASR) scheme which abstracts from the Greensand aquifer.
Eynsford	Disaggregate the Eynsford and Horton Kirby abstraction licences to allow a peak abstraction at Eynsford of 7.33 Ml/d. The Horton Kirby abstraction will remain at a maximum daily peak rate of 11.36 Ml/d.
Wansunt	6.0 Ml/d - increase in abstraction beyond existing licence limit.
Increase in M2 annual licence	Increase the annual maximum abstraction permitted under the M2 licence by up to 5 %. Abstractions would still be restricted when flows are medium to low (as per normal operations).
Waddon	0 – 7Ml/d - increase in abstraction beyond existing licence limit (average rate per year of 7.6Ml/d).
Swindon Oxford Water Resource Zone	
Baunton 1	6.3 Ml/d - a temporary suspension of the 32 Ml/d flow constraint on the River Churn at Cirencester. When flows in the River Churn are less than 32 Ml/d, abstraction would be permitted to a maximum rate of 6.3 Ml/d.
Baunton 2	17 Ml/d – a temporary suspension of the 32 Ml/d flow constraint on the River Churn at Cirencester. When flows in the River Churn are less than 32 Ml/d, abstraction would be permitted up to a maximum rate of 17 Ml/d (compared to the Baunton 1 drought permit maximum rate of 6.3 Ml/d).
Latton	5 Ml/d - a 5 Ml/d increase in the average licence limit (to 20 Ml/d) for the duration of the drought permit. The annual licence limit would be increased from 5,475 Ml to up to 6,390 Ml.

Water Source	Potential Drought Permits/Orders
Meysey Hampton	11.37 Ml/d - additional abstraction from the Great Oolite boreholes when preceding flow (mean 5 days before) in the River Coln at Bibury is less than 68 Ml/d (i.e. as per the terms of the revoked 'summer' licence).
Farmoor	30 Ml/d - proposed back-pumping of river flows from further downstream to help maintain a minimum flow in sensitive reaches.
Axford 1	7.1 Ml/d - remove the flow constraint of 6 Ml/d and increase abstraction to a daily average and peak of 13.1 Ml/d
Axford 2	14 Ml/d - removal of flow constraint and increase of average and peak abstraction from 6 Ml/d to 20 Ml/d.
Bibury	5 Ml/d - increase peak daily abstraction at the current boreholes from 6.819 Ml/d to 11.819 Ml/d.
Gatehampton	3.5 Ml/d - increasing the normal operating licence of 101.5 Ml/d to a total abstraction of 105 Ml/d.
Ogbourne emergency boreholes	Abstract 4 Ml/d from existing boreholes located 1 km away from the boreholes used in Thames Water's now revoked licence.
Oxford Canal - Banbury	5 -10 Ml/d - no abstraction normally occurs, permit for abstraction from the Bradley and Perry Hills boreholes via the Oxford Canal for transfer to Grimsbury Reservoir.
Childrey Warren	4.5 Ml/d - resume historical abstraction to previous licence limit following revocation of licence to abstract.
Ogbourne	Abstract 3.5 Ml/d from the Ogbourne boreholes used in the now revoked licence.
Kennet Valley Water Resource Zone	
Fobney Emergency Boreholes	12 – 30 Ml/d - bringing emergency abstraction licence online with output limited by groundwater resource available.
Pangbourne	7 Ml/d – removes flow constraint and allows the full amount of the Pangbourne licence to be abstracted.
Playhatch	2.8 - 4.1 Ml/d - increase in peak abstraction of existing licence from 8.2 Ml/d to 12.3 Ml/d.
Fobney Direct	Variable, up to 20 Ml/d – manipulation of the Arrowhead control structure at extreme low flows (<173 Ml/d gauged at Theale) to allow abstraction from River Kennet at expense of flows to Holy Brook.
Guildford Water Resource Zone	
Albury	6.8 Ml/d- extension of abstraction when flow constraint on the Law Brook is in force.
Shalford	5 Ml/d - increase the existing surface water abstraction from the River Wey and removing the licence aggregates.
SWA Water Resource Zone	
Pann Mill	7.3 Ml/d - increase from revised licence of 9.5 Ml/d up to old deployable output of 16.8 Ml/d
Henley Water Resource Zone	
Harpsden / Sheeplands	6 Ml/d – the total DO from the sources is 11.4 Ml/d (Sheeplands) and 16.5 Ml/d (Harpsden) which is 27.9 Ml/d, removing the aggregate condition with increased abstraction at Harpsden.

1.7 Consultation to date

To ensure that the stakeholder and regulatory engagement requirements are met, Thames Water continuously consulted with both the Environment Agency and Natural England in preparation of the 2013 and 2017 DPs. This is summarised below.

Following publication of the DP 2013, consultation on the environmental assessments of Thames Water's DP continued between Thames Water, Environment Agency, Natural England and Ricardo Energy and Environment (REE – formerly Cascade Consulting).

- Prior to issue of the DP 2013, a series of consultation meetings were held between Thames Water, Environment Agency and REE (Cascade Consulting) during the preparation of the Environmental Assessment Report (EAR) in support of the DP 2013. Specifically, there were

meetings in January and March 2012 to discuss the scope and methodology of the environmental assessments used to inform the EARs as set out in the scoping report[14].

- Following publication of the DP 2013, consultation with Natural England regarding the assessment against Habitats site conservation objectives was discussed. Further assessment was undertaken in consultation with Natural England. The approach to the assessment and the results were incorporated into each applicable EAR (see section 2.4).
- In addition, further to the Environment Agency having reviewed and commented on a number of draft EARs throughout September and October 2012, discussions were held to agree the distinction between the requirements for:
    - finalisation of the EARs for completion of the DP, and
    - finalisation of the EARs for actual drought permit applications.

The following consultation was undertaken in preparation of the DP 2017:

- The Environment Agency commented and reviewed a number of draft EARs for the DP 2013. Any comments not addressed for the DP 2013 were taken into consideration for the DP 2017 DP, as agreed with the Environment Agency.
    - Between February 2015 and April 2015 Cascade Consulting undertook a 'stock take' comprising a rapid review of the current position of environmental data and a review of work undertaken since publishing the DP 2013. The stock take included a review of the outstanding Environment Agency comments on the EARs, a review of recently collected Environment Agency data and a review of the Thames Water baseline data (including the RHS Plus walkover surveys). The stock take confirmed a strategy for addressing Environment Agency comments, refined the baseline monitoring programme and reviewed the feasibility of the drought options and their promotability. A briefing note of the findings was shared with the Environment Agency following this work, which the Environment Agency endorsed as a suitable approach for progressing with the environmental assessment work associated with updating Thames Water's DP 2017.
    - Following the 'stock take', a meeting between REE (Cascade Consulting), Thames Water and the Environment Agency was held in January 2016 to discuss and confirm the approach to the assessment (including a discussion about the report template) and the programme for preparation of the EARs in support of the DP 2017.
    - Subsequently, the Environment Agency were also consulted during the completion of the draft EARs for the DP 2017. The comments provided were reviewed and following a strategic meeting with the Environment Agency, some comments were addressed in the draft EARs, but a number of comments were addressed following further consultation after the submission of the draft DP in April 2017. It should be noted that comments received on the EARs did not materially change the findings of the HRA screening assessment.

Annual reporting of the baseline monitoring results associated with the drought options have been submitted to the Environment Agency for review each year. Following review of the data collected, consultation with the Environment Agency about the monitoring programme was undertaken in spring 2014 and spring 2015, to ensure that sufficient monitoring to inform the baseline was undertaken collaboratively between the Environment Agency and Thames Water. In spring 2016, it was agreed with the Environment Agency that three years of continuous monitoring followed by appropriate intervals for ecological features was sufficient as a minimum to provide a robust baseline[15]. This approach was reviewed annually.

During the preparation of Thames Water's DP 2017, Natural England and the Environment Agency were also consulted on the HRA Screening Report. Comments were addressed in the preparation of the Final HRA Screening Report that accompanied Thames Water's DP 2017.

[14] Thames Water Utilities Ltd (2012). Drought Plan: London Resource Zone Drought Permit Environmental Assessments Scoping Report. Draft Final. Prepared by Cascade Consulting, 6 January 2012.
[15] Meeting between the Environment Agency, Thames Water and Cascade Consulting (12 April 2016)

It should also be noted that in April 2018, Defra responded to Thames Water following their review of the Thames Water draft DP 2016, the representations received in response to the public consultation, the SoR, and the Environment Agency's advice to the Secretary of State. Following this review, Defra indicated that the Secretary of State required Thames Water to provide a high-level summary of the environmental impacts of Thames Water's drought actions in droughts worse than record ('severe droughts'). In response to this, Thames Water prepared an Environmental Assessment of Severe Droughts – Summary Report[16]. Implications for the HRA report following this assessment are addressed in the Severe Drought Report and Thames Water's Final DP 2017 and do not form part of this HRA report.

1.8 Consultation for DP 2022

Consultation on the HRA has continued throughout the preparation of the final DP 2022. The draft DP 2022 and the HRA Report were issued to Defra on 30 March 2021. Thames Water received approval to consult on the draft DP on 10 May 2021 and subsequently published the draft DP 2022 for public consultation on 7 June 2021 for a seven week period up to and including 30 July 2021.

The statutory consultation bodies (Environment Agency, Natural England and Historic England), as well as the public, were invited to express their views on the HRA Report and were able to use it as a reference point in expressing their views on Thames Water's draft DP 2022.

A Statement of Response (SoR) was prepared and issued on 20 September 2021 which explains the changes Thames Water have already made and will make to the Final Drought Plan 2022 (and accompanying documents, including the HRA) as a result of the consultation. **Appendix 2** sets out the consultation responses, Thames Water's response issued in its SoR, and the section of this HRA where the comments are addressed.

In addition, comments that were received through the specific consultation meetings / periods held over the course of the Drought Plan 2022 development, listed in **Table 1.4**, have also been taken into consideration in preparing this HRA.

Table 1.4 Stakeholder/regulatory engagement for DP2022

Date	Regulator/stakeholder	Type	Aim of meeting/correspond
23/07/2020	Environment Agency (Area)	Teleconference	Discussion of the Environmental Assessment Methodology Document; SEA and HRA approaches.
07/08/2020	Natural England	Teleconference	
13/07/2020 –14/08/2020	Environment Agency, Natural England and Historic England	Formal 5-week consultation period	SEA Scoping Consultation comments to be provided to Thames Water.
25/11/2020	Environment Agency	Teleconference	Draft EAR assessment outcomes; and update on SEA and HRA.
07/06/2021 – 30/07/ 2021	Public and regulators	Formal 7-week consultation period	To obtain feedback on the draft DP 2022 and its accompanying documents including the HRA, SEA and EARs.
24/08/2021	Environment Agency and Natural England	Teleconference	Discussion of the general progress with the draft DP 2022, and feedback on the HRA, SEA and EARs.
02/09/2021	Environment Agency	Teleconference	Discussion of the general progress with the draft DP 2022, and revisions to the EARs.

[16] Thames Water Utilities Limited (2018) Environmental Assessment of Severe Droughts – Summary Report. *Prepared by Ricardo Energy & Environment*. August 2018

Further consultation will also be undertaken, as required, at the time of any future applications for drought permits / orders.

1.9 Structure of report

The report is divided into the following sections: Section 2 Methodology, Section 3 HRA Screening of Drought Options, Section 4 HRA Screening Conclusions, Section 5 Stage 2 Appropriate Assessment, Section 6 Potential In-Combination Effects with other Plans and Projects and Section 7 Conclusions and Recommendations.

The HRA has also informed the production of the SEA of the DP.

2 Methodology

The objective of the HRA is to establish firstly whether schemes included in the final DP 2022 are likely to have a significant effect on Habitats sites (alone or in-combination with other supply schemes in the plan, or with other plans and projects), and secondly, where a significant effect is likely, to determine through Appropriate Assessment, whether the plan would adversely affect the integrity of the Habitats site(s).

HRA screening was therefore, completed for all of the drought options considered in the development of the final DP 2022.

2.1 Review of Existing Abstraction Licences

Permission to abstract water, granted through licences issued by the Environment Agency and held and operated by Thames Water, was subject to a 'Review of Consents' in accordance with Regulation 63 of the Conservation of Habitats and Species Regulations 2010 (as amended) (referred to as the Habitats Regulations). It should be noted that these Habitats Regulations have now been superseded by the Conservation of Habitats and Species Regulations 2017, as amended. This Review of Consents was undertaken by the Environment Agency and included screening to determine LSEs on Habitats sites and Appropriate Assessment if LSEs were identified, to either affirm an abstraction licence or recommend action to amend the licence conditions. The Habitats sites were initially screened to identify all sites with water dependent habitat within Thames Water's supply area. Those sites that contained water dependent habitat were then reviewed to assess whether Thames Water abstractions were located within the same groundwater or surface water catchment and therefore, could have potential to affect the hydrogeological or hydrological regime of the sites. Any sites that were in the same catchment as a Thames Water licensed abstraction source were assessed in more detail to determine whether the abstraction would be likely to have a significant effect. The Environment Agency looked in more detail at the sensitivities of the Habitats site to water supply, and at the local hydrology. In addition, the Environment Agency was also able to use simple drawdown calculations to conclude that the impact would be insignificant. This was to ensure that the integrity of Habitats sites was not at risk from the impacts of abstraction. Information provided by the outcomes of the Review of Consents (released to Thames Water on 29 August 2008) was used to support the HRA screening of Thames Water's DP 2017[17]. This identified that none of the drought options included in the 2017 Final DP required an "Appropriate Assessment" for a Habitats Directive Habitats site.

It is acknowledged that this Review of Consents was concluded over a decade ago and, as the competent authority of the final DP 2022, Thames Water are required to consider the validity of the conclusions in light of more recent data or evidence, changes in Habitats site condition, and the impacts of climate change. Natural England requires that any abstraction which is not within the terms of the existing licence (including timings or duration of the abstraction) should be screened and assessed accordingly within the HRA.

Thames Water have reviewed the conclusions of screening assessments in light of current evidence, including any changes to Habitats site condition, where the HRA previously relied on Environment Agency's Review Of Consents.

2.2 Identification of Habitats sites for Assessment

To provide an indication of those options more likely to have a significant effect on a Habitats site(s), those options that are within 10 km of a Habitats site were identified. Consideration was also given to the relative locations of options and Habitats sites within the same surface and groundwater catchments (where this information was available) to ensure that any connectivity over a longer distance that might affect water-dependent sites was taken into account. GIS data were used to map the locations and

[17] Thames Water Utilities Limited (2018) Habitats Regulations Assessment of Thames Water's Revised Draft Drought Plan Screening Report (Final). Prepared by Cascade Consulting.

boundaries of Habitats sites within or adjacent to the Thames Water WRZs[18] using publicly available data from Natural England. Habitats sites are shown in **Figure 2.1** (London and Guildford WRZs) and **Figure 2.2** (Swindon and Oxfordshire (SWOX); Kennet Valley; Henley; Slough/Wycombe/Aylesbury (SWA) WRZs). Note that North London Artificial Recharge Scheme, Chingford Artificial Recharge Scheme and West Berkshire Groundwater Scheme are not included in the London Water Resource Zone figure.

The attributes of Habitats sites, which contribute to and define their integrity, were considered with reference to Standard Data forms for SACs and SPAs and Information Sheets for Ramsar sites[19].

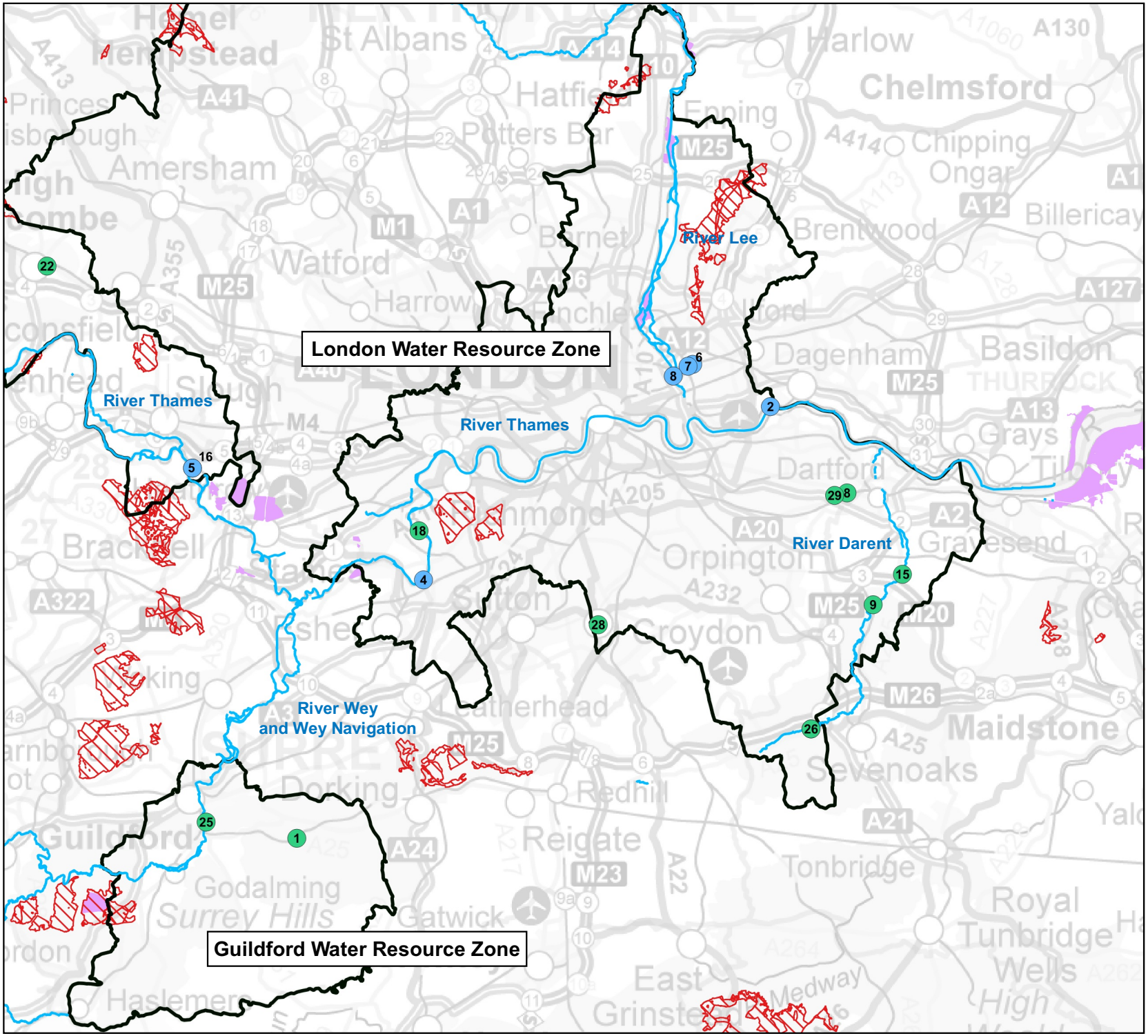
The data sources that were considered include:

- Relevant citation documents;
- Conservation objectives (SACs and SPAs) and Supplementary Advice (where available) including the targets and attributes that inform favourable condition status;
- Site Improvement Plans (SACs and SPAs);
- Regulation 33 information for European Marine Sites;
- Favourable condition tables for Sites of Special Scientific Interest (SSSI);
- Article 12 (SPAs) and Article 17 (SACs) status reports;
- SSSI condition assessments;
- Common Standards Monitoring Guidance (where specific targets have been set and agreed by Natural England and Environment Agency);
- Habitat preferences for the qualifying species (e.g. nesting, foraging, commuting) and food preferences; and
- Physical characteristics of the habitats and environment influencing them.

A summary of the information provided by these documents is provided in **Appendix 1**. This information allows identification of those features of each site which determine site integrity and the specific sensitivities of the site, as well as an analysis of how potential impacts of the drought options may affect site integrity.

The locations of the supply side and drought permit/order options were also mapped to establish their geographic proximity to the Habitats sites.

[18] 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.'
[19] These were obtained from the Joint Nature Conservation Committee and Natural England websites (www.jncc.gov.uk and www.naturalengland.org.uk).



Legend

- Drought Permit / Order Option
- Supply Side Drought Option
- Thames Water Water Resource Zone
- Main Watercourses
- Special Area of Conservation
- Special Protection Area
- RAMSAR

Drought Permit / Order Options:

1	Albury	16	Increase in M2 annual licence
2	Axford 1	17	Latton
3	Axford 2	18	Lower Thames
4	Baunton 1	19	Meysey Hampton
5	Baunton 2	20	Ogbourne and Ogbourne EBH
6	Bibury	21	Oxford Canal - Banbury
7	Childrey Warren	22	Pann Mill
8	Crayford	23	Pangbourne
9	Eynsford	24	Playhatch
10	Farmoor	25	Shalford
11	Fobney Direct	26	Sundridge 1
12	Fobney Emergency Boreholes	27	Sundridge 2
13	Gatehampton	28	Waddon
14	Harpsden / Sheeplands	29	Wansunt
15	Horton Kirby (Aquifer Storage and Recovery)		

Supply Side Drought Options:

1	North London Artificial Recharge Scheme
2	Thames Gateway Water Treatment Works
3	Chingford Artificial Recharge Scheme (CHARS)
4	Reduction in lowest residual flow on the LTCD from 300Ml/d to 200Ml/d
5	Earlier reduction in residual flow on the LTCD
6	East London Resource Development (ELRED)
7	Stratford Box
8	Old Ford
9	West Berkshire Groundwater Scheme (WBGWS)

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Thames Water

Project Title:
Thames Water Drought Plan 2022
Habitats Regulations Assessment

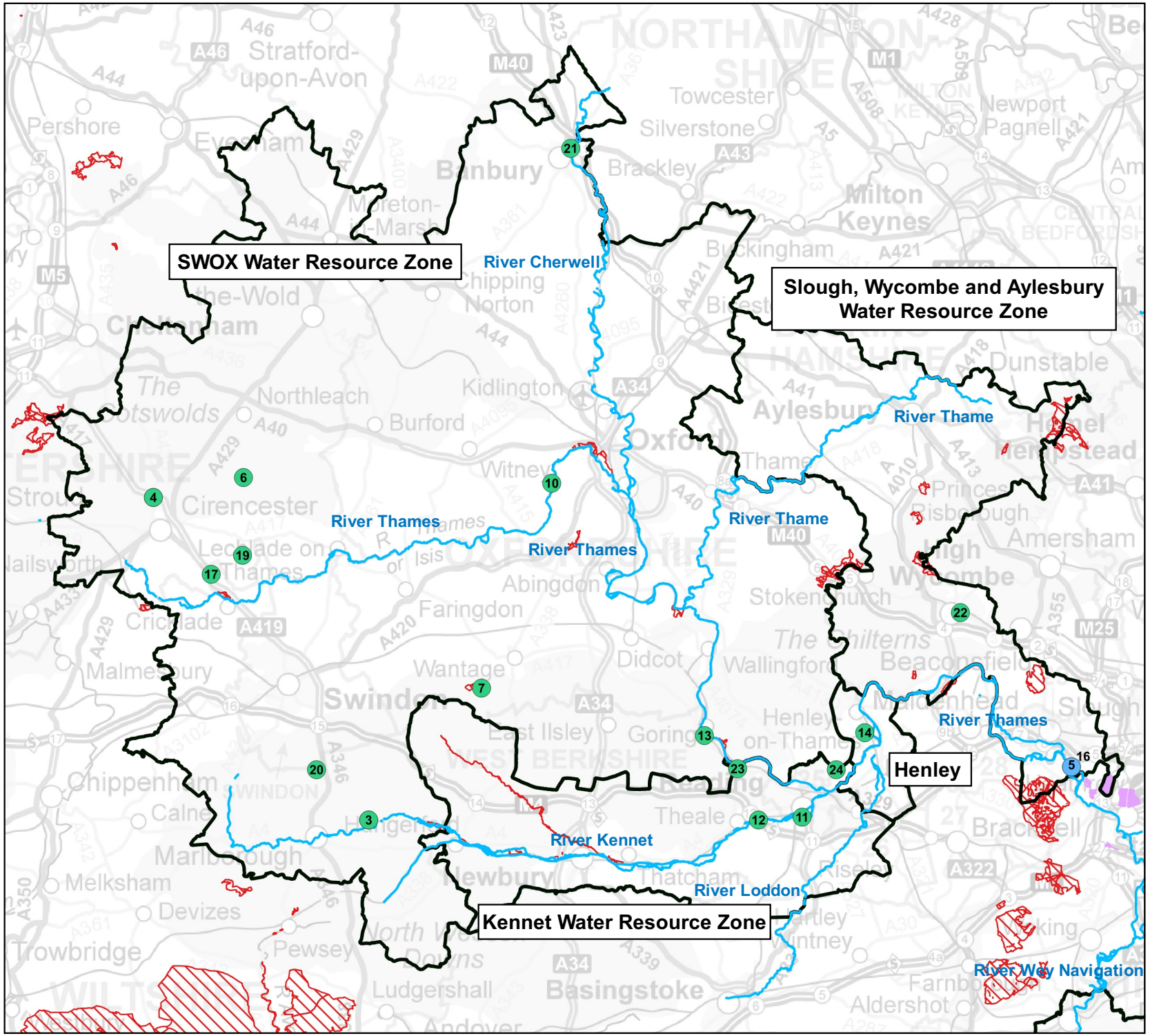
Figure Title:
Habitats Regulations Assessment:
Stage 1 Screening

Figure Number:	Date:
Figure 2.1	February 2022

N

0 7.5 15 km

Note: All locations are approximate



Legend

- Drought Permit / Order Option
- Supply Side Drought Option
- Main Watercourses
- Thames Water Water Resource Zone
- Special Area of Conservation
- Special Protection Areas
- RAMSAR

Drought Permit / Order Options:

1	Albury	16	Increase in M2 annual licence
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3	Axford 2	18	Lower Thames
4	Baunton 1	19	Meysey Hampton
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6	Bibury	21	Oxford Canal - Banbury
7	Childrey Warren	22	Pann Mill
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9	Eynsford	24	Playhatch
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11	Fobney Direct	26	Sundridge 1
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Supply Side Drought Options:

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2	Thames Gateway Water Treatment Works
3	Chingford Artificial Recharge Scheme (CHARS)
4	Reduction in lowest residual flow on the LTCD from 300Ml/d to 200Ml/d
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7	Stratford Box
8	Old Ford
9	West Berkshire Groundwater Scheme (WBGWS)

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Thames Water

Project Title:
Thames Water Drought Plan 2022
Habitats Regulations Assessment

Figure Title: Habitats Regulations Assessment: SWOX, Kennet Valley, Henley, SWA Water Resource Zones

Figure Number:	Date:
Figure 1.2	February 2022

N

0 7.5 15 km

Note: All locations are approximate

2.2.1 Managed Wetlands

Currently some existing abstractions are exempt from requiring an abstraction licence. This includes the primary offtake from water courses for managed wetlands. Natural England have indicated that following the implementation of the Water Act of 2003 such exemptions will no longer be in place. Any abstraction after 1st January 2018 will require a licence.

The potential impacts of the implementation of a drought permit on Habitats sites has been included in the EAR for each drought permit/option (see **Section 2.4** below). During a drought any drought permit will take precedence, but it will still be important to determine the effect of the implementation of a drought permit/option on the abstraction of water for managed wetlands and the conservation of such wetlands.

At this stage any exemptions are still in place and no licences have been issued. As a result, a detailed assessment of the effect of a drought permit/option on the abstraction of water for managed wetlands will need to be determined at the time of implementation of a permit/option.

2.3 Potential impacts of the options considered in the Drought Plan

The qualifying habitats and species of Habitats sites are vulnerable to a wide range of impacts such as physical loss or damage of habitat, disturbance from noise, light, human presence, changes in hydrology (e.g. changes in water levels/flow, flooding), changes in water or air quality and biological disturbance (e.g. direct mortality, introduction of disease or non-native species). However, the schemes considered for inclusion in the final DP 2022 only have the potential to give rise to some of these impacts.

The demand management schemes are unlikely to have any effects on Habitats sites as they comprise measures which will not result in any new development or water abstraction (repairing leakage and water efficiency measures) and which are largely implemented within urban areas. However, they have still been subject to the HRA screening process, the results of which are included in **Section 3**.

In determining the likelihood of significant effects on Habitats sites from the supply side drought options and drought permit/drought order drought options, particular consideration has been given to the possible source-receptor pathways through which effects may be transmitted from activities associated with DP options to features contributing to the integrity of the Habitats sites (e.g. groundwater or surface water catchments, air etc). **Table 2.1** shows the type of impacts drought options could have on Habitats site qualifying features.

Screening for LSEs has been determined on a proximity basis for many of the types of impacts, based on the proximity of the drought option location to each Habitats site. However, there are many uncertainties associated with using set distances as there are very few standards available as a guide to how far impacts will extend. Different types of impacts can occur over different distances, and the assumptions and distances used in this HRA and justification for them are shown in **Table 2.1**[20,21,22,23,24,25] below.

[20] Taken from UKWIR (2021) Environmental Assessment Guidance for Water Resources Management Plans and Drought Plans) (21/WR/02/15).
[21] Environment Agency (2013) Bird Disturbance from Flood and Coastal Risk Management Construction Activities. Overarching Interpretive Summary Report. Prepared by Cascade Consulting and Institute of Estuarine and Coastal Studies.
[22] Cutts N, Hemingway K and Spencer J (2013) The Waterbird Disturbance Mitigation Toolkit Informing Estuarine Planning and Construction Projects. Produced by the Institute of Estuarine and Coastal Studies (IECS). Version 3.2.
[23] Waterbird Disturbance & Mitigation Toolkit. TIDE toolbox - TIDE tools (tide-toolbox.eu)
[24] British Standards Institute (BSI) (2009) BS5228 - Noise and Vibration Control on Construction and Open Sites. BSI, London.
[25] Institute of Lighting Professionals (2020) Guidance Notes for the Reduction of Obtrusive Light GN01/20.

Table 2.1 Potential Impacts of Drought Options on Habitats sites.

Broad categories of potential impacts on Habitats sites, with examples	**Examples of activities responsible for impacts *(example distance considerations in italics)***
Physical loss: • Removal • Smothering	**Development of infrastructure associated with option**, e.g. new or temporary pipelines, transport infrastructure, temporary weirs. **Indirect effects from a reduction in flows** e.g. drying out of water-margin habitat. *Physical loss is likely to be significant where the boundary of the option extends within or is directly adjacent to the boundary of the Habitats site, or within/adjacent to an offsite area of known foraging, roosting, breeding habitat (that supports species for which a Habitats site is designated, or where natural processes link the option to the site, such as through hydrological connectivity downstream of an option, long shore drift along the coast, or the option impacts the linking habitat).*
Physical damage: • Sedimentation/silting • Prevention of natural processes • Habitat degradation • Erosion • Fragmentation • Severance/barrier effect • Edge effects	**Construction activity leading to permanent and/or temporary damage of available habitat, sedimentation/siltation, fragmentation, etc.** *Physical damage is likely to be significant where the boundary of the option extends within or is directly adjacent to the boundary of the Habitats site, or within/adjacent to an offsite area of known foraging, roosting, breeding habitat that supports species for which a Habitats site is designated, or where natural processes link the option to the site, such as through hydrological connectivity downstream of an option or sediment drift along the coast.*
Non-physical disturbance: • Noise • Visual presence • Human presence • Light pollution	**Noise from temporary construction or temporary pumping activities.** *Taking into consideration the noise level generated from general building activity (c. 122dB(A)) and considering the lowest noise level identified in appropriate guidance as likely to cause disturbance to estuarine bird species, it is concluded that noise impacts could be significant up to 1km from the boundary of the Habitats site.* **Noise from vehicular traffic during operation of an option.** *Noise from construction traffic is only likely to be significant where the transport route to and from the option is within 3-5km of the boundary of the Habitats site.* **Plant and personnel involved in in operation of the option.** *These effects (noise, visual/human presence) are only likely to be significant where the boundary of the option extends within or is adjacent to the boundary of the Habitats site, or within/adjacent to an offsite area of known foraging, roosting, breeding habitat (that supports species for which a Habitats site is designated).* **Options that might include artificial lighting**, *e.g. for security around a temporary pumping station.* *Effects from light pollution are more likely to be significant where the boundary of the option is within 500m of the boundary of the Habitats site.*

Broad categories of potential impacts on Habitats sites, with examples	Examples of activities responsible for impacts *(example distance considerations in italics)*
Water table/availability: • Drying • Flooding/stormwater • Changes to surface water levels and flows • Changes in groundwater levels and flows • Changes to coastal water movement	**Changes to water levels and flows due to increased water abstraction, reduced storage, or reduced flow releases from reservoirs to river systems. Potential for changes to habitat availability, for example reductions in wetted width of rivers leading to desiccation of macrophyte beds.** *These effects are only likely to be significant where the boundary of the option extends within the same ground or surface water catchment as the Habitats site. However, these effects are dependent on hydrological continuity between the option and the Habitats site, and sometimes whether the option is up or down stream from the Habitats site.*
Toxic contamination: • Water pollution • Soil contamination • Air Pollution	**Reduced dilution in downstream or receiving waterbodies due to changes in abstraction or reduced compensation flow releases to river systems.** *These effects are only likely to be significant where the boundary of the option extends within the same ground or surface water catchment as the Habitats site. However, these effects are dependent on hydrological continuity between the option and the Habitats site, and sometimes whether the option is up or down stream from the Habitats site.* **Air emissions associated with plant and vehicular traffic during construction and operation of options.** *The effect of dust is only likely to be significant where site is within or in close proximity to the boundary of the Habitats site. Without mitigation, dust and dirt from the construction site may be transported onto the public road network and then deposited/spread by vehicles on roads up to 500m from large sites, 200m from medium sites, and 50m from small sites as measured from the site exit.* *Effects of road traffic emissions from the transport route to be taken by the project traffic are only likely to be significant where the protected site falls within 200 metres of the edge of a road affected.*
Non-toxic contamination: • Nutrient enrichment (e.g. of soils and water) • Algal blooms • Changes in salinity • Changes in thermal regime • Changes in turbidity • Changes in sedimentation/silting	**Changes to water salinity, nutrient levels, turbidity, thermal regime due to increased water abstraction, discharges, storage, or reduced compensation flow releases to river systems.** *These effects are only likely to be significant where the boundary of the option extends within the same ground or surface water catchment as the Habitats site. However, these effects are dependent on hydrological continuity between the option and the Habitats site, and sometimes whether the option is up or down stream from the Habitats site.*
Biological disturbance: • Direct mortality • Changes to habitat availability • Out-competition by non-native species • Selective extraction of species • Introduction of disease • Rapid population fluctuations • Natural succession	**Killing or injury due to construction activity.** *Likely to be a risk where the boundary of the option extends within or is directly adjacent to the boundary of the Habitats site, or within/adjacent to an offsite area of known foraging, roosting, breeding habitat (that supports species for which a Habitats site is designated).* **Creation of new pathway for spread of non-native invasive species.**

Broad categories of potential impacts on Habitats sites, with examples	Examples of activities responsible for impacts *(example distance considerations in italics)*
	This effect is only likely to be significant where the option is situated within the Habitats site or an upstream tributary of the Habitats site, but also for inter-catchment water transfers.

Construction phase and operational phase impacts were reviewed and assessed. Most of the drought permit/order options reviewed comprise a change to an existing abstraction licence, with little or no requirement for additional infrastructure, and as such, few of these options can be considered to have a 'construction' phase.

The HRA Screening process was undertaken using professional judgement taking into account potential extent, complexity, duration, frequency, reversibility and probability of impacts, and assuming the implementation of suitable mitigation measures.

Where uncertainty remains after screening, and it cannot be concluded that a drought option is not likely to have significant effects on the qualifying features of a Habitats site, the drought option should be taken forward to Stage 2, which requires a full Appropriate Assessment of that option to be undertaken.

2.4 Drought Contingency Planning Environmental Assessments

EARs are being prepared for the drought permit/order sites identified in **Table 1.3**, to support Thames Water's DP 2022.

The aim of these studies is to produce environmental reports that have been agreed with the Environment Agency and Natural England such that in the event of a drought, they are readily available for updating based on the prevailing drought situation at that time. The environmental studies consider all potentially affected habitats and species including, but not limited to, SACs, SPAs and Ramsar features as well as any SSSI or species/habitats of principal importance for the conservation of biodiversity in England (identified in the Natural Environment and Rural Communities (NERC) Act 2006 Section 41). The reports also include Environmental Monitoring Plan (EMP) recommendations for each drought permit/order site. These environmental studies, undertaken outside of an actual drought event, are intended to be used as the basis for the EAR to be prepared in support of a specific drought permit / order application, should the need arise.

Following publication of the 2013 DP, a further assessment of potential impacts on Habitats sites in proximity to the drought permit/order sites was undertaken in consultation with Natural England[26]. This screening assessment identified and agreed those Habitats sites that may be impacted during drought permit/order implementation. Those sites identified as potentially impacted have been included for full assessment in the EARs drafted in support of the final DP 2022. Information from the assessments has been used to inform the HRA.

2.5 Review of Potential In-combination Effects

Article 6(3) of the Habitats Directive requires an Appropriate Assessment of 'Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in-combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives'.

The review has therefore, considered the in-combination effects of the drought options in the Thames Water final DP 2022 and the in-combination effects of the final DP 2022 with a number of plans and projects that could have an impact on the Habitats sites identified within this HRA, as follows:

- Inter-option effects within Thames Water final DP 2022
- Thames Water WRMP19
- Other water company WRMPs and DPs

[26] Consultation of the potential impacts of the scheme on conservation objectives (received 20 March 2014) was undertaken with Natural England on 12 April 2016.

- Thames River Basin Management Plan (RBMP) 2015 and the Severn RBMP 2015
- Environment Agency Regional DPs
- Environment Agency River Thames Scheme
- Environment Agency Oxford Flood Alleviation Scheme
- Environment Agency Abingdon Flood Alleviation Scheme
- Canal and Rivers Trust Putting Water into Waterways Water Resources Strategy 2015-2020.
- Other major planned infrastructure schemes.

The assessment has used all publicly available information. It should also be noted that the water companies are at different stages of updating their WRMPs and DPs and therefore further updates may be required to the HRA in-combination assessment at the time of application for any of the drought permits.

3 HRA Screening of Drought Options

3.1 Potential Likely Significant Effects of Drought Options

The HRA of the final DP 2022 screened all of the drought options in each of Thames Water's WRZs. A total of 44 options (5 demand side, 9 supply side, and 30 supply side drought permit/order options) were screened, with 28 of these options identified as being within 10 km of a Habitats site or where a source receptor pathway beyond 10 km could occur. This provided an indication of the schemes that may be likely to have a significant effect on a Habitats site(s). The HRA screening matrix for this assessment is presented in **Tables 3.1 -–3.3**. Where source receptor pathways from the drought options to Habitats sites have not been identified, drought options have been excluded from the screening matrix presented in **Tables 3.1 – 3.3**. This totals 16 options include the following: Sundridge 1 and 2, Crayford, Horton Kirby, Eynsford, Increase in M2 annual licence, Bibury, Ogbourne emergency boreholes, Oxford Canal – Banbury, Ogbourne, Wansunt, Waddon, Pangbourne, Playhatch, Albury and Thames Gateway Water Treatment Works. As described in **Section 2**, an assessment of potential impacts on Habitats sites in proximity to the drought permit/order sites that were included in previous DPs was undertaken in consultation with Natural England.

In extremis supply side options, also referred to as 'more before level 4' actions, may be considered during a drought to mitigate the need for Level 4 measures such as rota-cuts in an emergency situation. Thames Water is currently completing further consideration of such options to provide supply benefits to reduce the risk of reaching Level 4. At present these options are not well defined and therefore, it is not possible to undertake an HRA assessment. Further work to define the feasibility and scope of these options is ongoing.

These screening assessments identified and agreed those Habitats sites that may be impacted during drought permit/order implementation, and this information was used to inform the HRA in 2013 and the HRA for the final DP 2017 and final DP 2022. Effects in-combination with other drought options within Thames Water's final DP 2022 were assessed in the screening process and are documented in the matrix.

The tables show that the majority of the drought options within Thames Water's final DP 2022 are not considered likely to have significant adverse effects on the qualifying features of Habitats sites. The exception to this is the West Berkshire Groundwater Scheme (WBGWS). The WBGWS is not a drought permit option but a well-established strategic scheme for the London WRZ owned by the Environment Agency. It is operated in accordance with an Environment Agency/Thames Water operating agreement and its use is triggered when London reservoir storage reaches the Level 2 on the Lower Thames Control Diagram.

Table 3.1 Screening of Demand Side Drought Options for Likely Significant Effects on Habitats sites.

Option	Likely Significant Effect and Potential for Alteration of Measure to Avoid Effects?	Further HRA Assessment Required?
Media /water efficiency campaign	None – media/water efficiency campaign includes increased water efficiency messages via increased customer communications. No impacts on Habitats sites are anticipated, other than to acknowledge that decreased consumer demand will have a net positive effect in-combination with existing abstraction and/or drought option sites that have the potential to impact Habitats sites due to reduced pressure on water resources and reduced abstraction at source.	No
Leakage reduction	None – it is envisaged that leakage detection and repair schemes will largely be undertaken primarily in urban areas. No impacts on Habitats sites are anticipated, other than to acknowledge that decreased consumer demand will have a net positive effect in-combination with existing abstraction and/or drought option sites that have the potential to impact Habitats sites due to reduced pressure on water resources and reduced abstraction at source.	No
Temporary use ban	None – a hose pipe ban, or any restrictions on consumer water use are demand management measures and as such, are not anticipated to have impacts on Habitats sites. It is acknowledged that decreased consumer demand will have a net positive effect in-combination with existing abstraction and/or drought option sites that have the potential to impact Habitats sites, due to reduced pressure on water resources and reduced abstraction at source.	No
Drought Order to ban Non-Essential Use	None – a non-essential use ban and its components are demand management measures and as such are not anticipated to have impacts on Habitats sites. It is acknowledged that decreased consumer demand will have a net positive effect in-combination with existing abstraction and/or drought option sites that have the potential to impact Habitats sites due to reduced pressure on water resources and reduced abstraction at source.	No
Emergency Drought Order	None – an emergency drought order includes extreme demand management measures and as such are not anticipated to have impacts on Habitats sites. It is acknowledged that decreased consumer demand will have a net positive effect in-combination with existing abstraction and/or drought option sites that have the potential to impact Habitats sites due to reduced pressure on water resources and reduced abstraction at source.	No

Table 3.2 Screening of Supply Side Drought Options for Likely Significant Effects on Habitats sites.

Option	Habitats site[27]	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on Habitats site(s) alone?	Effect in-combination with existing consents?	*Effect in-combination with other drought options?*
North London Artificial Recharge Scheme (NLARS)	Epping Forest SAC (0.3km from the nearest borehole)	<u>Construction</u> There is no construction phase associated with this drought option. <u>Operation</u> Both Northern Atlantic wet heaths with *Erica tetralix* and European dry heaths are water dependent qualifying features however, only Northern Atlantic wet heaths are groundwater dependent and sensitive to significant changes to water levels. NLARS boreholes abstract from a chalk-basal sands aquifer which is confined by clay-rich parts of the Lambeth Group and London Clay[28]. The top of the chalk is approximately 30 – 60m below surface level. Due to the depth and confined nature of the chalk aquifer, no impact pathway to Northern Atlantic wet heaths and associated water supply has been identified. Therefore, no LSEs are anticipated on Epping Forest SAC as a result of NLARS implementation.	No	No	*No*
	Lee Valley SPA and Ramsar (2 boreholes within the boundaries of the SPA and Ramsar site)	<u>Construction</u> There is no construction phase associated with this drought option. <u>Operation</u> Gadwall, northern shoveler, great bittern (qualifying feature of the SPA only), water milfoil and water boatman are all water dependent qualifying features. There are two boreholes located within the boundaries of the SPA and Ramsar site: Warwick reservoir west (23) and Forest road (40). Therefore, potential impact pathways have been identified if waterbodies associated with the Lee Valley SPA and Ramsar site are hydrologically connected to the groundwater within the chalk aquifer and are within the anticipated drawdown extent. NLARS boreholes abstract from a chalk-basal sands aquifer which is confined by clay-rich parts of the Lambeth Group and London Clay[29]. The top of the chalk is approximately 30 – 60m below surface level. Due to the depth and confined nature of the chalk aquifer, no impact pathways have been identified on qualifying habitats and species of the Lee Valley SPA and Ramsar site. In addition, the scheme is currently licensed and the licences would not be changed as part of drought plan implementation (i.e. operation of these options will be within existing licence limits with regards to timing and volumes).	No	No	*No*

[27] The distances given are to the nearest element of each scheme.
[28] Thames Water Utilities Ltd (2012). North London Artificial Recharge Scheme Licence Application. Environmental Report. 1 – 24.
[29] Thames Water Utilities Ltd (2012). North London Artificial Recharge Scheme Licence Application. Environmental Report. 1 – 24.

Option	Habitats site[27]	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on Habitats site(s) alone?	Effect in-combination with existing consents?	*Effect in-combination with other drought options?*
		Therefore, no LSEs are anticipated on the Lee Valley SPA and Ramsar site as a result of NLARS implementation.			
	Wormley-Hoddesdon Park Woods SAC (3.5km)	<u>Construction</u> There is no construction phase associated with this drought option. <u>Operation</u> No LSEs are anticipated from NLARS alone as the qualifying feature of the SAC is not water dependent (Sub-Atlantic and medio-European oak or oak-hornbeam forests).	No	No	*No*
Chingford Artificial Recharge Scheme (CHARS)	Epping Forest SAC (0.3km from the nearest borehole)	<u>Construction</u> There is no construction phase associated with this drought option. <u>Operations</u> Both Northern Atlantic wet heaths with *Erica tetralix* and European dry heaths are water dependent qualifying features however, only Northern Atlantic wet heaths are groundwater dependent and sensitive to significant changes to water levels. CHARS boreholes abstract from a chalk-basal sands aquifer which is confined by clay-rich parts of the Lambeth Group and London Clay[30]. The top of the chalk is approximately 30 – 60m below surface level. Due to the depth and confined nature of the chalk aquifer, no impact pathway to Northern Atlantic wet heaths and associated water supply has been identified. Therefore, no LSEs are anticipated on Epping Forest SAC as a result of CHARS implementation.	No	No	*No*
	Lee Valley SPA and Ramsar (1.9km from the nearest borehole)	<u>Construction</u> There is no construction phase associated with this drought option. <u>Operation</u> Gadwall, northern shoveler, great bittern (qualifying feature of the SPA only), water milfoil and water boatman are all water dependent qualifying features. Potential impact pathways from CHARS during operation have been identified if waterbodies associated with the Lee Valley SPA and Ramsar site are hydrologically connected to the groundwater within the chalk aquifer and are within the anticipated drawdown extent.	No	No	*No*

[30] Thames Water Utilities Ltd (2012). North London Artificial Recharge Scheme Licence Application. Environmental Report. 1 – 24.

Option	Habitats site[27]	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on Habitats site(s) alone?	Effect in-combination with existing consents?	*Effect in-combination with other drought options?*
		CHARS boreholes abstract from a chalk-basal sands aquifer which is confined by clay-rich parts of the Lambeth Group and London Clay[31]. The top of the chalk is approximately 30 – 60m below surface level. Due to the depth and confined nature of the chalk aquifer, no impact pathways have been identified on qualifying habitats and species of the Lee Valley SPA and Ramsar site. In addition, the operation of this drought option would be in accordance with the existing abstraction licence. Therefore, no LSEs are anticipated on the Lee Valley SPA and Ramsar site as a result of CHARS implementation.			
Reduction in lowest residual flow on the LTCD from 300Ml/d to 200Ml/d	South West London Waterbodies SPA and Ramsar (operationally direct link)	<u>Construction</u> There is no construction phase associated with this drought option. <u>Operation</u> Both gadwall and northern shoveler are water dependent qualifying species of the South West London Waterbodies SPA and Ramsar site. The drought option would allow greater abstraction from the River Thames via the Lower Thames intakes, resulting in a reduction of the rate of drawdown in the Thames Valley storage reservoir system (including those reservoirs designated as part of the SPA and Ramsar). The abstraction point is approximately 4.8 km east at the closest point from the Habitats site. As the abstraction location is downstream of South West London Waterbodies SPA and Ramsar site, a reduction in flow within the River Thames will not impact on water levels within the Habitats site upstream. In addition, as water levels will remain the same in the Lower Thames during abstraction (aided by the presence of weirs), no impacts are anticipated on groundwater supply to waterbodies associated with the SPA and Ramsar sites. Alternatively, the reduction on the rate of drawdown in the Thames Valley storage reservoir may contribute to maintaining water levels in South West London Reservoirs over the winter, which could have a minor benefit on the overwintering bird population. However this is unlikely to be significant and has not been considered further. Potentially shorter duration of drawdown, or a less extensive drawdown than might have occurred without the drought option in the summer months is unlikely to significantly affect the sites' qualifying features.	No	No	*No*

[31] Thames Water Utilities Ltd (2012). North London Artificial Recharge Scheme Licence Application. Environmental Report. 1 – 24.

Option	Habitats site[27]	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on Habitats site(s) alone?	Effect in-combination with existing consents?	*Effect in-combination with other drought options?*
		The operation of this drought option will also be within existing licensing limits with regards to timings and volumes. Therefore, no LSEs are anticipated during operation of the reduction in lowest residual flow on the LTCD drought option alone on the Southwest London Waterbodies SPA and Ramsar.			
	Richmond Park SAC (3.6km from abstraction point)	<u>Construction</u> There is no construction phase associated with this drought option. <u>Operation</u> Stag beetles are not water dependent, therefore, LSEs during operation of this option are not anticipated.	No	No	*No*
	Wimbledon Common SAC (5.5km from abstraction point)	<u>Construction</u> There is no construction phase associated with this drought option. <u>Operation</u> Northern Atlantic wet heaths with *Erica tetralix* and European dry heaths are water dependent. However, the Habitats site is approximately 3.3km from the River Thames at its closest point and is located upstream of potentially impacted reaches. Therefore, no LSEs from the operation of this option are anticipated alone.	No	No	*No*
Earlier reduction in residual flow on the LTCD	South West London Waterbodies SPA, Ramsar (operationally direct link)	<u>Construction</u> There is no construction phase associated with this drought option. <u>Operation</u> Both gadwall and northern shoveler are water dependent qualifying species of the South West London Waterbodies SPA and Ramsar site. The drought option would allow greater flexibility in abstraction capability from the River Thames via the Lower Thames intakes, resulting in reduction of the rate of drawdown in the Thames Valley storage reservoir system (including those reservoirs designated as part of the SPA). The abstraction point is approximately 1.9 km north-west at the closest point from the Habitats site and Wraysbury No. 1 gravel pit is 0.2 km from the River Thames. Note that the Wraysbury Reservoir SSSI is in favourable condition. There is a potential impact pathway as the abstraction point is upstream of the Habitats sites and therefore, if water levels were reduced in the River Thames, this could impact on water supply within associated waterbodies if hydrologically connected via surface or groundwater. However, as the abstraction will not impact on water levels in the River Thames and only flow and velocity, no impact pathway has been identified.	No	No	*No*

Option	Habitats site[27]	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on Habitats site(s) alone?	Effect in-combination with existing consents?	*Effect in-combination with other drought options?*
		In addition, the reduction on the rate of drawdown is anticipated to contribute to maintaining water levels in South West London Reservoirs over the winter which will benefit overwintering birds. Potentially shorter duration of drawdown, or a less extensive drawdown than might have occurred without the drought option in the summer months is unlikely to significantly affect the sites' qualifying features. The operation of this drought option will also be within existing licensing limits with regards to timings and volumes. Therefore, no LSEs are anticipated from the operation of the earlier reduction in residual flow on the LTCD drought option alone on the Southwest London Waterbodies SPA and Ramsar.			
	Windsor Forest and Great Park SAC (1km from the River Thames)	Construction There is no construction phase associated with this drought option. Operation The qualifying features of the SAC which include old acidophilous oak woods, Atlantic acidophilous beech forests and violet click beetle are not water dependant and therefore, LSEs during operation of the option alone are not anticipated.	No	No	*No*
	Burnham Beeches SAC (approximately 8.5km from abstraction point)	Construction There is no construction phase associated with this drought option. Operation Atlantic acidophilous beech forests with Ilex are not classified as water dependent and therefore, no LSEs during the operation of the drought option alone are anticipated.	No	No	*No*
East London Resource Development (ELRED)	Epping Forest SAC (3.3km)	Construction There is no construction phase associated with this drought option. Operation Both Northern Atlantic wet heaths with *Erica tetralix* and European dry heaths are water dependent qualifying features however, only Northern Atlantic wet heaths are groundwater dependent and sensitive to significant changes in water levels.	No	No	*No*

Option	Habitats site[27]	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on Habitats site(s) alone?	Effect in-combination with existing consents?	*Effect in-combination with other drought options?*
		ELRED boreholes abstract from a chalk-basal sands aquifer which is confined by clay-rich parts of the Lambeth Group and London Clay[32]. The top of the chalk is approximately 30 – 60m below surface level. Due to the depth and confined nature of the chalk aquifer, no impact pathways have been identified on qualifying habitats and species of the Epping Forest SAC. Therefore, no LSEs on Epping Forest SAC as a result of ELRED implementation have been identified.			
	Lee Valley SPA and Ramsar (5.1km from the nearest borehole)	<u>Construction</u> There is no construction phase associated with this drought option. <u>Operation</u> Gadwall, northern shoveler, great bittern (qualifying feature of the SPA only), water milfoil and water boatman are all water dependent qualifying features. ELRED boreholes abstract from a chalk-basal sands aquifer which is confined by clay-rich parts of the Lambeth Group and London Clay[32]. The top of the chalk is approximately 30 – 60m below surface level. Due to the depth and confined nature of the chalk aquifer, no impact pathways have been identified on qualifying habitats and species of the Lee Valley SPA and Ramsar site. The operation of this drought option would also be in accordance with the existing abstraction licence. The licence requires monitoring of groundwater quality to inform any risk of saline intrusion. No saline intrusion has been identified during operation of the abstraction. Therefore, no LSEs are anticipated from the operation of the ELRED drought option alone on the Lee Valley SPA and Ramsar site.	No	No	*No*
Stratford Box	Epping Forest SAC (3.5km)	<u>Construction</u> There is no construction phase associated with this drought option. <u>Operation</u> Both Northern Atlantic wet heaths with *Erica tetralix* and European dry heaths are water dependent qualifying features however, only Northern Atlantic wet heaths are groundwater dependent and sensitive to inappropriate water levels. Therefore, there is a potential impact pathway to wet heaths if Epping Forest SAC is hydrologically connected the chalk aquifer abstracted from. Based on	No	No	*No*

[32] Thames Water Utilities Ltd (2012). North London Artificial Recharge Scheme Licence Application. Environmental Report. 1 – 24.

Option	Habitats site[27]	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on Habitats site(s) alone?	Effect in-combination with existing consents?	*Effect in-combination with other drought options?*
		condition assessments of the underpinning Epping Forest SSSI, 8 out of 9 units that include heathland are in unfavourable condition, as a result of a lack of land management (bracken and bramble invasion, grazing recommended) and exposure to air pollution. The unfavourable condition of units within the Epping Forest SSSI have not been caused by changes in hydrological regime within the Habitats site. Stratford Box boreholes abstract from a chalk-basal sands aquifer which is confined by clay-rich parts of the Lambeth Group and London Clay[33]. The top of the chalk is approximately 30 – 60m below surface level. Due to the depth and confined nature of the chalk aquifer, no impact pathways have been identified on qualifying habitats and species of the Epping Forest SAC. Therefore, no LSEs from the operation of Stratford Box on wet heaths present within the boundaries of Epping Forest SAC alone are anticipated.			
	Lee Valley SPA and Ramsar (4.8km)	<u>Construction</u> There is no construction phase associated with this drought option. <u>Operational</u> Gadwall, northern shoveler, great bittern (qualifying feature of the SPA only), water milfoil and water boatman are all water dependent qualifying features. Stratford Box boreholes abstract from a chalk-basal sands aquifer which is confined by clay-rich parts of the Lambeth Group and London Clay[34]. The top of the chalk is approximately 30 – 60m below surface level. Due to the depth and confined nature of the chalk aquifer, no impact pathways have been identified on qualifying habitats and species of the Lee Valley SPA and Ramsar site. The operation of this drought option would also be in accordance with the existing abstraction licence. Therefore, no LSEs are anticipated from the operation of the Stratford Box drought option alone on the Lee Valley SPA and Ramsar site.	No	No	*No*
Old Ford	Epping Forest SAC (4.8km)	<u>Construction</u> There is no construction phase associated with this drought option. <u>Operation</u>	No	No	*No*

[33] Thames Water Utilities Ltd (2012). North London Artificial Recharge Scheme Licence Application. Environmental Report. 1 – 24.
[34] Thames Water Utilities Ltd (2012). North London Artificial Recharge Scheme Licence Application. Environmental Report. 1 – 24.

Option	Habitats site[27]	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on Habitats site(s) alone?	Effect in-combination with existing consents?	*Effect in-combination with other drought options?*
		Both Northern Atlantic wet heaths with *Erica tetralix* and European dry heaths are water dependent qualifying features however, only Northern Atlantic wet heaths are groundwater dependent and sensitive to inappropriate water levels. Therefore, there is a potential impact pathway if the wet heaths are hydrologically connected to the chalk aquifer. Based on condition assessments of the underpinning Epping Forest SSSI, 8 out of 9 units that include heathland are in unfavourable condition, as a result of a lack of land management (bracken and bramble invasion, grazing recommended) and exposure to air pollution. The unfavourable condition of units within the Epping Forest SSSI have not been caused by changes in hydrological regime within the Habitats site. Old Ford boreholes abstract from a chalk-basal sands aquifer which is confined by clay-rich parts of the Lambeth Group and London Clay[35]. The top of the chalk is approximately 30 – 60m below surface level. Due to the depth and confined nature of the chalk aquifer, no impact pathways have been identified on qualifying habitats and species of the Epping Forest SAC. Therefore, no LSEs from the operation of Old Ford on wet heaths present within the boundaries of Epping Forest SAC alone are anticipated.			
	Lee Valley SPA and Ramsar (4.7km)	<u>Construction</u> There is no construction phase associated with this drought option. <u>Operation</u> Gadwall, northern shoveler, great bittern (qualifying feature of the SPA only), water milfoil and water boatman are all water dependent qualifying features. Old Ford boreholes abstract from a chalk-basal sands aquifer which is confined by clay-rich parts of the Lambeth Group and London Clay[36]. The top of the chalk is approximately 30 – 60m below surface level. Due to the depth and confined nature of the chalk aquifer, no impact pathways have been identified on qualifying habitats and species of the Lee Valley SPA and Ramsar site. The operation of this drought option would also be in accordance with the existing abstraction licence. Therefore, no LSEs are anticipated from the operation of the Old Ford drought option alone on the Lee Valley SPA and Ramsar.	No	No	*No*

[35] Thames Water Utilities Ltd (2012). North London Artificial Recharge Scheme Licence Application. Environmental Report. 1 – 24.
[36] Thames Water Utilities Ltd (2012). North London Artificial Recharge Scheme Licence Application. Environmental Report. 1 – 24.

Option	Habitats site[27]	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on Habitats site(s) alone?	Effect in-combination with existing consents?	*Effect in-combination with other drought options?*
West Berkshire Groundwater Scheme (WBGWS)	River Lambourn SAC (discharge locations within the boundaries of the SAC)	<u>Construction</u> Minor pipeline connections/ repairs may be required. However, no LSEs from minor construction works are anticipated. <u>Operation</u> Severn boreholes associated with the WBGWS are located within the boundaries of the River Lambourn SAC, which abstract groundwater from unconfined chalk catchments of the Lambourn. All of the qualifying features of the River Lambourn SAC are water dependent and include water courses of plain to montane levels with *Ranunculus fluitantis,* brook lamprey *Lampetra planeri* and bullhead *Cottus gobio*. Therefore, potential impact pathways to qualifying features of the SAC include a reduction in water flow during operation, causing a deviation from 'naturalised' flow which could cause increased siltation, a reduction in wetted width of the channel and alterations to the biotope mosaic of the river. The underpinning SSSI is in unfavourable – recovering condition due to heavy modification of the watercourse and lack of bankside vegetation. However, flows are considered acceptable and characteristic of the river type (assessment conducted in 2019). Siltation and hydrological changes have been listed as pressures/ threats currently impacting on the condition of the River Lambourn SAC. Therefore, LSEs cannot be ruled out at this stage during the operation of WBGWS and an Stage 2 Appropriate Assessment is required. The conclusions of the Stage 2 Appropriate Assessment are in **Section 5.3** of this report.	Yes	No	*No*
	Kennet and Lambourn Floodplain SAC (1.7km from closest borehole)	<u>Construction</u> Minor pipeline connections may be required as part of the construction phase of this drought option. However, no LSEs from minor construction works are anticipated. <u>Operation</u> Desmoulin's whorl snail is a water dependent qualifying feature of the Kennet and Lambourn Floodplain SAC. It is restricted to calcareous wetlands surrounding lakes, rivers or fens. The snail resides in habitats with high humidity and therefore, maintenance of the local hydrological regime is vitally important for sustaining the population. Potential impact pathways have been identified, particularly in areas of the SAC located adjacent to the River Lambourn due to the potential reduction in flow as a result of this drought option. This could reduce the wetted width of the channel, therefore, impacting on the availability of suitable habitats to support Desmoulin's whorl snail. During previous assessments, the potential LSEs on Thatcham Reedbeds SSSI which is an underpinning SSSI of the Kennet and Lambourn Floodplain SSSI has been identified, which is largely in unfavourable – recovering condition; including unit 1 which is adjacent to the River Lambourn. In addition, Hunt's green which is lowland neutral grassland (unit 5 of the Kennet and Lambourn	Yes	No (Subject to modified operating agreement)	*No* (Subject to modified operating agreement)

Option	Habitats site[27]	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on Habitats site(s) alone?	Effect in-combination with existing consents?	*Effect in-combination with other drought options?*
		Floodplain SSSI which is currently in unfavourable – declining condition) and marshy grassland associated with unit 1 and 2 of Boxford Water Meadows SSSI (unit 1 is in favourable condition and unit 2 is in unfavourable – recovering condition) could be effected. Hydrological changes have been identified as a key threat to Desmoulin's whorl snail. Therefore, LSEs cannot be ruled out at this stage on the Kennet and Lambourn Floodplain SAC during operation of WBGWS and an Stage 2 Appropriate Assessment is required. The conclusions of the Stage 2 Appropriate Assessment are in **Section 5.3** of this report.			
	Hackpen Hill SAC (1.2 km from closest borehole)	<u>Construction</u> Minor pipeline connections may be required as part of the construction phase of this drought option. However, no LSEs from minor construction works are anticipated as sufficiently distanced from the Habitats site. <u>Operation</u> No water dependent qualifying features associated with Hackpen Hill SAC and therefore, no LSEs during operation are anticipated.	No	No	*No*

Table 3.3 Screening of Supply Side Drought Permit/Order Options for Likely Significant Effects on Habitats sites.

Option	Habitats site[37]	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on Habitats site(s) alone?	Effect in-combination with existing consents?	*Effect in-combination with other drought options?*
London Water Resource Zone					
Lower Thames	South West London Waterbodies SPA, Ramsar (operationally direct link)	<u>Construction</u> The Lower Thames Drought Permit would involve some construction works associated with the back-pumping element of the scheme (temporary pipework to pump water over weirs with associated generators). The location of the backpumping element of the scheme would approximately 3 km distance from the SAC/Ramsar. There will be no loss of qualifying habitat due to the scheme as the construction footprint does not impinge on any Habitats sites. Transport of materials and equipment during construction on site will require minimal general construction traffic. Transport will utilise the existing road network or the River Thames; the temporary increase in vehicle numbers required for the construction of the scheme is considered to be negligible. Therefore, no LSEs anticipated during construction. <u>Operation</u> Both gadwall and northern shoveler are water dependent qualifying species of the South West London Waterbodies SPA and Ramsar site. The drought option would allow greater abstraction from the River Thames via the Lower Thames intakes, resulting in a reduction of the rate of drawdown in the Thames Valley storage reservoir system (including those reservoirs designated as part of the SPA and Ramsar). The abstraction point is approximately 4.8 km east at the closest point from the Habitats site. As the abstraction location is downstream of South West London Waterbodies SPA and Ramsar site, a reduction in flow within the River Thames will not impact on water levels within the Habitats site upstream. In addition, as water levels will remain the same in the Lower Thames during abstraction, no effects are anticipated on groundwater supply to waterbodies associated with the SPA and Ramsar sites. Alternatively, this option has the potential for minor beneficial effects on the SPA and Ramsar by reducing the rate of reservoir drawdown than would be experienced without the option. However, this relationship has not be assessed further in the screening. The operation of this drought option will also be within existing licensing limits with regards to timings and volumes.	No	No	*No*

[37] The distances given are to the nearest element of each scheme.

Option	Habitats site[37]	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on Habitats site(s) alone?	Effect in-combination with existing consents?	*Effect in-combination with other drought options?*
		Therefore, no LSEs are anticipated from the operation of the Lower Thames drought option alone on the South West London Waterbodies SPA, Ramsar.			
	Richmond Park SAC (1.8km from abstraction point)	<u>Construction</u> The Lower Thames Drought Permit would involve some construction works associated with the back-pumping element of the scheme. This will not require landtake from within SAC boundaries. Backpumping would be required over Molesey weir (4.4km from the SAC) and possibly Teddington weir (2km from the SAC). It would require installation of barges with fish friendly pumps and temporary pipework to get water over the weirs. There would also be a requirement to install a temporary power source to service the pumps. This could be done with mobile temporary generators and would require installation at agreed appropriate locations. The river reach between Molesey weir and Teddington weir is 1.2km from the SAC at its closest point. Considering the distances involved, no LSEs are not anticipated during construction. <u>Operation</u> The stage beetle is not water dependent and therefore, no LSEs from the drought option alone during operation are anticipated on Richmond Park SAC.	No	No	*No*
Swindon Oxford Water Resource Zone					
Baunton 1	North Meadow and Clattinger Farm SAC (12km)	<u>Construction</u> There is no construction phase associated with this drought option. <u>Operation</u> Lowland hay meadows are classified as groundwater dependent habitats, therefore, there is a potential impact pathway due to a reduction in groundwater level during operation. However, the borehole is located on a highly productive, great oolite group aquifer and the SAC is located on clays that confine the underlying aquifer. Therefore, no hydrological connectivity has been identified between the Habitats site and Baunton 1. No LSEs are anticipated from the operation of the Baunton 1 drought option alone on the North Meadow and Clattinger Farm SAC.	No	No	*No*
Baunton 2	North Meadow & Clattinger Farm SAC (12km)	<u>Construction</u> There is no construction phase associated with this drought option. <u>Operation</u>	No	No	*No*

Option	Habitats site[37]	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on Habitats site(s) alone?	Effect in-combination with existing consents?	*Effect in-combination with other drought options?*
		Lowland hay meadows are classified as groundwater dependent habitats, therefore there is a potential impact pathway due to a reduction in groundwater level during operation. However, the borehole is located on a highly productive, great oolite group aquifer and the SAC is located on clays that confine the underlying aquifer. Therefore, no hydrological connectivity has been identified between the Habitats site and Baunton 2. No LSEs are anticipated from the operation of the Baunton 2 drought option alone on the North Meadow and Clattinger Farm SAC.			
Latton	North Meadow & Clattinger Farm SAC (2km)	<u>Construction</u> There is no construction phase associated with this drought option. <u>Operation</u> Lowland hay meadows are classified as groundwater dependent habitats, therefore there is a potential impact pathway due to a reduction in groundwater level during operation. Both the borehole and the Habitats site are located on rocks with essentially no groundwater due to clay confining the underlying aquifer. The bedrock at Latton and the Habitats site consists of mudstone and therefore, has limited permeability. On that basis, no hydrological connectivity between the borehole and lowland hay meadows associated with the SAC is anticipated. It is likely that the water dependent feature is supported via surface water rather than groundwater supply. Therefore, no LSEs are anticipated from the operation of the Latton drought option alone on the North Meadow and Clattinger Farm SAC.	No	No	*No*
Meysey Hampton	North Meadow & Clattinger Farm SAC (4.3km)	<u>Construction</u> There is no construction phase associated with this drought option. <u>Operation</u> The scheme involves the increased abstraction from existing boreholes. Lowland hay meadows are classified as groundwater dependent habitats, therefore, there is a potential impact pathway due to a reduction in groundwater level during operation. Both the borehole and the Habitats site are located on rocks with essentially no groundwater due to clay confining the underlying aquifer. On that basis, no hydrological connectivity between the borehole and lowland hay meadows associated with the SAC is anticipated. It is likely that the water dependent feature is supported via surface water rather than groundwater supply. In addition, if borehole abstraction impacted on water levels in the River Thames, the SAC is located upstream of potentially impacted reaches.	No	No	*No*

Option	Habitats site[37]	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on Habitats site(s) alone?	Effect in-combination with existing consents?	*Effect in-combination with other drought options?*
		No LSEs are anticipated from the operation of the Meysey Hampton drought option alone on the North Meadow and Clattinger Farm SAC.			
Farmoor	Oxford Meadows SAC (5.3km)	<u>Construction</u> Minor construction works may be required to bring the option online as a drought source. Works will include temporary electric submersible pumps powered from the existing permanent Environment Agency electricity supply kiosks, adjacent to the locks. Two pumps would be required at each of the four locks (Iffley, Osney, Godstow and King's Weir). There will be no loss of qualifying habitat due to the scheme as the construction footprint does not impinge on any Habitats sites and given the distance between Oxford Meadows SAC and the four locks (Iffley, Osney, Godstow and King's Weir) (>5km); impacts from noise or dust are unlikely. Transport of materials and equipment during construction on site will require minimal general construction traffic. Transport will utilise the existing road network. The temporary increase in vehicle numbers required for the construction of the scheme is considered to be negligible. Therefore, no LSEs from the construction phase are anticipated on the qualifying features of Oxford Meadows SAC. <u>Operation</u> Both lowland hay meadows and creeping marshwort *Apium repens* are water dependent qualifying features of Oxford Meadows SAC. A hydrological assessment for the scheme has identified that the River Thames will be subject to reductions in velocity, whilst the tributaries (including the Oxford watercourses) will be subject to a reduction in velocity and water level, due to lower flows. The lowland meadows are reliant on winter flooding. Although many parts of the site are not considered to be significantly hydrologically linked with the River Thames – water levels are primarily linked to groundwater levels. The proposed scheme will impact low flows between ~ May and December, and not flood flows overwinter. Therefore, no LSEs are anticipated from the operation of the Farmoor drought option alone on the Oxford Meadows SAC.	No	No	*No*
	Little Wittenham SAC (>10km however, adjacent to potentially impacted	<u>Construction</u> Minor construction works may be required to bring the option online as a drought source. However, the location of the construction work would be >10km distance from the SAC. Therefore, no LSEs on the qualifying features of Little Wittenham SAC are anticipated during construction. <u>Operation</u> Great crested newts are water dependent qualifying features of Little Wittenham SAC. The site is currently in favourable condition and hydrological changes has not been identified as a threat or	No	No	*No*

Option	Habitats site[37]	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on Habitats site(s) alone?	Effect in-combination with existing consents?	*Effect in-combination with other drought options?*
	reach of River Thames)	pressure that could prevent Little Wittenham SAC achieving favourable conservation status. The 2022 Farmoor EAR identified that the Little Wittenham SAC is not likely to be fed by the River Thames, with springs and other surface sources almost certainly feeding into the site, thus the drought permit is not considered likely to impact on the permanence of the ponds within the SAC. No LSEs are anticipated from the operation of the Farmoor drought option alone on the Little Wittenham SAC.			
	Hartslock Wood SAC (>10km however, adjacent to potentially impacted reach of River Thames)	<u>Construction</u> Minor construction works may be required to bring the option online as a drought source. However, the location of the construction work would be >10km distance from the SAC. Therefore, no LSEs are anticipated on the qualifying features of Hartslock Wood SAC during construction. <u>Operation</u> Qualifying features of the SAC are not water dependent and therefore, no LSEs have been identified from the Farmoor drought option alone during operation.	No	No	*No*
	Cothill Fen SAC (6km)	<u>Construction</u> Minor construction works may be required to bring the option online as a drought source. Works will include temporary electric submersible pumps powered from the existing permanent Environment Agency electricity supply kiosks, adjacent to the locks. Two pumps would be required at each of the four locks (Iffley, Osney, Godstow and King's Weir). There will be no loss of qualifying habitat due to the scheme as the construction footprint does not impinge on any Habitatssites and given the distance between Cothill Fen SAC and the four locks (Iffley, Osney, Godstow and King's Weir) (>5km); impacts from noise or dust are unlikely. Transport of materials and equipment during construction on site will require minimal general construction traffic. Transport will utilise the existing road network. The temporary increase in vehicle numbers required for the construction of the scheme is considered to be negligible. Therefore, no LSEs during the construction phase of this scheme are anticipatedon the qualifying features of any Habitats sites. <u>Operation</u> The 2022 Farmoor EAR confirms that Cothill Fen SAC is not within the zone of influence of the scheme (i.e. the area over which the scheme could affect groundwater and surface water).	No	No	*No*

Option	Habitats site[37]	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on Habitats site(s) alone?	Effect in-combination with existing consents?	*Effect in-combination with other drought options?*
		Therefore, no LSEs are anticipated from the operation of the Farmoor drought option on the Cothill Fen SAC alone..			
Axford 1	Kennet and Lambourn Floodplain SAC (6.5km)	Construction There is no construction phase associated with this drought option. Operation The drought option involves additional abstraction from existing boreholes. The 2022 Axford 1 EAR confirms that the Kennet and Lambourn Floodplain SAC is not within the zone of influence of the scheme (i.e. the area over which the scheme will influence groundwater or surface water). Therefore, no LSEs of the Axford 1 drought option alone during operation are anticipated on the Kennet and Lambourn Floodplain SAC.	No	No	*No*
Axford 2	Kennet and Lambourn Floodplain SAC (6.5km)	Construction There is no construction phase associated with this drought option. Operation The drought option involves additional abstraction from existing boreholes. The Axford 2 EAR indicated potential impact on surface water flows within the SAC. It is noted that flows are augmented to the Thatcham Reedbeds[38] via a sluice to allow a small offtake from the River Kennet into the Kennet and Lambourn Floodplain SAC. The implementation of this Drought Option will not impact on the augmented flows. No LSEs are anticipated from the operation of the Axford 2 drought option alone on the Lambourn Floodplain SAC.	No	No	*No*
Gatehampton	Hartslock Wood SAC (0.4km)	Construction There is no construction phase associated with this drought option. Operation None of the qualifying features of Hartslock Wood SAC are classed as water dependent. Therefore, no LSEs are anticipated from the operation of the Gatehampton drought option alone on the Hartslock Wood SAC.	No	No	*No*

[38] Environment Agency (2008) Kennet and Lambourn Floodplain SAC – Habitats Directive Stage 4, Appendix 19 and Site Action Plan.

Option	Habitats site[37]	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on Habitats site(s) alone?	Effect in-combination with existing consents?	*Effect in-combination with other drought options?*
Childrey Warren	River Lambourn SAC (6.5km)	Construction There is no construction phase associated with this drought option. Operation The option will involve the abstraction of water from the Vale of White Horse chalk aquifer. The River Lambourn SAC is located in a different groundwater body (Berkshire Downs Chalk) and surface water catchment (River Lambourn). Therefore, there is no hydrological connectivity between the scheme and the SAC. Therefore, no LSEs are anticipated from the operation of the Childrey Warren drought option alone on the River Lambourn SAC.	No	No	*No*
	Hackpen Hill SAC (0.6km)	Construction There is no construction phase associated with this drought option. Operation The qualifying features of the site are not water dependent and Hackpen Hill SAC is not located in the zone of influence of the scheme (i.e. the area over which the scheme could affect groundwater and surface water). Therefore, no LSEs are anticipated from the operation of the Childrey Warren drought option alone on the Hackpen Hill SAC.	No	No	*No*
Kennet Valley Water Resource Zone					
Fobney Emergency Boreholes	Hartslock Wood SAC (8.1km)	Construction There is no construction phase associated with this drought option. Operation The 2022 Fobney Emergency Boreholes EAR confirms that Hartslock Wood SAC is not located within the zone of influence of the scheme (i.e. the area over which the scheme could affect groundwater and surface water). In addition, qualifying features of the SAC are not classed as water dependent. Therefore, no LSEs are anticipated from the operation of the Fobney Emergency Boreholes drought option alone on the Hartslock Wood SAC.	No	No	*No*
Fobney Direct		Construction There is no construction phase associated with this drought option.	No	No	*No*

Option	Habitats site[37]	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on Habitats site(s) alone?	Effect in-combination with existing consents?	*Effect in-combination with other drought options?*
	Thames Basin Heaths SPA (9.1km)	<u>Operation</u> The scheme involves the redirection of water allowing more to be abstracted from the River Kennet and less being directed to Holy Brook. As the Habitats site is located upstream of the abstraction point and therefore, not reliant on water supply in Holy Brook, no impact pathway has been identified that could impact on supporting habitat of Dartford warbler, nightjar and woodlark. Therefore, no LSEs are anticipated from the operation of the Fobney Direct drought option alone are anticipated on the Thames Basin Heaths SPA.			
Guildford Water Resource Zone					
Shalford	Thames Basin Heaths SPA (4km)	<u>Construction</u> There is no construction phase associated with this drought option. <u>Operation</u> The 2022 Shalford EAR confirms that Thames Basin Heaths SPA is not located within the zone of influence of the scheme (i.e. the area over which the scheme could impact groundwater and surface water). Therefore, no LSEs are anticipated from the operation of the Shalford drought option alone on the Thames Basin Heaths SPA.	No	No	*No*
	Thursley, Ash, Pirbright and Chobham SAC (8km)	<u>Construction</u> There is no construction phase associated with this drought option. <u>Operation</u> The 2022 Shalford EAR confirms that Thursley, Ash, Pirbright and Chobham SAC is not located within the zone of influence of the scheme (i.e. the area over which the scheme could impact groundwater and surface water). Therefore, no LSEs are anticipated from the operation of the Shalford drought option alone on the Thursley, Ash, Pirbright and Chobham SAC.	No	No	*No*

Option	Habitats site[37]	Potential for effects on qualifying features?	Is scheme likely to have a significant effect on Habitats site(s) alone?	Effect in-combination with existing consents?	*Effect in-combination with other drought options?*
SWA Water Resource Zone					
Pann Mill	Chilterns Beechwoods SAC (4.2km)	Construction There is no construction phase associated with this drought option. Operation The 2022 Pann Mill EAR confirms that Chilterns Beechwoods SAC is not within the zone of influence of the scheme (i.e. the area over which the scheme could affect groundwater and surface water). In addition, no water dependent qualifying features are associated with the SAC. Therefore, no LSEs are anticipated from the operation of the Pann Mill drought option alone on the Chilterns Beechwoods SAC.			
	Burnham Beeches SAC (9.2km)	Construction There is no construction phase associated with this drought option. Operation The 2022 Pann Mill EAR confirms that Burnham Beeches SAC is not located within the zone of influence of the scheme (i.e. the area over which the scheme could affect groundwater and surface water). In addition, no water dependent qualifying features associated with the SAC. Therefore, no LSEs are anticipated from the operation of the Pann Mill drought option alone.	No	No	*No*
Henley Water Resource Zone					
Harpsden / Sheeplands	Chilterns Beechwoods SAC (7.8km)	Construction There is no construction phase associated with this drought option. Operation The 2022 Harpsden / Sheeplands EAR confirms that Chilterns Beechwoods SAC is not within the zone of influence of the scheme (i.e. the area over which the scheme could affect groundwater and surface water). In addition, no water dependent qualifying features are associated with the SAC. Therefore, no LSEs are anticipated from the operation of the Harpsden / Sheeplands drought option alone on the Chilterns Beechwoods SAC.	No	No	*No*

4 HRA Screening Conclusions

The HRA Stage 1 Screening assessment concluded that WBGWS supply side option will be subject to a Stage 2 Appropriate Assessment. This is due uncertainties regarding the potential LSEs of WBGWS on the River Lambourn SAC and the Kennet and Lambourn Floodplain SAC. This assessment will identify if the option can meet the requirements of the integrity test, with the consideration of appropriate mitigation measures.

A summary of qualifying features of the River Lambourn SAC and the Kennet and Lambourn Floodplain SAC being screened in for Stage 2 Appropriate Assessment, due to potential LSEs of the WBGWS is presented below in **Table 4.1.**

Table 4.1 Summary of the outcome of the HRA state 1 screening assessment, indicating which qualifying features of the River Lambourn SAC and the Kennet and Lambourn Floodplain SAC require a stage 2 appropriate assessment, due to potential likely significant effects of the West Berkshire Groundwater Scheme.

Habitats site	Qualifying feature	Likely significant effect?
River Lambourn SAC	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation	Yes
	Brook lamprey	Yes
	Bullhead	Yes
Kennet and Lambourn Floodplain SAC	Desmoulin's whorl snail	Yes

5 Information to Inform Appropriate Assessment

5.1 Introduction

Regulation 63 of the Habitat Regulations states that competent authority (in this case Thames Water), before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which

a) is likely to have a significant effect on a European site or a European offshore marine site (either alone or in combination with other plans or projects), and
b) is not directly connected with or necessary to the management of that site,
c) must make an appropriate assessment of the implications of the plan or project for that site in view of that site's conservation objectives.

Screening has identified potential LSEs as a result of the implementation of the WBGWS on the River Lambourn SAC and the Kennet and Lambourn Floodplain SAC. A Stage 2 HRA (Appropriate Assessment) is, therefore, required.

The Appropriate Assessment of the WBGWS considered the potentially damaging aspects of the operation, and the potential effects on the associated Habitats site's qualifying features and achievement of the conservation objectives.

The potential for adverse effects on the integrity of a Habitats site depends on the scale and magnitude of the action and its predicted impacts, taking into account the distribution of the qualifying features across (*the baseline*) the site in relation to the predicted impact and the location, timing and duration of the proposed activity and the level of understanding of the effect, such as whether it has been recorded before and, based on current ecological knowledge, whether it can be expected to operate at the site in question.

The conclusion of the Appropriate Assessment is known as the integrity test and requires the competent authority to ascertain whether the proposed scheme (either alone or in-combination with other plans or projects), will have no adverse effect on site integrity. The following definition of site integrity is provided by Defra: the integrity of the site is "*the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the level of populations of the species for which it was classified*"[39].

The baseline conditions for the associated Habitats sites are presented in Section 5.2, and the Appropriate Assessment is provided in Section 5.3.

5.2 Baseline

5.2.1 River Lambourn SAC

The River Lambourn SAC is a lowland chalk river, approximately 0.27 km² and located in Berkshire and Marlborough Downs National Character Area[40]. The river is fed by a chalk aquifer of the north Wessex Downs. As the river is dominated by spring flow from the aquifer, flow is dependent on groundwater levels, which will naturally decline during the summer months. The upper reaches of the River Lambourn will dry up during spring flows, which are referred to as 'Winterbourne' reaches. Along the River Lambourn, multiple habitats are supported including reed swamp, tall fen and willow carr[40].

5.2.1.1 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation

Water quantity and the resultant extent of inundation of macrophyte communities, plus the seasonal timing of changes in supply, are key factors influencing the development and stability of *Ranunculion*

[39]Defra Circular 01/2005.
[40] Natural England (2019). European Site Conservation Objectives: Supplementary advice on conserving and restoring site features. River Lambourn Special Area of Conservation (SAC) Site Code: UK0030257. Natura 2000, 1 – 30.

fluitantis and *Callitricho-Batrachion* vegetation[41]. The dynamic nature of riverine environments requires associated species to constantly adapt to fluctuations in flow regime and sediment load, leading to changes in fluvial processes and associated habitats. The optimum flow rate for *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation is between 0.3 and 0.5m/s[42]. High flow rates and flushes associated with increased rainfall in autumn are vitally important for Ranunculaceae species, as it removes excess sediment deposited during the summer, for the growing season. The growth of *Ranunculus penicillatus* subsp. *pseudofluitans* for example, has coincided with maximum flow in chalk streams[41]. In addition, *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation supports a diversity of community assemblages including diatoms, macroinvertebrates and fish. Therefore, deterioration of macrophytes will have a direct impact on associated species and the structure and function of the riverine system.

5.2.1.2 Brook lamprey Lampetra planeri

Brook lampreys are the smallest lamprey species present in Britain, growing to 13-15 cm once mature and are purely a freshwater species[43]. The ammocoete larvae occupy silt beds for up to 7 years and feed by filtering fine organic particles including diatoms and algae from the surrounding waterbody. Once metamorphosis occurs, adult brook lamprey migrate upstream to suitable spawning grounds to spawn when water temperatures reach 10-11°C, usually in March and April. The adult lamprey create oval depressions in spawning grounds consisting of clean stones and gravel present in flowing water to lay approximately 1,500 eggs per female[43]. Brook lamprey require gravel beds for spawning, silt beds for their larval stage, good water quality, low levels of abstraction and an absence of barriers between suitable gravel beds and silt beds to support different life stages[40].

5.2.1.3 Bullhead Cottus gobio

Bullhead is the only freshwater cottid found in the UK. It is a bottom-living fish that inhabits a variety of rivers, streams and stony lakes. It requires good water quality, a stony substrate free from excessive siltation, macrophyte beds and sufficient cover from overhanging vegetation or woody debris[40]. Bullheads spawn from February to June; typically, once for females in upland streams and up to four times in warmer lowland streams[44]. Bullheads are susceptible to changes in oxygen saturation and temperature, with critical thermal limits of -4.2 and 27.7ºC[44].

5.2.1.4 Conservation Objectives

The Conservation Objectives for the River Lambourn SAC are outlined in 'European Site Conservation Objectives for River Lambourn Special area of Conservation Site Code: UK0030257'. They ensure that the integrity of the site is maintained or restored as appropriate, and that the site contributes to achieving the Favourable Conservation Status of its qualifying features, by maintaining or restoring:

- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
- The structure and function (including typical species) of qualifying natural habitats;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely;
- The populations of qualifying species; and
- The distribution of qualifying species within the site.

5.2.1.5 Site Condition

The River Lambourn SAC is legally underpinned by the River Lambourn SSSI. Natural England's SSSI site condition assessment in 2019 recognised that:

[41] Hatton-Ellis T.W and Grieve, N. (2003). Ecology of Watercourses Characterised by Ranunculion fluitantis and Callitricho-Batrachion Vegetation. Conserving Natura 2000 Rivers Ecology Series No. 11. English Nature, Peterborough.
[42] Environment Agency (2004). *Ranunculus* in Chalk rivers: Phase 2. Science Report W1-042/TR.
[43] Maitland, P. S (2003). Ecology of the River, Brook and Sea Lamprey. Conserving Natura 2000 Rivers Ecology Series No. 5. English Nature, Peterborough.
[44] Tomlinson, M. L and Perrow, M. R. (2003). Ecology of the Bullhead. Conserving Natura 2000 Rivers Ecology Series No. 4. English Nature, Peterborough, 1-19.

- 100% of the SSSI is assessed to be in unfavourable – recovering condition.

5.2.2 Kennet and Lambourn Floodplain SAC

The Kennet and Lambourn Floodplain SAC is approximately 1.14 km² and flows through several river valleys including Lambourn and Kennet in the Berkshire and Marlborough Downs. The SAC consists of former water meadows, riverside fens, sedge beds and swamps[45].

5.2.2.1 Desmoulin's whorl snail

Desmoulin's whorl snail is the largest *Vertigo* species, with a shell height of up to approximately 2.6 mm. The distribution of Desmoulin's whorl snail in the UK is mainly confined to the south east of England, stretching from east Dorset to north – west Norfolk[46]. The snail lives on reed grasses and sedges, such as reed sweet-grass (*Glyceria maxima*), and tussocks of greater pond-sedge (*Carex riparia*) and lesser pond-sedge (*C. acutiformis*), where it feeds on the microflora. In autumn, it may ascend taller reeds and scrub[45]. Desmoulin's whorl snail is considered a terrestrial gastropod but is associated with permanently wet habitats, including calcareous swamps, fens and marshes, and riparian margins. It lives on living and dead stems and leaves of tall plants and grazes on fungi, micro-algae and bacteria growing on marsh plants, and decaying higher plants. The hydrological regime associated with these environments is essential for this species to survive. The snail is dependent on the maintenance of high-water levels and standing water[47] and is susceptible to extreme fluctuations in groundwater levels, potentially inducing intolerable hydrological conditions.

5.2.2.2 Conservation Objectives

The Conservation Objectives for the Kennet and Lambourn SAC are outlined in 'European Site Conservation Objectives for River Lambourn Special area of Conservation Site Code: UK0030044'. They ensure that the integrity of the site is maintained or restored as appropriate, and that the site contributes to achieving the Favourable Conservation Status of its qualifying features, by maintaining or restoring:

- The extent and distribution of the habitats of qualifying species;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which the habitats of qualifying species rely;
- The populations of qualifying species; and
- The distribution of qualifying species within the site.

5.2.2.3 Site Condition

The Kennet and Lambourn Floodplain SAC is legally underpinned by the Kennet and Lambourn Floodplain SSSI. Natural England's SSSI site condition assessment in 2019 recognised that:

- 68.39% of the SSSI is assessed to be in favourable condition;
- 16.01% unfavourable – declining;
- 14.5% unfavourable – recovering; and
- 1.1% unfavourable – no change.

[45] Natural England (2019). European Site Conservation Objectives: Supplementary advice on conserving and restoring site features. Kennet and Lambourn Floodplain Special Area of Conservation (SAC) Site code: UK0030044. 1 – 13.
[46] Kileen, I.J. (2003). Ecology of Desmoulin's Whorl Snail. Conserving Natura 2000 Rivers Ecology Series No.6. England Nature, Peterborough, 1-27.
[47] House, R.H., Thompson, R.J, & Acreman, M., (2016). Projecting impacts of climate change on hydrological conditions and biotic responses in a chalk valley riparian wetland. Journal of Hydrology. 534, 178-192.

5.3 Appropriate Assessment

5.3.1 Potential Adverse Effects

Using the Kennet Valley Groundwater Model, the following impact pathways were identified on the River Lambourn SAC[48]:

- During pumping for augmentation, the source of the river would move approximately 0.5 km further downstream as a result of the operation of the WBGWS.
- Following cessation of WBGWS pumping the drawdown in groundwater would cause a sustained reduction in flow within the River Lambourn[48].

Therefore, potential impact pathways to qualifying features of the SAC include a reduction in water flow during operation, causing a deviation from 'naturalised' flow which could cause increased siltation, a reduction in wetted width of the channel and alterations to the biotope mosaic of the river. The underpinning SSSI is in unfavourable – recovering condition due to heavy modification of the watercourse and lack of bankside vegetation. However, flows are considered acceptable and characteristic of the river type (assessment conducted in 2019) [49]. Siltation and hydrological changes have been listed as pressures/ threats currently impacting on the condition of the River Lambourn SAC[50].

The reduction in flow could impact on the ability of the SAC to comply with the following attributes and associated targets of water courses of plain to montane levels with *Ranunculus fluitantis*, brook lamprey and bullhead: to maintain or restore the extent and pattern of in-channel and riparian biotopes (habitat mosaic) to that characteristic of natural fluvial processes, maintain or restore the natural flow regime of the river (water course flow), maintain the natural sediment regime, maintain the natural nutrient regime and maintain the distribution and extent of supporting habitat[51].

Using the Kennet Valley Groundwater Model, the following impact pathway was identified on the Kennet and Lambourn Floodplain SAC[48]:

- The drawdown at the WBGWS Enborne wellfield would lower groundwater at the Thatcham Reedbeds component of the Kennet and Lambourn Floodplain SAC[48].

Potential impact pathways have been identified, particularly in areas of the SAC located adjacent to the River Lambourn due to the potential reduction in flow as a result of this drought option. This could reduce the wetted width of the channel, therefore, impacting on the availability of suitable habitats to support Desmoulin's whorl snail. Thatcham Reedbeds SSSI is largely in unfavourable – recovering condition, including unit 1 which is adjacent to the River Lambourn. In addition, Hunt's green which is lowland neutral grassland (unit 5 of the Kennet and Lambourn Floodplain SSSI which is currently in unfavourable – declining condition) and marshy grassland associated with unit 1 and 2 of Boxford Water Meadows SSSI (unit 1 is in favourable condition and unit 2 is in unfavourable – recovering condition) could be affected. Hydrological changes have been identified as a key threat to Desmoulin's whorl snail[50].

In the absence of mitigation measures, the reduction in groundwater supply could impact on the ability of the SAC to comply with the following attributes and associated targets of Desmoulin's whorl snail: to maintain the extent of supporting habitat, maintain the distribution and continuity of supporting habitat, maintain water quality and quantity to a standard which provides the necessary conditions for Desmoulin's whorl snail, maintain appropriate soil/ground moisture and maintain the extent and patterning of in-channel and riparian habitats mosaic[52].

[48] Environment Agency and Thames Water Utilities Ltd (2015). West Berkshire Groundwater Scheme Operating Strategy. 1 – 44.
[49] Natural England (2019). Condition of SSSI Units for Site River Lambourn SSSI. Designated Sites View.
[50] Natural England (2014). Site Improvement Plan River Lambourn and Kennet-Lambourn Floodplain. 1 – 16.
[51] Natural England (2019). European Site Conservation Objectives: Supplementary advice on conserving and restoring site features. River Lambourn Special Area of Conservation (SAC) Site Code: UK0030257. Natura 2000, 1 – 30.
[52] Natural England (2019). European Site Conservation Objectives: Supplementary advice on conserving and restoring site features. Kennet and Lambourn Floodplain Special Area of Conservation (SAC) Site Code: UK0030044. Natura 2000, 1 – 13.

5.3.2 Monitoring and Mitigation Measures

The Environment Agency identified hydrometric monitoring that would be required if WBGWS was proposed for implementation. The monitoring requirements associated with the relevant SAC are shown in **Table 5.1** below[53].

Table 5.1 Hydrometric Monitoring Actions required by the Environment Agency and Thames Water during the operation of West Berkshire Groundwater Scheme and the relevant Special Area of Conservation (SAC)[53].

Monitoring action required	Relevant Special Area of Conservation (SAC)
Monitoring sites (river/ level and groundwater level) will be agreed and included in the operating agreement.	River Lambourn SAC and Kennet and Lambourn Floodplain SAC
Monitoring should begin when Thames Water Utilities Ltd. give the Environment Agency 3 weeks' notice that they want the scheme to be operated.	River Lambourn SAC and Kennet and Lambourn Floodplain SAC
Monitoring should continue while the scheme is being operated. Monitoring should cease sometime after the scheme is closed down – the duration of the monitoring will depend up hydrological conditions.	River Lambourn SAC and Kennet and Lambourn Floodplain SAC
The location of the source of the Lambourn and Winterbourne should be monitored fortnightly for the agreed period of monitoring.	River Lambourn SAC
The flow augmentation discharges to the river should be monitored at 15 minute intervals.	River Lambourn SAC
Spot flow gauging at required sites should be undertaken on two occasions prior to the switch on of the scheme, at fortnightly intervals while the scheme is operational, on at two occasions after switch off.	River Lambourn SAC
There should be a mechanism for reviewing the results, and switching off the scheme if the net gain becomes insignificant or any other unacceptable impacts occur.	River Lambourn SAC and Kennet and Lambourn Floodplain SAC
Restrict use of the Enborne wellfield with an indicator groundwater level of 27.7 mAOD measured at Folly Farm OBH and phased switch off of the scheme, and a groundwater level constraint of 68.9 mAOD measured at Newbury STWs OBH.	River Lambourn SAC and Kennet and Lambourn Floodplain SAC

To mitigate for the potential adverse effects of the WBGWS, the Lambourn, Shefford and Winterbourne wellfields of the scheme should not be used in a second consecutive year or a subsequent drought to ensure that recovery of groundwater to 'natural' levels. The scheme could only be used for a second consecutive year or during a subsequent drought if the following conditions were assessed and agreed with Thames Water, Natural England and the Environment Agency[54]:

- Recovery of the upper ephemeral reaches e.g the source of the River Lambourn has reached a portion of recovery (such as Lambourn village) for a period which allows ecology to recover (such as 6 months);
- Recovery of flow to near normal in the upper perennial reaches e.g. flows at East Shefford gauging station have recovered to near average for the time of year;
- Recovery of flows to near normal in the lower reaches e.g. flows at Shaw gauging station have recovered to near average for the time of year; and

[53] Environment Agency and Thames Water Utilities Ltd (2015). West Berkshire Groundwater Scheme Operating Strategy. 1 – 44.
[54] Environment Agency and Thames Water Utilities Ltd (2015). West Berkshire Groundwater Scheme Operating Strategy. 1 – 44.

- Recovery of groundwater levels to near normal[54].

Thames Water have also installed an offtake structure to ensure water levels are maintained within the Kennet and Lambourn Floodplain SAC. At Eddington Mill the River Kennet splits into several channels through historic sluices with a smaller channel ensuring flow to the SAC. Connectivity with the River Kennet will have to be maintained during the implementation of the drought permit. This would require active maintenance and monitoring of the weir and structure that ensures flow in the SAC. During low flows this could include the monitoring of weir structures and the removal of debris to ensure flow is maintained within the SAC. Consultation with Natural England and the Environment Agency and walkovers will be required to establish the weirs and structures that are critical to maintenance of flow in the SAC. Where required, weirs may need to be modified to ensure that flow can be controlled into the SAC.

5.3.3 Integrity test conclusion

On the basis of the above agreed monitoring and mitigation measures during scheme operation, no adverse effects on the River Lambourn SAC and the Kennet and Lambourn Floodplain SAC are anticipated. Completion of the licence application is still required in order for the scheme to be implemented.

6 Potential In-Combination Effects with Other Plans and Projects

6.1 Potential In-combination effects of the Drought Plan

Most of Thames Water's drought options were identified as having no LSEs on Habitats sites. However, a number of drought options could be used at a similar time (inter-option effects), should they be required and therefore, an assessment has been completed to determine the potential for LSEs, as detailed in **Table 6.1.**

Table 6.1 Thames Water Drought Plan Options In-combination Effects.

Option	Habitats site	In-Combination With	Habitats site	Effect In-Combination?
Axford 1	Kennet and Lambourn Floodplain SAC	Ogbourne	None within 10km	**No** – Ogbourne is not within 10 km of a Habitats site and the zone of influence of the groundwater abstractions does not overlap with the SAC.
Axford 2	Kennet and Lambourn Floodplain SAC	Ogbourne and/or Ogbourne EBH	None within 10km	**No** – Ogbourne options not within 10 km of any Habitats sites and the zone of influence of the groundwater abstractions does not overlap with the SAC.
Farmoor	Oxford Meadows SAC Hartslock Wood SAC Little Whittenham SAC Cothill Fen SAC	Gatehampton	Hartslock Wood SAC	**No** – Gatehampton has negligible hydrological impacts, therefore no in-combination effect
Fobney EBH	Hartslock Wood SAC	West Berkshire Groundwater Scheme	River Lambourn SAC Kennet and Lambourn Floodplain SAC	**No** – no overlapping Habitats sites
Fobney Direct	Thames Basin Heaths SPA	West Berkshire Groundwater Scheme	River Lambourn SAC Kennet and Lambourn Floodplain SAC	**No** – no overlapping Habitats sites
Fobney Direct	Hartslock Wood SAC	Fobney EBH	Thames Basin Heath SPA	**No** – no overlapping Habitats sites
Latton	North Meadow and Clattinger Farm SAC	Meysey Hampton	North Meadow and Clattinger Farm SAC	**No** – neither option is in hydrological connectivity with Habitats site, therefore no LSEs are anticipated.
Reduction in lowest residual flow on the LTCD from 300 Ml/d to 200 Ml/d	South West London Waterbodies SPA and Ramsar site Windsor Forest	Lower Thames	South West London Waterbodies SPA and Ramsar site Richmond Park	**No** – both options are downstream of the South West London Waterbodies SPA and Ramsar site, more than 4

Option	Habitats site	In-Combination With	Habitats site	Effect In-Combination?
	and Great Park SAC Burnham Beeches SAC		SAC	km away and unlikely to impact on water levels in the River Thames.
Earlier Reduction in residual flow on the LTCD	South West London Waterbodies SPA and Ramsar site Windsor Forest and Great Park SAC Burnham Beeches SAC	Lower Thames	South West London Waterbodies SPA and Ramsar site Richmond Park SAC	**No –** the options are approximately 19.1 km apart and 35.8 km via hydrological connectivity. As the Lower Thames is located downstream of South West London Waterbodies SPA and Ramsar and water levels are unlikely to be impacted, no LSEs are anticipated.
West Berkshire Groundwater Scheme	River Lambourn SAC Kennet and Lambourn SAC Hackpen Hill SAC	Childrey Warren	River Lambourn SAC Hackpen Hill SAC	**No –** No water dependent qualifying features associated with Hackpen Hill SAC. Childrey Warren is approximately 6.7 km away from the River Lambourn SAC and the source protection zone does not overlap with boreholes associated with West Berkshire Groundwater Scheme. No LSEs are anticipated.
Baunton 1	North Meadow and Clattinger Farm SAC	Baunton 2	North Meadow and Clattinger Farm SAC	**No –** would not be operated at the same time.
Baunton 1	North Meadow and Clattinger Farm SAC	Latton	North Meadow and Clattinger Farm SAC	**No –** due to mudstone and clay bedrock, North Meadow and Clattinger Farm SAC is unlikely to be hydrologically connected to groundwater and therefore, no in-combination effects anticipated.
Baunton 2	North Meadow and Clattinger Farm SAC	Latton	North Meadow and Clattinger Farm SAC	**No –** due to mudstone and clay bedrock, North Meadow and Clattinger Farm SAC is unlikely to be hydrologically connected to groundwater and therefore, no in-combination effects anticipated.
Meysey Hampton	North Meadow and Clattinger Farm SAC	Baunton 1	North Meadow and Clattinger Farm SAC	**No –** due to clay bedrock, North Meadow and Clattinger Farm SAC is unlikely to be hydrologically connected to groundwater. In

Option	Habitats site	In-Combination With	Habitats site	Effect In-Combination?
				addition, potential impacts of the Meysey Hampton borehole on reaches of the River Thames are downstream of the SAC. No LSEs in-combination anticipated.
Meysey Hampton	North Meadow and Clattinger Farm SAC	Baunton 2	North Meadow and Clattinger Farm SAC	**No –** due to clay bedrock, North Meadow and Clattinger Farm SAC is unlikely to be hydrologically connected to groundwater. In addition, potential impacts of the Meysey Hampton borehole on reaches of the River Thames are downstream of the SAC. No LSEs in-combination anticipated.
Farmoor	Oxford Meadows SAC Hartslock Wood SAC Little Whittenham SAC Cothill Fen SAC	Fobney Emergency Boreholes	Hartslock Wood SAC	**No –** no water dependent qualifying features associated with Hartslock Wood SAC.
Gatehampton	Hartslock Wood SAC	Fobney Emergency Boreholes	Hartslock Wood SAC	**No –** no water dependent qualifying features associated with Hartslock Wood SAC.
West Berkshire Groundwater Scheme	River Lambourn SAC Kennet and Lambourn SAC	Axford 1	Kennet and Lambourn SAC	**No -** At the closest point the options are 9.5 km apart. The groundwater zone of influence of Axford 1 does not overlap with the Kennet and Lambourn SAC (particularly Thatchams Reedbeds). The reduction in flows during the operation of the drought permit and delay to recovery in groundwater is unlikely to lead to any significant changes in wetted width or wetted perimeter beyond that which is experienced in the normal range of hydrological variation and therefore, no LSEs in-combination anticipated.
West Berkshire Groundwater Scheme	River Lambourn SAC Kennet and Lambourn SAC	Axford 2	Kennet and Lambourn SAC	**No -** At the closest point the options are 9.5 km apart and the source protection zones for both

Option	Habitats site	In-Combination With	Habitats site	Effect In-Combination?
				options do not overlap. As the zone of influence of Axford 2 does not overlap with the Kennet and Lambourn SAC (particularly Thatchams Reedbeds). The reduction in flows during the operation of the drought permit and delay to recovery in groundwater is unlikely to lead to any significant changes in wetted width or wetted perimeter beyond that which is experienced in the normal range of hydrological variation and therefore, no LSEs in-combination anticipated.
Axford 1	Kennet and Lambourn SAC	Axford 2	Kennet and Lambourn SAC	**No –** would not be operated at the same time.
Fobney Direct	Thames Basin Heaths SPA	Shalford	Thames Basin Heaths SPA Thursley, Ash, Pirbright and Chobham SAC	**No –** the options are approximately 37.5 km apart and the point where potential in-combination effects may occur on the River Thames is downstream of the Thames and Basin Heaths SPA.
Pann Mill	Chilterns Beechwoods SAC Burnham Beeches SAC	Harpsden/ Sheeplands	Chilterns Beechwoods SAC	**No –** no water dependent qualifying features associated with Chilterns Beechwoods SAC.

Potential in-combination effects with other relevant plans and projects (as described in **Section 2.5**) have been reviewed and are summarised in the following sections.

6.2 Thames Water's Water Resource Management Plan (2019)

In 2019, Thames Water published their final WRMP 2019 which sets out how they plan to provide a secure and sustainable supply of water for their customers over the next 80 years, from 2020 to 2100.

Thames Water has examined the supply/demand balance for each WRZ and determined how any deficits between forecast demand and reliable water supplies should be addressed for the selected planning period. A wide range of alternative options has been considered by Thames Water to address any forecast supply shortfalls, including:

- alternative water tariffs to encourage water efficiency (linked to Thames Water's strategy to continue extending water metering to the majority of its customers)
- promotion of water efficiency measures
- reducing water leakage from the water supply network or at customers' properties
- water transfers from other water companies or other owners of water sources

- desalination
- indirect water reuse
- river or groundwater abstraction
- new reservoirs
- increased transfer of water between WRZs.

WRMP 2024 will be published in late 2024. As such, an assessment of in-combination effects has been undertaken considering WRMP19. This includes the following WRMP schemes:

- Horton Kirby Aquifer Storage and Recovery (ASR)
- Southfleet/ Greenhithe groundwater – Removal of Constraints
- ASR South East London (Addington) scheme
- New River Head – Removal of Constraints

The Horton Kirby ASR is common to both the WRMP19 and Thames Water's final DP 2022. The Horton Kirby ASR option does not impact on any Habitats sites and therefore, no in-combination effects have been identified.

It has not been confirmed whether the Southfleet and Greenhithe option will be delivered in AMP7 or AMP8 yet, but it is possible that it will be delivered in AMP7 and so, would be available prior to 2025. We will keep the Environment Agency informed of progress with the scheme development and will provide confirmation as soon as the option development timescale is firmed up. However, no overlapping Habitats sites have been identified with Thames Water's final DP 2022 and Southfleet and Greenhithe option.

Potential in-combination effects of the New River Head WRMP option and five of the drought options (North London Artificial Recharge Scheme, Chingford Artificial Recharge Scheme, East London Resource Development, Stratford Box, and Old Ford) on the Lee Valley SPA and Ramsar site has been considered, as they overlap operationally and are within the zone of influence of the SPA and Ramsar site.

None of the drought options have any construction activities associated with them, therefore, there cannot be in-combination construction related effects with any of the WRMP options. In addition, the New River Head WRMP option was planned for activation/ operation in 2020 and therefore, will not overlap with the operation of options within Thames Water's DP 2022. Therefore, no in-combination effects are anticipated from the operation of the drought options and the WRMP options.

6.3 Environment Agency Drought Plans

The potential for in-combination effects of Thames Water's DP 2022 with the Environment Agency's National Drought Action Plan has been assessed. When publicly available, the relevant area DPs will be reviewed (only DP for south-west England publicly available at time of reporting).

Part of the Environment Agency's role is to reduce the impact of drought on the natural environment by taking specific actions. The Environment Agency can apply for environmental drought orders if the environment is suffering serious damage because of abstraction during a drought. The plan says that the Environment Agency would work with stakeholders including water companies to identify where and when it would be necessary and its potential effects on any essential public supplies or infrastructure.

An overview of the process of using drought actions and triggers is provided in the Environment Agency National Drought Action Plan. Actions described include communications (internal and external), monitoring and drought orders. External communications may have positive in-combination effects with Thames Water's media/water efficiency campaign demand side option, as drought communication messages may reinforce each other, thereby resulting in increased demand savings.

Environment Agency environmental drought order actions have the potential to have in-combination impacts with Thames Water's DP 2022. The Environment Agency can apply to the Secretary of State

for environmental drought orders if the environment is suffering serious damage as the result of abstraction during a drought. Nevertheless, liaison is required with the Environment Agency to permit the operation of the DP schemes, and the Environment Agency also monitor the actions taken to ensure these are in accordance with any drought permits/orders.

Given that the Environment Agency drought actions will have a positive effect on river flows and lake levels and, therefore, the natural environment and ecology, no in-combination effects have been identified and no LSEs anticipated with the DP 2022. However, due to the uncertainties of potential locations, this should be considered further at the time of any potential application for drought permits/orders by Thames Water or the Environment Agency.

6.4 Other Water Company Drought Plans

Assessment of the potential for in-combination effects of supply side and drought permit/order options listed in neighbouring water companies' DPs has been undertaken.

It should be noted, that DPs for other companies/organisations are subject to review from the Environment Agency and Defra on the same timescales as Thames Water's DP revision. Thames Water has previously held discussions with neighbouring water companies in order to identify any drought options which may have the potential to cause in-combination effects. Where necessary, further discussions and, if required, more assessment work, will be undertaken to further improve understanding of potential in-combination effects.

The assessments have been informed by the most recent information available on the neighbouring water company DPs, taking into consideration information gathered through Thames Water's ongoing consultation with other neighbouring water companies.

The following neighbouring watering company DPs were considered:

- Affinity Water (2022)
- Anglian Water (2022)
- Bristol Water (2022)
- Essex and Suffolk Water (2022)
- Severn Trent (2022)
- South East Water (mid Kent) (2022)
- Southern Water (2019)
- Sutton and East Surrey Water (2021)
- Wessex Water (2021)

Affinity Water Central and Southeast (2022)

There is potential for likely significant in-combination effects between five drought options in Thames Water's final DP 2022 (NLARS, CHARS, ELRED, Stratford Box and Old Ford) and three drought options in Affinity Water's draft DP 2022 (THUN, WHIH and FULL). This is due to potential for overlapping drawdown extent of borehole abstractions on the Lee Valley SPA and Ramsar site. However, drought options in Affinity Water's draft DP 2022 are located north of the Lee Valley SPA and Ramsar site (4 – 15 km north) and drawdown does not extend to underpinning SSSIs to the south, such as Turnford and Cheshunt Pits SSSI and Walthamstow Reservoirs SSSI. As impact pathways from THUN, WHIH and FULL have only been identified for Amwell Quarry SSSI associated with the northern areas of the Lee Valley SPA and Ramsar site, no likely significant in-combination effects with drought options in Thames Water's final DP 2022 are anticipated. In addition, NLARS, CHARS, ELRED, Stratford Box and Old Ford all abstract from the confined chalk aquifer (30 – 60m below surface level), which is not hydrologically connected to surface habitats.

Wormley-Hoddesdon Park Woods SAC was screened into Stage 1 for NLARS in Thames Water's final DP 2022 and THUN and FULL in Affinity Water's draft DP 2022. Chilterns Beechwoods SAC was screened for Pann Mill and Harpsden Sheeplands in Thames Water's final DP 2022 and RUNGS, PICC and AMER in Affinity Water's draft DP 2022. Similarly, Burnham Beeches SAC was screened for Pann Mill and earlier reduction in residual flow on the LTCD in Thames Water's final DP 2022 and PICC and AMER in Affinity Water's draft DP 2022. In all instances, no construction works required and no water

dependent qualifying features are associated with the SAC. Therefore, no in-combination likely significant effects anticipated.

Anglian Water (2022)

No likely significant in-combination effects between Thames Water's final DP 2022 and Anglian Water's DP 2022, due to no overlapping Habitats sites. Therefore, no LSEs in-combination anticipated.

Bristol Water (2022)

No likely significant in-combination effects between Thames Water's final DP 2022 and Bristol Water's DP 2022, due to no overlapping Habitats sites. Therefore, no LSEs in-combination anticipated.

Essex and Suffolk Water (2018)

The Essex Water Resource Zone and associated supply area is bounded by the Thames Estuary and the River Roding. There are no overlapping abstractions from the same river however, groundwater abstractions may occur from the same chalk aquifer. ELRED, Stratford Box and Old Ford are approximately 3.6 km north of the groundwater source proposed in Essex and Suffolk Water's draft DP 2022. The source protection zones for Thames Water's final DP 2022 do not overlap with the groundwater source location and therefore, it is not anticipated that the drawdown extent will overlap. In addition, south of ELRED, Stratford Box and Old Ford no European sites that could be affected in-combination have been identified. Therefore, based on currently available information, no likely significant in-combination effects are anticipated.

Severn Trent (2022)

No likely significant in-combination effects between Thames Water's final DP 2022 and Severn Trent's DP 2022 have been identified as the Habitatssites being considered in both plans differ. Therefore, and no LSEs anticipated.

South East Water (2022)

None of the drought options in the South East Water's draft DP 2022 have an overlapping zone of influence affecting the same Habitats sites, as those in Thames Water's final DP 2022. Therefore, no likely significant in-combination effects have been identified.

Southern Water (2019)

No likely significant in-combination effects between drought options in Thames Water's final DP 2022 and Southern Water's DP have been identified as the Habitatssites being considered in both plans differ. Therefore, and no LSEs anticipated.

Sutton and East Surrey Water (2021)

The Sutton and East Survey (SES) draft DP 2021 supply area is within close proximity to Waddon drought permit in Thames Water's final DP 2022, which was excluded from further screening in this HRA as no impact pathways to Habitats sites were identified. In addition, no Habitats sites have been identified as potentially affected by either the groundwater or surface water drought permits within SES draft DP 21. Therefore, no likely significant in-combination effects with Thames Water's final DP 2022 are anticipated.

Wessex Water (2021)

No likely significant in-combination effects between drought options in Thames Water's final DP 2022 and Wessex Water's DP have been identified, as the Habitats sites being considered in both plans differ. Therefore, no LSEs in-combination are anticipated.

6.5 Other Water Company WRMPs

Assessment of the potential for in-combination effects with Thames Water's final DP 2022 and neighbouring water companies' WRMPs has been undertaken.

It should be noted that all WRMPs are subject to review every five years. The information used to carry out these assessments is considered to be the most up to date information publicly available at time of writing. Where possible, this is also informed through on-going discussions that Thames Water is holding with neighbouring water companies in order to identify any water resource options which may

have the potential to cause cumulative impacts with their drought options. The assessments should be reviewed at the time of drought option implementation to ensure that no changes to the WRMPs have been made in the intervening period, and that the assessment, therefore remains valid. For example, the other water company WRMPs will be developed and issued during the period of Thames Water's DP.

The following WRMPs were considered:

Affinity Water (2020)

In Affinity Waters revised WRMP 2020, both Abingdon Reservoir to Harefield Transfer and Abingdon to Iver 2 were identified as options that could cause LSEs on South West London Waterbodies SPA during construction a pipeline. LSEs were identified due to noise and visual disturbance at the underpinning SSSI, Wraysbury No. 1 gravel pit. There are three river abstraction options in Thames Water's final DP 2022 that were screened for potential operational effects on South West London Waterbodies SPA/ Ramsar site. As the impact pathway for two of the options is not the same, no likely significant in-combination effects are anticipated. The Lower Thames option does include some construction works, however, is approximately 16.5 km east of Wraysbury No. 1 gravel pit SSSI and therefore, it is not deemed likely that a significant in-combination effect will occur.

Anglian Water (2019)

No likely significant in-combination effects between drought options in Thames Water's final DP 2022 and Anglian Water's WRMP have been identified as the Habitats sites being considered in both plans differ. Therefore, no LSEs in-combination are anticipated.

Bristol Water (2019)

No likely significant in-combination effects between drought options in Thames Water's revised draft DP 2022 and Bristol Water's WRMP have been identified as the Habitats sites being considered in both plans differ. Therefore, no LSEs in-combination are anticipated.

Essex and Suffolk Water (2019)

All four of the Water Resource Zones in Essex and Suffolk Water's WRMP 2019 have a baseline supply surplus in each year of the plan, therefore, no new supply schemes will be developed. A new scheme is being promoted by Essex and Suffolk Water in their Periodic Review 2019 Business Plan which would be a new pipeline from Abberton Reservoir to Hanningfield Reservoir. Based on a straight route from both locations, the closest drought option in Thames Water's final DP 2022 is NLARS. As the impact pathways from this option which is groundwater abstraction are during operation, no likely significant in-combination effects are anticipated with the Abberton to Hanningfield Pipeline Scheme.

Severn Trent (2019)

No likely significant in-combination effects between drought options in Thames Water's final DP 2022 and Severn Trent's WRMP have been identified, as the Habitats sites being considered in both plans differ. Therefore, no LSEs in-combination are anticipated.

South East Water (2019)

Four Habitats sites were considered in the HRA Stage 1 Screening assessment of both South East Water's WRMP 2019 and Thames Water's final DP 2022; Burnham Beeches SAC, Thursley, Ash, Pirbright and Chobham SAC, Windsor Forest and Great Park SAC and Thames Basin Heaths SPA. The WRMP options are associated with the western region water resource zone for South West Water. Burnham Beeches SAC is just outside of the western region water resource zone for South East Water, with CGW-2 being the closest groundwater catchment management option (approximately 45 km away). Due to the distance between Thames Water's final DP 2022 (>40 km) and no low-level residual effects identified from Pann Mill and earlier reduction in residual flow on the LTCD, no likely significant effects in-combination with options in South East Water's WRMP 2019 are anticipated. Potential likely significant in-combination effects have been identified between CGW-2 (groundwater catchment management) and Shalford on the Thursley, Ash, Pirbright and Chobham SAC. However, the options are approximately 40 km apart, therefore, no likely significant in-combination effect has been identified. No low-level residual effects have been identified for the earlier reduction in residual flow on the LTCD on Windsor Forest and Great Park SAC due to no construction works and no water dependent qualifying

features associated with the SAC. Therefore, no likely significant in-combination effects have been identified with CGW-2, which is approximately 44 km away from the earlier reduction in residual flow on the LTCD. Potential likely significant in-combination effects have been identified between CGW-2 (groundwater catchment management) which is an option in South East Water WRMP 2019 and Fobney Direct and Shalford drought options in Thames Water's final DP 2022. However, due to approximate distance between the options (19 km at closest point), no likely significant in-combination effects have been identified. In addition, no low level residual effects were anticipated from the drought options in Thames Water's final DP 2022 due to location of options downstream of the Habitats site and no construction works proposed.

Therefore, no likely significant in-combination effects between Thames Water's revised DP 2022 and South East Water WRMP 2019 have been identified.

Southern Water (2019)

No likely significant in-combination effects between drought options in Thames Water's final DP 2022 and Southern Water's WRMP have been identified as the Habitats sites being considered in both plans differ. Therefore, no LSEs in-combination are anticipated.

Sutton and East Surrey Water (2019)

The supply area for SES Water WRMP 2019 overlaps with Waddon drought option in Thames Water's final DP 2022, which was excluded from further screening in this HRA as no impact pathways to Habitats sites were identified. Therefore, no low-level residual effects in-combination with SES Water WRMP 2019 options are anticipated. In addition, no impact pathways from the four preferred options in the SES WRMP 2019 have been identified on Habitats sites. Therefore, no likely significant effects in-combination with Thames Water's final DP 2022 options are anticipated.

Wessex Water (2019)

No likely significant in-combination effects between drought options in Thames Water's final DP 2022 and Wessex Water's WRMP have been identified, as the Habitats sites being considered in both plans differ. Therefore, no LSEs in-combination are anticipated.

6.6 Other Plans and Projects

Thames River Basin Management Plan (2015)

The River Basin Management Plans (RBMPs) set out how organisations, stakeholders and communities can work together to improve the water environment.

The Thames RBMP overlaps considerably with Thames Water's operational boundaries and therefore, includes all of the Habitats sites considered in this HRA. The RBMP has identified potential hazards associated with the implementation of measures to address significant water management issues. As the level of detail within the plan does not allow consideration of effects on each Habitats site individually, the plan has assessed the potential impacts on the qualifying feature as a collective i.e. 'dry grassland' across several SACs.

The RBMP HRA has concluded that none of the measures identified would have significant negative effects on any Habitats site, as the locations where the measures would be implemented are not constrained. The measures would also be implemented in such a way that there would be no in-combination effects within the RBMP.

Therefore, no likely significant in-combination effects with Thames Water's final DP 2022 have been identified.

Severn River Basin Management Plan (2015)

In accordance with RBMPs, the DP 2022 includes measures to maintain a supply-demand balance while addressing the need to deliver sustainable abstraction from water bodies. As the 10 management catchments included in the Severn RBMP do not overlap with drought options within the Thames Water final DP 2022, no likely significant in-combination effects have been identified.

Environment Agency River Thames Scheme

The Southwest London Water bodies SPA and Ramsar are present within the study area for the River Thames Scheme[55] which aims to reduce flooding between Datchet and Teddington.

The scheme has been subject to a full HRA which is not publicly available. The HRA concluded that the scheme will not adversely affect the integrity of the site subject to appropriate mitigation being put in place. If it is not possible to find sufficient mitigation for the effects of diversion channels on Southwest London Waterbodies SPA, a case for IROPI will be prepared. Further HRAs will also be undertaken on individual component parts arising from the Scheme. It is noted that a loss of habitat in the Thorpe Hay Meadow SSSI is also likely and mitigation and/or compensation measures need to be developed.

The SPA and Ramsar are also within the zone of influence of the Lower Thames drought option. However, no LSEs are anticipated from the construction phase with minor construction work being mitigated by best practice construction methods, or operational phase with a reduced rate of drawdown being potentially beneficial.

Although no likely significant in-combination effects between the River Thames Scheme and Thames Water's final DP 2022 are currently envisaged, this will be kept under review as more details of the River Thames Scheme become available.

Environment Agency Oxford Flood Alleviation Scheme

The Oxford Meadows SAC and Cothill Fen SAC are within 10km of the proposed Oxford Flood Alleviation Scheme[56]. Oxford Meadows SAC is upstream of the proposed scheme, whilst Cothill Fen SAC is approximately 4.7km south west, however, no HRA or environmental assessment is available for the scheme yet.

The Farmoor drought option has minor construction works but no LSEs have been identified on either Habitats site due to distance. Cothill Fen SAC is not within the operational zone of influence, and the option will not impact flood flows over winter which the Oxford Meadows SAC is reliant on.

Therefore, no likely significant in-combination effects between the Oxford Flood Alleviation Scheme and Thames Water's final DP 2022 are currently envisaged, however this will be kept under review as more details of the Oxford Flood Alleviation Scheme become available.

Environment Agency Abingdon Flood Alleviation Scheme

Cothill Fen SAC and Little Wittenham SAC are within 10km of the proposed Abingdon Flood Alleviation Scheme[57]. Cothill Fen SAC is 3km north west of the scheme whilst Little Wittenham SAC is 9km south east. No HRA or environmental assessment is available for the scheme yet.

Little Wittenham SAC is within 10km of the Farmoor drought option. The Habitats site is at a sufficient distance so as not to be impacted by the minor construction works required for the Farmoor drought option. The Habitats site is fed by other water sources than the River Thames and therefore, not likely to be impacted by the operation of the Farmoor drought option.

No construction or operation effects have been identified on Cothill Fen SAC resulting from the Farmoor drought option due to distance from the construction site and the Habitats site being outside the operational zone of influence.

Therefore, no likely significant in-combination effects between the Abingdon Flood Alleviation Scheme and Thames Water's final DP 2022 are currently envisaged, however, this will be kept under review as more details of the Abingdon Flood Alleviation Scheme become available.

[55] Environment Agency (2010) River Thames Scheme: Strategy Appraisal Report. Accessed at: https://www.gov.uk/government/publications/river-thames-scheme-strategy-appraisal-report.
[56] Environment Agency (2017) Oxford Flood Alleviation Scheme: design consultation. Accessed at: https://www.gov.uk/government/consultations/oxford-flood-alleviation-scheme-design-consultation
[57] Environment Agency (2017) Abingdon flood schemes: latest news. Accessed at: Abingdon flood schemes: latest news - GOV.UK (www.gov.uk)

Canal and Rivers Trust Putting Water into Waterways Water Resources Strategy 2015-2020

To ensure long term security of water supply and provide a level of service of 1 in 20 years (5% probability of a drought closure occurring in any single year), the Canal and Rivers Trust have developed a Water Resources Strategy[58] setting out 14 strategic actions for completion by 2020 and dividing the entire network into hydrological units for more effective management of water resources.

A number of the hydrological units overlap with Thames Water's final DP 2022 including the Kennet and Avon Canal, Lower Lee/Lee Navigation and South Oxford Canal.

However, the main actions for the strategy are to undertake a range of modelling scenarios for the hydrological units in order of preference. Specific restoration projects or other canal developments are not detailed, however Strategic Action 4 states that appropriate water resource assessments will be undertaken aiming for *"no net impact on long term water resource levels of service."*

In-combination effects with any of Thames Water's final DP 2022 options are therefore, considered unlikely, however, further consideration should be given at the project level.

Other major planned infrastructure schemes

Most of the confirmed or well-developed plans for significant infrastructure schemes are scheduled to be constructed and commissioned within the next 5-10 years. Relevant schemes have been reviewed in relation to spatial and temporal proximity to the Thames Water's final DP 2022 options to assess whether any in-combination effects might arise. Key schemes reviewed included:

- Thames Tideway Tunnel Project
- Crossrail 1: construction (2013 – 2020) and the westerly extension (post-2020)
- Crossrail 2
- High Speed Two Rail Network (HS2): Construction of Phase 1 of the HS2 network from Euston station (London) to Birmingham.
- North London Heat and Power Project
- North London (Electricity Line) Reinforcement

Of these schemes, the following can be excluded from the in-combination effects assessment:

- HS2 – this scheme has no spatial proximity (> 7km) to any of the drought options within the DP 2022 and therefore, cannot act in-combination with them.
- Crossrail 1 – works due to be complete by 2020 and therefore, no potential construction in-combination effects.

Thames Tideway Tunnel Project

No likely significant in-combination construction effects (construction due to be completed by 2021) or operational effects have been identified in connection with the Thames Tideway project.

Crossrail 2

Crossrail 2 has been developed to the stage of an outline strategy with an indicative route and stations, but no firm decisions have yet been reached on the funding of the line[59]. Should Crossrail 2 gain approval in the next few years, there is a possible risk of in-combination effects during the operation of Crossrail 2 with the North London Artificial Recharge Scheme, Chingford Artificial Recharge Scheme, East London Resource Development, Stratford Box and Old Ford on the Epping Forest SAC, Lee Valley SPA and Ramsar site. All of the supply side drought options considered individually in the Stage 1 HRA Screening were concluded to have no LSEs on the qualifying features of the SAC, SPA and Ramsar site, due to a lack of hydrological connectivity and interaction between the chalk aquifer and surface waterbodies (during operation). The proposed route of Crossrail 2 is approximately 1.8 km west of Epping Forest and 0.2 km west of the Lee Valley SPA and Ramsar site; at present the proposed scheme does not spatially overlap with the supply side drought options. As there is no construction phase associated with the supply side drought options, there will be no in-combination effects on the Epping

[58] Canal and Rivers Trust (2015) Putting the water into waterways: Water Resources Strategy 2015-2020. Accessed at https://canalrivertrust.org.uk/media/original/24335-water-resources-strategy.pdf.
[59] Crossrail 2 (2020) What are the next steps for Crossrail 2? Accessed from: https://crossrail2.co.uk/next-steps/

Forest SAC, Lee Valley SPA or Ramsar site during the construction of Crossrail 2. In addition, no operational in-combination effects are anticipated as there is no evidence to suggest that Crossrail 2 is hydrologically connected to the Epping Forest SAC, Lee Valley SPA or Ramsar site. Therefore, no likely significant in-combination effects are anticipated when considering Thames Water's final DP 2022 drought options and Crossrail 2.

North London Heat and Power Project

The construction of the Energy Recovery Facility at Edmonton EcoPark is anticipated in July 2022, as part of the North London Heat and Power Project[60]. There is a possible risk of in-combination effects during the operation of the Energy Recovery Facility with the North London Artificial Recharge Scheme, Chingford Artificial Recharge Scheme, East London Resource Development, Stratford Box and Old Ford on the Epping Forest SAC, Lee Valley SPA and Ramsar site. All of the supply side drought options considered individually in the Stage 1 HRA Screening were concluded to have no LSEs on the qualifying features of the SAC, SPA and Ramsar site, due to a lack of hydrological connectivity and interaction between the chalk aquifer and surface waterbodies (during operation). The proposed location of the Edmonton EcoPark is approximately 2.1 km south-west of Epping Forest and 2.6 km north of the Lee Valley SPA and Ramsar site; at present the proposed scheme does not spatially overlap with the supply side drought options. As there is no construction phase associated with the supply side drought options, there will be no in-combination effects on the Epping Forest SAC, Lee Valley SPA or Ramsar site during the construction of the Energy Recovery Facility. In addition, no operational in-combination effects are anticipated as there is no evidence to suggest that the Energy Recovery Facility is hydrologically connected to the Epping Forest SAC, Lee Valley SPA or Ramsar site. Therefore, no likely significant in-combination effects are anticipated when considering Thames Water's final DP 2022 drought options and the North London Heat and Power Project.

North London (Electricity Line) Reinforcement

As the North London (Electricity Line) Reinforcement runs adjacent to the Chingford and Banbury Reservoirs, there is a possible risk of in-combination effects with the North London Artificial Recharge Scheme, Chingford Artificial Recharge Scheme, East London Resource Development, Stratford Box and Old Ford on the Epping Forest SAC, Lee Valley SPA and Ramsar site. As there is no construction phase associated with the supply side drought options, there will be no in-combination effects on the Epping Forest SAC, Lee Valley SPA or Ramsar site during the construction of the North London (Electricity Line) Reinforcement. In addition, there is no evidence to suggest that this scheme is hydrologically connected to the Epping Forest SAC, Lee Valley SPA or Ramsar site. Therefore, no likely significant in-combination effects are anticipated when considering Thames Water's final DP 2022 drought options and the North London (Electricity Line) Reinforcement.

[60] North London Heat and Power Project (2020) Project Timeline. Accessed from: http://www.northlondonheatandpower.london/project-timeline/

7 Conclusions and Recommendations

Thames Water has completed the first stage of the HRA process, screening, on its final DP 2022 options list. The screening stage identified whether any drought options have the potential to cause a Likely Significant Effect (LSE) on the integrity of a Habitats site(s).

Due to uncertainties regarding the potential LSEs of the West Berkshire Groundwater Scheme (WBGWS) on the River Lambourn SAC and the Kennet and Lambourn Floodplain SAC, this drought option was taken through to Stage 2 Appropriate Assessment. With consideration of a hydrometric monitoring programme and appropriate mitigation measures (previously agreed between the Environment Agency and Thames Water), no adverse effects on site integrity are anticipated from the implementation of the WBGWS. No LSEs were identified for all other drought options in Thames Water's final DP 2022, when considered alone on Habitats site(s).

In-combination effects were assessed between drought options of Thames Water's final DP 2022, with its Water Resource Management Plan (WRMP)19, the Environment Agency's DPs, the Thames and Severn River Basin Management Plan, other water company WRMPs and DPs and other major infrastructure projects available at this time. No in-combination LSEs between drought options and with other plans and projects were identified on Habitat site(s).

A summary of the conclusions of the Stage 1 Screening and Stage 2 Appropriate Assessment is presented in **Table 7.1.**

Table 7.1 Summary of HRA Screening Conclusions.

Drought Option	Is scheme likely to have a significant effect on Habitats site(s) alone?	Effect in-combination with existing consents?	Effect in-combination with other drought options?	Appropriate Assessment (AA) required?	Adverse effect on site integrity?
Demand Management					
Media/water efficiency campaign	No	No	No	No	N/A
Leakage reduction	No	No	No	No	N/A
Temporary use Ban	No	No	No	No	N/A
Drought Order to ban Non-Essential Use	No	No	No	No	N/A
Emergency Drought Order	No	No	No	No	N/A
Supply Side Options					
London WRZ					
North London Artificial Recharge Scheme	No	No	No	No	N/A
Thames Gateway Water Treatment Works (TGWTW)	No	No	No	No	N/A
Chingford Artificial Recharge Scheme (CHARS)	No	No	No	No	N/A
Reduction in lowest residual flow on the Lower Thames Control Diagram at Teddington Weir from 300Ml/d to 200Ml/d	No	No	No	No	N/A
Earlier reduction in	No	No	No	No	N/A

Drought Option	Is scheme likely to have a significant effect on Habitats site(s) alone?	Effect in-combination with existing consents?	Effect in-combination with other drought options?	Appropriate Assessment (AA) required?	Adverse effect on site integrity?
residual flow at Teddington Weir on the Lower Thames Control Diagram					
East London Resource Development (ELRED)	No	No	No	No	N/A
Stratford Box	No	No	No	No	N/A
Old Ford	No	No	No	No	N/A
West Berkshire Groundwater Scheme (WBGWS)	Yes	No	No	Yes	No
Drought permit/order					
London WRZ					
Sundridge 1	No	No	No	No	N/A
Sundridge 2	No	No	No	No	N/A
Lower Thames	No	No	No	No	N/A
Crayford	No	No	No	No	N/A
Horton Kirby (Aquifer Storage & Recovery)	No	No	No	No	N/A
Eynsford	No	No	No	No	N/A
Wansunt	No	No	No	No	N/A
Increase in M2 annual licence	No	No	No	No	N/A
Waddon	No	No	No	No	N/A
SWOX Water Resource Zone					
Baunton 1	No	No	No	No	N/A
Baunton 2	No	No	No	No	N/A
Latton	No	No	No	No	N/A
Meysey Hampton	No	No	No	No	N/A
Farmoor	No	No	No	No	N/A
Axford 1	No	No	No	No	N/A
Axford 2	No	No	No	No	N/A
Bibury	No	No	No	No	N/A
Gatehampton	No	No	No	No	N/A
Ogbourne emergency boreholes	No	No	No	No	N/A
Oxford Canal - Banbury	No	No	No	No	N/A
Childrey Warren	No	No	No	No	N/A
Ogbourne	No	No	No	No	N/A
Kennet Valley Water Resource Zone					
Fobney Emergency Boreholes	No	No	No	No	N/A
Pangbourne	No	No	No	No	N/A

Drought Option	Is scheme likely to have a significant effect on Habitats site(s) alone?	Effect in-combination with existing consents?	Effect in-combination with other drought options?	Appropriate Assessment (AA) required?	Adverse effect on site integrity?
Playhatch	No	No	No	No	N/A
Fobney Direct	No	No	No	No	N/A
Guildford Water Resource Zone					
Albury	No	No	No	No	N/A
Shalford	No	No	No	No	N/A
SWA Water Resource Zone					
Pann Mill	No	No	No	No	N/A
Henley Resource Zone					
Harpsden/Sheeplands	No	No	No	No	N/A

Appendices

Appendix 1 Habitats Sites Summaries

Table A1.1. Summaries of Habitats Sites within the Thames Water region.

Site Name	Reason for Designation	Site Vulnerability
Burnham Beeches SAC (UK0030034)	**H9120 Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrub layer (*Quercion robori-petraeae* or *Ilici-Fagenion*)** Burnham Beeches is an example of Atlantic acidophilous beech forests in central southern England. It is an extensive area of former beech wood-pasture with many old pollards and associated beech *Fagus sylvatica* and oak *Quercus* spp. high forest. Surveys have shown that it is one of the richest sites for saproxylic invertebrates in the UK, including 14 Red Data Book species.	The beech forest is subject to threats and pressures from public access/ disturbance, air pollution (nitrogen deposition), habitat fragmentation, high deer populations, biodiversity decline and invasive non-native species.
Chilterns Beechwoods SAC (UK0012724)	**H9130 Asperulo-Fagetum beech forests ('Beech forests on neutral to rich soils')** The Chilterns Beechwoods SAC represent a good example of southern beech woodland characteristic of the south-east of England on the Chalk. The woodland is an important part of a grassland-scrub-woodland mosaic, which supports a diverse range of species including dog's mercury *Mercurialis perennis*, sanicle *Sanicula europaea* an yellow archangel *Lamium galeobdolon*. **H6210 Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*)** This habitat is typically located on thin, well-drained, lime-rich soils associated with chalk and limestone. The grassland at Chilterns Beechwoods SAC includes species such as sheep's fescue *Festuca ovina*, quaking grass *Briza media* and wild thyme *Thymus praecox*. **S1083 Stag beetle *Lucanus cervus*** Stag beetles are the largest terrestrial beetle present in the UK, growing up to 7cm, and have a south-eastern distribution in the UK. Larvae develop in decaying timber, therefore, forests provide an essential functioning role in maintaining this species abundance.	The beech forest is subject to threats and pressures including lack of or inappropriate forestry and woodland management, damage from high deer populations, invasive non-native species, disease and air pollution (nitrogen deposition). Threats and pressures associated with stag beetles include changes in species distribution, public access/ disturbance and air pollution. The latter is also relevant to dry grasslands and scrublands on chalk or limestone.
Cothill Fen SAC (UK0012889)	**H7230 Alkaline fens** One of the largest surviving examples of alkaline fen vegetation in central England, a region where fen vegetation is rare. The M13 *Schoenus nigricans – Juncus subnodulosus* vegetation found here occurs under a wide range of hydrological conditions, with frequent bottle sedge *Carex rostrata*, grass-of-Parnassus *Parnassia palustris*, common butterwort *Pinguicula vulgaris* and marsh helleborine *Epipactis palustris*. **H91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)** Alluvial forests consists of woods dominated by alder *Alnus glutinosa* and willow *Salix* spp. on flood plains that typically occur on moderately base-rich, eutrophic soils subject to periodic inundation.	The alkaline fens are subject to pressures and threats from water pollution, hydrological changes and air pollution (atmospheric nitrogen depositions).

Site Name	Reason for Designation	Site Vulnerability
Epping Forest SAC (UK0012720)	**H9120 Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae* or *Ilici-Fagenion*)** Epping Forest represents Atlantic acidophilous beech forests in the north-eastern part of the habitat's UK range. Although the epiphytes at this site have declined, largely as a result of air pollution, it remains important for a range of rare species, including the moss *Zygodon forsteri*. The long history of pollarding, and resultant large number of veteran trees, ensures that the site is also rich in fungi and dead-wood invertebrates. **S1083 Stag beetle *Lucanus cervus*** Epping Forest is a large woodland area in which records of stag beetle *Lucanus cervus* are widespread and frequent; the site straddles the Essex and east London population centres. Epping Forest is a very important site for fauna associated with decaying timber, and supports many Red Data Book and Nationally Scarce invertebrate species. **H4010 Northern Atlantic wet heaths with *Erica tetralix*** At Epping Forest the wet heaths consist of M16 *Erica tetralix – Sphagnum compactum* wet heath. **H4030 European dry heaths** At Epping Forest the European dry heaths comprises of H1 *Calluna vulgaris – Festuca ovina* heathland.	Qualifying features of Epping Forest are currently subject to threats and pressures as a result of air pollution (nitrogen deposition), undergrazing, public access/ disturbance, changes in species distribution, significant changes water levels, water pollution, invasive non-native species and exposure to disease.
Hackpen Hill SAC (UK0030162)	**1654 Early gentian *Gentianella anglica*** Hackpen Hill is an extensive area of unimproved chalk grassland in the Downs. The site has a variety of aspect and gradients, with the grassland dominated by red fescue *Festuca rubra* and upright brome *Bromus erectus*. The herb flora includes a significant population of early gentian *Gentianella anglica*. **6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia)** (* important orchid sites). At Hackpen Hill SAC extensive areas of species-rich, agriculturally unimproved chalk grassland are present that support a diverse range of plants including orchids such as frog orchid *Coeloglossum viride* and fragrant orchid *Gymnadenia conopsea*.	No current issues affecting the qualifying feature(s) of the Habitats site have been identified.
Hartslock Wood SAC (UK0030164)	**H1166 Great crested newt *Triturus cristatus*** Two main ponds set within mixed woodland that supports large numbers of this species. **H6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia)** Hosts the priority habitat type "orchid rich sites". The steep slopes of this site on the chalk of the Chilterns comprise a mosaic of chalk grassland, chalk scrub and broadleaved woodland. The site supports one of only three UK populations of monkey orchid *Orchis simia*, a nationally rare Red Data Book species. **H91J0 *Taxus baccata woods of the British Isles***	The grasslands are subject to pressures from air pollution (atmospheric nitrogen depositions).

Site Name	Reason for Designation	Site Vulnerability
	Open patches show a rich flora including local species such as southern wood-rush *Luzula forsteri*, wood barley *Hordelymus europaeus* and narrow-lipped helleborine *Epipactis leptochila.*	
Kennet and Lambourn Floodplain SAC (UK0030044)	**1016 Desmoulin`s whorl snail *Vertigo moulinsiana*** - The cluster of sites selected in the Kennet and Lambourn valleys supports one of the most extensive known populations of Desmoulin's whorl snail *Vertigo moulinsiana* in the UK and is one of two sites representing the species in the south-western part of its range in the important chalk stream habitat. Integrity of the population is being maintained by taking measures, including habitat creation, to safeguard populations. The habitat occupied at this site differs from the Fenland sites in East Anglia in that it is predominantly reed sweet-grass *Glyceria maxima* swamp or tall sedges at the river margins, in ditches and in depressions in wet meadows.	Threats and pressures impacting on Desmoulins whorl snail include siltation, water pollution, invasive non-native species, hydrological changes, inland flood defence works, incoorect cutting/ mowing, change in land management and inappropriate water levels.
Lee Valley SPA (UK9012111)	**A021 Great bittern *Botaurus stellaris* (wintering)** Great bittern roost at several locations in the Lee Valley and mainly feed within or near *Phragmites* reedbeds of large waterbodies. The extent and distribution of standing open water habitat should be restored or maintained at 345 hectares (ha) and marginal water at a depth of 30 – 100 cm. The optimal size for a single waterbody should be >0.5 ha. By maintaining the structure and function of the supporting habitat, the population abundance should be consistently above an average of six individuals within a 5-year peak mean count. However, there currently is an ongoing decline in great bittern populations present within the Lee Valley SPA, potentially caused by milder winter weather. Food availability is also a critically important factor attracting individuals to the SPA and supporting the target population abundance. **A051 Gadwall *Anas strepera strepera* (wintering)** During the winter period, gadwall favour gravel pits and reservoirs where they feed on macrophytes. Each underpinning SSSI of the Lee Valley SPA supports abundances of gadwall of national importance. The attribute target for the SPA is to maintain non-breeding populations above an average of 456 individuals (5-year peak mean count); unlike great bittern and Northern shoveler, gadwall abundance has remained stable. Food availability is regarded as a key factor affecting the distribution of gadwall within the SPA. In addition, it is important that the extent and distribution of standing open water habitat is restored or maintained at 345 ha and optimal depth maintained at <0.25m over at least 50% of the total standing water area[61]. **A056 Northern shoveler *Anas clypeata* (wintering)** Northern shoveler largely occupy Walthamstow Reservoirs, Turnsford and Cheshunt Pits, Rye Meads and Amwell quarry SSSI and require a mixture of shallow and deep open water habitats for foraging and	Threats and pressures effecting the Lee Valley SPA include water pollution, hydrological changes, public access/ disturbance, inappropriate scrub control and cutting/ mowing, fish stocking, invasive non-native species and air pollution (nitrogen deposition). The recreational pressure on the site is regulated to an extent through zoning of waterbodies within the Lee Valley Regional Park.

[61] Natural England (2018). Habitats site Conservation Objectives: Supplementary Advice on Conserving and Restoring Site Features. Lee Valley Special Protection Area. Natura 2000 database, 1 – 23.

Site Name	Reason for Designation	Site Vulnerability
	roosting. The extent and distribution of standing open water habitat should be restored or maintained at 345 ha and optimal depth maintained at <0.3 m over at least 50% of the total standing water area. The population abundance should be maintained or restored to an average of 406 individuals (5-year peak mean count), with current declines related to water level control and food availability in Walthamstow reservoirs and overall scrub/ tree management.	
Lee Valley Ramsar (UK11034)	**Gadwall (wintering) *Anas strepera strepera*** Species/ populations occurring at levels of international importance. Peak counts in winter in north-west Europe of 445 individuals representing an average of 2.6% of the British population (5 year peak mean 1998/9 – 2002/3). **Northern shoveler (wintering) *Anas clypeata*** Species/ populations occurring at levels of international importance. Peak counts in winter in north-west and central Europe of 287 individuals representing an average of 1.9% of the British population (5 year peak mean 1998/9 – 2002/3). **Whorled water-milfoil *Myriophyllum verticillatum*** It is an aquatic perennial that colonises slow flowing, calcareous waterbodies including lakes, streams, canals and ditches[62]. In the UK, the plans distribution is concentrated in eastern and southern England with no records in Scotland and <10 records in Wales. **Water boatman *Micronecta minutissima*** Water boatman (*M. minutissima*) is a nationally rare aquatic invertebrate in the UK and currently the species is listed as of least concern in the IUCN Red List of Threatened Species. It is part of the lesser water boatman family (Corixidae). There are few records of this species in the UK, with most individuals observed in southern England and East Anglia.	See Lee Valley SPA site improvement plan information above.
Little Wittenham SAC (UK0030184)	**S1166 Great crested newt *Triturus cristatus*** The population of great crested newts is centred on two artificial ponds set within mixed woodland with grassy rides and adjoining grazed pasture. From previous surveys, >2000 great crested newts have been recorded at Little Wittenham SAC, which is the largest known population in southern England.	The great crested population is subject to threats and pressures including invasive non-native species (predatory fish) and public access/ disturbance.
North Meadow and Clattinger Farm SAC (UK0016372)	**H6510 Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*)** This site represents an exceptional survival of the traditional pattern of management for hay meadows with unique vegetation communities. The site also contains a very high proportion of fritillary *Fritillaria meleagris* (>90% of the surviving UK population), a rare species highly characteristic of damp lowland meadows.	Threats and pressures effecting the lowland hay meadow qualifying feature includes significant changes water levels, habitat fragmentation, lack of or inappropriate commons management, public access/ disturbance and water pollution.

[62] Biological Records Centre (2008). Online Atlas of the British and Irish Flora, *Myriophyllum verticillatum.* Accessed from: Myriophyllum verticillatum | Online Atlas of the British and Irish Flora (brc.ac.uk).

Site Name	Reason for Designation	Site Vulnerability
Oxford Meadows SAC (UK0012845)	**H6510 Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*)** Hay meadows with unique vegetation communities reflecting the influence of long-term grazing and hay-cutting on lowland hay meadows. Species present at the site include greater burnet *Sanguisorba officinalis,* meadow foxtail *Alopecurus pratensis* and pepper saxifrage *Silaum silaus*. **S1614 Creeping Marshwort *Apium repens*** Creeping marshwort is a very rare plant of seasonally flooded habitat with little competition from surrounding vegetation. Port Meadow is part of the wider Oxford Meadows site and is one of the key sites for this species in the UK. Creeping marshwort is also protected under Schedule 8 pf the Wildlife and Countryside Act 1981 and therefore, it is an offence to pick or uproot any part of the plant.	The special interest of the site is critically dependent upon groundwater levels and annual flooding, and the site is very sensitive to changes in groundwater levels. Several of the component parts are dependent upon traditional hay-cutting and aftermath grazing. Key threats and pressures that are affecting Oxford Meadows include hydrological changes and invasive non-native species.
Richmond Park SAC (UK0030082)	**S1083 Stag beetle *Lucanus cervus*** Richmond Park has a large number of ancient trees with decaying timber. It is at the heart of the south London centre of distribution for stag beetle and is a site of national importance for the conservation of the fauna of invertebrates associated with the decaying timber of ancient trees.	No key threats or pressure have been identified for Richmond Park SAC and associated qualifying features.
River Lambourn SAC (UK0030257)	**H3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation** The Lambourn is an example of a lowland river in a chalk catchmentin central southern England.chalk In its upper reaches, the River Lambourn it is a winterbourne, drying through the summer months. It is one of the least-modified rivers of this type, with a characteristic flora dominated by pond water-crowfoot *Ranunculus peltatus*. In the downstream perennial sections *R. peltatus* is replaced by stream water-crowfoot *R. penicillatus* var. *pseudofluitans*. **S1163 Bullhead Cottus gobio** The Lambourn represents bullhead populations inhabiting chalk streams in central southern England. Good water quality, coarse sediments and extensive beds of submerged plants again provide excellent habitat for the species. **S1096 Brook lamprey *Lampetra planeri*** The River Lambourn provides good habitat conditions for Brook lamprey which include gravel beds for spawning, silt beds for ammocoetes, good water quality and low abstraction rates.	The River Lambourn is considered to have one of the least modified catchments in southern England and has one of the lowest levels of abstraction. The site is subject to the following threats and pressures: siltation, water pollution, invasive non-native species, hydrological changes, inland flood defence works and inappropriate cutting/ mowing.
South West London Waterbodies SPA (UK9012171)	**A051 Gadwall *Anas strepera* (wintering)** The birds present at South West London Waterbodies SPA during the winter have either derived from UK breeding populations or have migrated from breeding grounds present in colder climates; including Fennoscandia, central and eastern Europe and western Russia**Error! Bookmark not defined.**. The Habitats sites support an estimated 2.4% of the north-west European population of gadwall (based on 5-year peak mean 1993/94 – 1997/98. **A056 Northern shoveler *Anas clypeata* (wintering)**	Threats and pressures effecting gadwall and northern shoveler at South West Lonond Waterbodies SPA include public access/ disturbance, changes in species distributions, invasive non-native species, natural changes to site conditions, fish stocking and inappropriate weed control.

Site Name	Reason for Designation	Site Vulnerability
	The birds that occupy South West London Waterbodies SPA and Ramsar site during the winter have either derived from UK breeding populations or have migrated from breeding grounds present in colder climates. They typically arrive in September and remain in the UK until March – early April and are often sighted in pairs or small groups. The Habitats sites support an estimated 2.1% of the north-west/ central European population of Northern shoveler (based on 5-year peak mean 1993/94 – 1997/98)[63].	
South West London Waterbodies, Ramsar (UK11065)	**Gadwall *Anas strepera* (wintering)** Supports species/ populations occurring at levels of international importance including gadwall which in north-west Europe supports 487 individuals, representing an average of 2.8% of the British population (5 year peak mean 1998/9 – 2002/3). **Northern shoveler *Anas clypeata* (wintering)** Supports species/ populations occurring at levels of international importance including northern shoveler which in north-west and central Europe supports 397 individuals, representing an average of 2.6% of the British population (5 year peak mean 1998/9 – 2002/3).	See site improvement plan information regarding South West London Waterbodies SPA for information on relevant threats and pressures.
Thames Basin Heaths SPA (UK9012141)	A composite site of open heathland habitats that is located across the counties of Surrey, Hampshire and Berkshire in southern England. **A302 Dartford warbler *Sylvia undata* (breeding)** During the breeding season the SPA regularly supports 27.8% of the British population of Dartford warblers which is an Annex I species. **A224 Nightjar *Caprimulgus europaeus* (breeding)** During the breeding season the SPA regularly supports 7.8% of the British population of nightjars which is an Annex I species. **A246 Woodlark *Lullula arborea* (breeding)** During the breeding season the SPA regularly supports 9.9% of the British population of woodlark which is an Annex I species.	Threats and pressures effecting qualifying species of the SPA include public access/ disturbance, undergrazing, lack of or inappropriate forestry and woodland management, inappropriate scrub control, wildfire/ arson, air pollution (nitrogen deposition), unknowns regarding location, extent and condition of species, military activities and habitat fragmentation. The mosaic of habitats which form the internationally important lowland heathland are dependent on active heathland management. Lack of grazing and other traditional management practices therefore pose a threat. Development pressure on neighbouring land and the cumulative and indirect effects of neighbouring developments also pose a potential long-term problem. At present the Ministry of Defence land is used principally for firing ranges and military exercises (predominantly on foot). A significant proportion of the site is local authority-owned land. The local authority land is often designated as Public Open Space and is heavily used for informal recreation.
Thursley, Ash, Pirbright and Chobham SAC (UK0012793)	**H4010 Northern Atlantic wet heaths with *Erica tetralix*** The site is representative of National Vegetation Classification type M16 *Erica tetralix – Spahgnum compactum* wet heath which supports a number of rare	Threats and pressures effecting qualifying habitats of the site include undergrazing, lack of or inappropriate forestry and woodland management, hydrological changes, invasive non-native species,

[63] English Nature (2000). EC Directive 79/409 on the Conservation of Wild Birds: Special Protection Areas (SPA). South West London Waterbodies, Classification citation, pg 1.

Site Name	Reason for Designation	Site Vulnerability
	plants including brown beak-sedge *Rhynchospora fusca*, marsh clubmoss *Lycopodiella inundata* and marsh gentian *Gentianella pneumonanthe*. **H4030 European dry heaths** The site is representative of the National Vegetation Classification type H2 *Calluna vulgaris – Ulex* minor dry heathland. Supports a number of rare species including European nightjar, Dartford warbler, sand lizard (*Lacerta agilis*) and smooth snake (*Coronella austriaca*). **H7150 Depressions on peat substrates of the *Rhynchosporion*** The peat within the SAC forms part of a mosaic associated with the valley mire and wet heath and supports a range of species including white beaked-sedge *Rhynchospora alba,* bog asphodel *Narthecium ossifragum* and early marsh-orchid *Dactylorhiza incarnata.*	wildfire/ arson, air pollution (nitrogen deposition), military activities and habitat fragmentation. Insufficient grazing or other traditional practices, including bracken control and scrub clearance, is a serious potential threat, as is lowering of water tables as a result of water abstraction or other reasons which could cause loss or damage to wet heath and mire communities. A Memorandum of Understanding exists between Natural England and the Ministry of Defence through which the impact of military activities is regulated.
Windsor Forest and Great Park SAC (UK0012586)	**H9190 Old acidophilous oak woods with *Quercus robur* on sandy plains** Windsor represents old acidophilous oak woods in the south-eastern part of its UK range. It has the largest number of veteran oaks *Quercus* spp. in Britain (and probably in Europe), a consequence of its management as wood-pasture. It is of importance for its range and diversity of saproxylic invertebrates, including many rare species (e.g. the beetle *Lacon querceus*), some known in the UK only from this site, and has recently been recognised as having rich fungal assemblages. Windsor Forest and Great Park has been identified as of potential international importance for its saproxylic invertebrate fauna by the Council of Europe. **S1079 Violet click beetle *Limoniscus violaceus*** Violet click beetle was first recorded at Windsor Forest in 1937. The site is thought to support the largest of the known populations of this species in the UK. There is a large population of ancient trees on the site, which, combined with the historical continuity of woodland cover, has resulted in Windsor Forest being listed as the most important site in the UK for fauna associated with decaying timber on ancient trees. The site was also identified as of potential international importance for its saproxylic invertebrate fauna by the Council of Europe. **H9120 Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrublayer (*Quercion robori-petraeae* or *Ilici-Fagenion*).** This habitat consists of beech *Fagus sylvatica* forests with holly *Ilex aquifoliul* and a key feature of the site is the large number of veteran trees that contribute to the overall importance of the site for saproxylic invertebrates and fungi.	The qualifying features of the site are subject to the following threats and pressures: lack of or inappropriate forestry and woodland management, invasive non-native species, exposure to disease and air pollution (nitrogen deposition). The special invertebrate interest is heavily dependent upon a continuous supply of very old and decaying trees. Both the invertebrate interest and oak woodland are vulnerable to changes in management practices.
Wormley-Hoddesdonpark Woods SAC (UK0013696)	**H9160 Sub-Atlantic and medio-European oak or oak-hornbeam forests of the Carpinion betuli**	The site is subject to the following threates and pressures: disease (acute oak decline), invasive non-native species, air pollution (nitrogen deposition), damage from deer,

Site Name	Reason for Designation	Site Vulnerability
	Large stands of almost pure hornbeam *Carpinus betulus* (former coppice), with sessile oak *Quercus petraea* standards.	illicit vehicles, lack of or inappropriate forestry and woodland management and public access/ disturbance.

Appendix 2 Consultation Responses received through the draft DP 2022 public consultation process

This Appendix sets out the consultation responses received through the draft DP 2022 public consultation process held from 7 June 2021- 30 July 2021. Thames Water's response issued in its Statement of Response (SoR) is provided, together with the section of this HRA where the comments are addressed.

	Consultee	Comment	Thames Water Response (in the SoR)	How addressed in Habitats Regulations Assessment
1	Natural England	It appears that the HRA may have used outdated information regarding designated sites. Appendix 1 (European Designated Site Summaries) needs updating. This appendix should reflect information available in the Supplementary Advice to the Conservation Objectives (SACOs), Site Improvement Plans (SIPs) and condition assessments. The HRA screening assessments (and EARs if relevant) should be reviewed in line with the latest information available. European designated sites are now called Habitats sites. The column labelled 'Site vulnerability' shows evidence of being out of date. For example, there is reference to AMP4 and the Environmentally Sensitive Areas (ESA) scheme (which was closed to new applicants in 2005, and replaced by a new scheme), and it states that abstraction pressure in the Lee Valley SPA —will be addressed through the Environment Agency review of consents. This review concluded in 2008.	We will update the HRA to reflect the most recent information in relation to Habitats sites, including the Supplementary Advice to the Conservation Objectives (SACOs), Site Improvement Plans (SIPs) and condition assessments. The screening of Likely Significant Effects will be reviewed in view of the most up to date information and in consideration of most recent case law with regards to feature condition.	Appendix 1 and the stage 1 screening tables (Table 3.1 – 3.3) have been updated to reflect the most recent information available.
2	Natural England	The screening table for LSE (Table 3.2, p.31) doesn't include all the supply side options which are listed in Tables 1.2 and 1.3 (p.14-16). The reason for this should be made clear. We note that only those drought options that are likely to be effective in the period to 2027 have been considered in the HRA and SEA, and that 'More before 4' options have not been developed yet. We accept this decision for this plan, but other options that might be used post-2027 will of course need to be subject to HRA and SEA in future plans. Natural England expects Thames Water to use the Water Resources Management Planning process (WRMP) to remove its reliance on potentially damaging orders and permits. Caselaw has clarified the need in HRA to take account of whether a Habitats site is failing its conservation objectives when deciding on the significance of effects. A number of Habitats sites are not meeting their conservation objectives for water quantity/flow, water quality and/or geomorphological processes. These conservation objective failures can be exacerbated by climate change and drought. Drought options have the potential to add to these failures.	We will clarify the difference in Tables 1.2 and 1.3 in the HRA. We note the comments regarding the requirement to become more resilient and so less reliant on DPs, this will be addressed in our WRMP and so does not require any change to our Drought Plan. As noted above, the condition of qualifying features will be reviewed as part of the updates to the HRA. Habitats sites failing their conservation objectives will be considered when deciding on the significance of effects. Not all supply side options are associated with Habitat sites and the text will be amended to explain where supply options are excluded from the assessment. Future plans and projects that could result in in-combination impacts will be considered at the next iteration of the Drought Plan.	Additional clarification has been added to Section 3.1 regarding supply side options included in the stage 1 screening assessment.
3	Natural England	Where drought permit options operate within current licence operating conditions, the HRA has relied on the conclusions of the EA's Review of Consents (ROC). This review concluded over a decade ago and, as the competent authority of the dDP, Thames Water should check the validity of the conclusions in light of more recent data or evidence, changes in designated site condition, and the impacts of climate change. Any abstraction which is not within the terms of the existing licence (including timings or duration of the abstraction) should be screened and assessed accordingly within the HRA.	We will review situations where the HRA relies on Environment Agency's Review Of Consents to check whether there are any changes to Habitats site condition. We will then review the conclusions of the HRA to reflect the most recent information in relation to Habitats sites.	The stage 1 screening tables (Table 3.1 – 3.3) have been updated to remove reliance on the conclusions of the Environment Agency's Review of Consents.
4	Natural England	The screening assessments for several schemes in relation to Lee Valley SPA/Ramsar (p.31-32) say —The SPA and Ramsar site consists of artificial bunded reservoirs which are supplied with water from the River Lee. There is no evidence to suggest hydrological connectivity between the reservoirs and aquifers and it is therefore highly unlikely that the drought order would impact on the designated features of either the SPA or the Ramsar. This is not the case, as several habitats across the site are groundwater-fed. The assessments should be reviewed to check whether there is potential for the borehole sites to be in hydrological connectivity with the groundwater sources which feed the Lee Valley SPA/Ramsar. If hydrological connectivity is possible, an appropriate assessment should be undertaken, and the potential for in combination impacts and cumulative should be reviewed. If the company concludes that the boreholes abstract from a confined aquifer, this view should be supported by robust evidence. The Lee Valley SPA/Ramsar comprises four component SSSIs, the habitats of which support the qualifying features of the SPA/Ramsar: - Amwell Quarry SSSI is a former gravel pit, including two large lakes and a variety of associated wetland, grassland and woodland habitats. It is groundwater-fed. - Rye Meads SSSI consists of wet meadows, disused and operational effluent lagoons and Rye House Marsh. These provide a variety of different habitats including open water habitats swamp communities, tall fen communities, marshy grassland and scrub. The water meadows are largely groundwater-fed and are not affected by water levels in the River Lee. - Turnford and Cheshunt Pits SSSI include ten former gravel pits, along with areas of marsh, grassland, ruderal herbs, scrub and woodland; part of the Small River Lee; and a further water body, Hall Marsh Scrape, which was constructed specifically for use by waterfowl. The pits are largely gravel / groundwater-fed but are also subject to overspill from the Lee Navigation and flood relief channel in times of high water. - Walthamstow Reservoirs SSSI comprises ten relatively small and shallow water storage basins which are topped up from surface water sources. Several of these are fringed by sloping earth banks	None of the drought plan sources are located within any proximity to the groundwater dependant Lee Valley SPA and so we do not have any sources that we would use differently in a drought that can have an impact on the SPA. All the supply options that have the potential to impact on the Lee Valley SPA/Ramsar SPA are already licensed and the licences would not be changed as part of drought plan implementation (i.e. operation of these options will be within existing licence limits with regards to timing and volumes). We will include a statement in the HRA to clarify the lack of potential impact of drought sources on the Lee Valley SPA. This will include additional information from more recent environmental reports on the impacts of the licensed abstractions on groundwater levels.	The stage 1 screening assessment of potential likely significant effects of the North London Artificial Recharge Scheme, Chingford Artificial Recharge Scheme, East London Resource Development, Stratford Box and Old Ford on the Lee Valley SPA and Ramsar site have been reviewed and updated taking into consideration hydrological connectivity and the estimated zone of influence (or drawdown extent). This is shown in Table 3.2.

	Consultee	Comment	Thames Water Response (in the SoR)	How addressed in Habitats Regulations Assessment
		and together with the presence of wooded islands form distinctive habitat features. Potential impacts of the drought options on supporting habitat should also be assessed. The Supplementary Advice to the Conservation Objectives for Lee Valley SPA/Ramsar discusses the importance of habitat outside the boundary of the SPA/Ramsar to support the population of bittern Botaurus stellaris, which is a SPA qualifying feature.		
5	Natural England	The assessment of impacts on the South West London Waterbodies SPA/Ramsar does not consider the influence of groundwater, including in connectivity with the River Thames, on the water levels in the gravel pits. Wraysbury No 1 is fed by groundwater and is offline from the surface water network. Wraysbury & Hythe End Gravel Pits (also known as Wraysbury No 2) is fed by Horton Brook, which receives baseflow from the river terrace gravels. Groundwater supply from the underlying gravels is also important to Thorpe Park Gravel Pit. Impacts on any supporting habitat outside the SPA/Ramsar boundary should also be assessed. If hydrological connectivity between the drought options and these water bodies is possible, an appropriate assessment should be undertaken, and the potential for in combination and cumulative impacts should be reviewed.	We have considered the potential for our drought options to have an impact on these sites and there is negligible risk. This is because our Drought Permit option for the lower Thames does not result in any reduction in levels in the lower Thames, it just reduces flow and velocity therefore there is no significant effective impact pathway. We will update the assessment to make this clear. As noted above, the supply options that have the potential to impact on the this SPA/Ramsar are already licensed and the licences would not be changed as part of drought plan implementation (i.e. operation of these options will be within existing licence limits with regards to timing and volumes). We will include a statement in the HRA to clarify the lack of potential impact of drought sources on the South West London Waterbodies SPA/Ramsar. This will include additional information from more recent environmental reports on the impacts of the licensed abstractions on groundwater levels.	The stage 1 screening assessment of potential likely significant effects of the reduction in lowest residual flow on the LTCD from 300 Ml/d to 200 Ml/d, earlier reduction in residual flow on the LTCD and Lower Thames on the South West London Waterbodies SPA and Ramsar site has been reviewed and updated based on hydrological connectivity and the zone of influence (drawdown extent). This is shown in Tables 3.2 and 3.3.
6	Natural England	There are some errors in the assessment for the West Berkshire Groundwater Scheme (WBGWS) which need amending. The Review of Consents for the River Lambourn SAC and the Kennet and Lambourn Floodplain SAC concluded that this scheme would have a likely significant effect (LSE) on these sites. Reduced groundwater levels would reduce baseflow in the Lambourn and would affect groundwater supply to Thatcham Reedbeds (part of the Kennet and Lambourn Floodplain SAC). Mitigation measures have been put in place, but these should be detailed in an appropriate assessment for this scheme, and not screened out as having no LSE. River Lambourn SAC - The WBGWS will not be used for two consecutive years, to allow groundwater to recover thereby protecting flows in the River Lambourn SAC. This needs to be made clear in the HRA (in an appropriate assessment), and there needs to be evidence in the dDP that this has been taken into account in planning for prolonged droughts. - Reference to a sluice augmenting flow with water from the River Kennet is incorrect – that is a scheme to protect the Kennet and Lambourn Floodplain SAC, not the River Lambourn SAC. Kennet and Lambourn Floodplain SAC- The HRA correctly states that two mitigation measures were identified to protect this site from groundwater depletion. The first was a reduction of the Speen licence, which was implemented in 2015. The second was augmenting water supply to the Thatcham Reedbeds via an offtake from the Kennet when the Enborne wellfield part of the WBGWS is in use. This augmentation scheme should be explained in an appropriate assessment. - The offtake to fulfil this measure is in place (built by Thames Water) and ready to use. However, the transfer licence and operating agreement need to be finalised. - A Drought Plan should not rely on drought options where mitigation measures identified in the HRA have not been secured. However, the Environment Agency has assured us that the licence and operating agreement will be finalised shortly and that there is no reason the augmentation scheme could not be delivered when needed. Natural England, therefore, accepts that this scheme can remain in the dDP, but we urge EA and Thames Water to finalise arrangements and issue the necessary licence before the Drought Plan is published.	We will clarify in the HRA that the Review of Consents for the River Lambourn SAC and the Kennet and Lambourn Floodplain SAC concluded that this scheme would have a likely significant effect (LSE) on these sites. Reduced groundwater levels would reduce baseflow in the Lambourn and would affect groundwater supply to Thatcham Reedbeds (part of the Kennet and Lambourn Floodplain SAC). Mitigation measures have been put in place, and these will be detailed in an appropriate assessment that will be carried for this scheme, rather than screened out as having no LSE. We will include a statement in the HRA in relation to the River Lambourn SAC that the West Berkshire Groundwater Scheme will not be used for two consecutive years, to allow groundwater to recover thereby protecting flows in the River Lambourn SAC. This will be made clear in the HRA (as part of the appropriate assessment). We have included evidence in our Drought Plan that this has been taken into account in planning for prolonged droughts. The following text has been added to Section 6.1.8.4: "The Operating Agreement includes a clause (Section 5 - West Berkshire Groundwater Scheme Operating Strategy) to ensure that abstraction does not take place in two consecutive years from specified wellfields within the scheme unless specific recovery conditions are satisfied or further use is agreed by both Thame Water and the EA. This requirement was put in place following the Appropriate Assessment for the Kennet and Lambourn SSSI. This has been taken into account in the assessment of the schemes Deployable Output.". We will correct the reference in the HRA to a sluice augmenting River Lambourn flow with water from the River Kennet - and confirm that this is a scheme to protect the Kennet and Lambourn Floodplain SAC, not the River Lambourn SAC. This augmentation scheme will be explained as part of the appropriate assessment for the SAC. We will make the licence application to secure the licence for augmentation of the Thatcham Reedbeds when the Enborne wellfield of the West Berkshire Groundwater Scheme is in operation. We will not implement the scheme until this licence is in place.	The stage 1 screening of the West Berkshire Groundwater Scheme has been reviewed and amended to reflect potential likely significant effects on the River Lambourn SAC and the Kennet and Lambourn Floodplain SAC in Table 3.1. An Appropriate Assessment has also been completed (Section 5). Based on agreed mitigation measures with the Environment Agency, no adverse effects are anticipated from the scheme that could affect site integrity.
7	Natural England	Any appropriate assessments which are undertaken (including for the WBGWS) should have regards to whether the Habitats site is failing its conservation objectives. If it is failing, the appropriate assessment must demonstrate that the drought option will not exacerbate the conservation objective	We will update the HRA to reflect the most recent information in relation to Habitats sites current status in relation to conservation objectives.	An Appropriate Assessment has been completed (see Section 5). Based on agreed mitigation measures with the Environment

	Consultee	Comment	Thames Water Response (in the SoR)	How addressed in Habitats Regulations Assessment
		failures. The appropriate assessments must demonstrate that all adverse effects on integrity have been avoided or mitigated with sufficient certainty.	If the recent information shows that it is failing, we will update the appropriate assessment to demonstrate that the drought option will not exacerbate the conservation objective failures. The appropriate assessments will demonstrate that all adverse effects on integrity can be avoided or mitigated with sufficient certainty.	Agency, no adverse effects are anticipated from the scheme that could affect site integrity.
8	Natural England	The HRA concluded there will be no in combination or cumulative effects between drought options or with other plans and projects. The range of plans and projects considered appears to be comprehensive. However, the justification for screening no LSE is not always clear, and there seems to be a reliance on a no LSE conclusion in the HRAs for other plans and projects, undertaken by other water companies or organisations. As the competent authority for the dDP, Thames Water must check the reasons for the conclusions of no LSE in other plans, and make its own assessment. If there is no potential impact pathway between drought options/projects and the environmental receptor (Habitats sites and/or their interest features) then it is fair to assume that there will not be an impact in combination or cumulatively. However, in all other circumstances, the potential for cumulative impacts must be screened within the HRA. The assessment should take account of whether a Habitats site is failing its conservation objectives, and whether the drought options have the potential to add to these failures. It is noted that the SEA of the dDP states that potential cumulative impacts between the Waddon drought permit and SES Water's Drought Plan were identified, whereas the HRA says they were not. This assessment should be reviewed for accuracy and consistency.	We will update the screening of the in-combination effects. This will include a review of the HRAs for the relevant WRMPs and HRAs for neighbouring water companies to consider the justification in the screening of impacts to ensure that there will be no in-combination impacts that may require consideration. There are no Habitat sites associated with the Waddon drought option.	Section 7 addressing in-combination assessments between drought options and other plans and projects has been updated with more detail to support conclusion of no likely significant in-combination effects.

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