Affinity Water

Drought Management Plan 2022

Habitats Regulations Assessment Report

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Executive Summary

Water companies are required to prepare and maintain Statutory Drought Management Plans (DMPs) every five years, and, as part of this process, must ensure the DMP meets the requirements of the Habitats Regulations 2017, as amended. Affinity Water Services Limited (Affinity Water) is updating its Statutory DMP, last published in November 2019, which includes the Habitats Regulations Assessment (HRA) and other associated Environmental Assessments.

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

Affinity Water has nine drought permits which may result in environmental impact on qualifying features of European sites. An HRA stage 1 screening assessment was completed to identify if any of the drought permits could lead to likely significant effects on European sites. The HRA stage 1 screening concluded that one of the drought permits (THUN) had potential to cause likely significant effects on European sites and this drought permit has been taken through to stage 2 appropriate assessment. This was due to uncertainty regarding the potential reduction in groundwater supply to the Lee Valley SPA and Ramsar site. In light of the European sites' Conservation Objectives, the stage 2 appropriate assessment concluded that the THUN drought permit would not cause adverse effects on site integrity.

In-combination effects of the THUN drought permit alongside Affinity Water's Water Resource Management Plan (WRMP) 2019 projects, other water company WRMPs and DPs and other major infrastructure projects were assessed on a precautionary basis and following best practice. No in-combination effects are anticipated.

A summary of the conclusions of the HRA stage 1 screening assessment and stage 2 appropriate assessment are provided in **Table A.**

Table A: Summary of Habitats Regulations Assessment stage 1 screening assessment and stage 2 appropriate assessment of Affinity Water's draft Drought Management Plan 2022 drought permits.

Drought Permit	Likely significant effects alone?	Appropriate assessment required?	Adverse effect on integrity of European site?	Residual low-level effect that requires in-combination assessment?	In-combination effect with other plans and projects?
THUN	Yes	Yes	No	Yes	No
WHIH	No	No	N/A	Yes	No

Drought Permit	Likely significant effects alone?	Appropriate assessment required?	Adverse effect on integrity of European site?	Residual low-level effect that requires in-combination assessment?	In-combination effect with other plans and projects?
FULL	No	No	N/A	Yes	No
RUNGS	No	No	N/A	No	N/A
PICC	No	No	N/A	No	N/A
AMER	No	No	N/A	No	N/A
SYLE	No	No	N/A	No	N/A
SDRE	No	No	N/A	No	N/A
SBUC	No	No	N/A	No	N/A

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Glossary

Abbreviation	Definition
DMP	Drought Management Plan
Affinity Water	Affinity Water Services Ltd
DPG	Drought Plan Guideline
DPG2020	Drought Plan Guideline 2020
HRA	Habitats Regulations Assessment
UKWIR	UK Water Industry Research
LSE	Likely significant effects
SPA	Special Protection Area
SAC	Special Areas of Conservation
SSSI	Sites of Special Scientific Interest
pSPA	Potential Special Protection Area
pSAC	Possible/ Proposed Special Area of Conservation
CJEU	Court of Justice of the European Union
WRZ	Water Resource Zone
WRMP	Water Resource Management Plan
IRZ	Impact Risk Zone
RBMP	River Basin Management Plan
NERC	Natural Environment and Rural Communities
EMP	Environmental Monitoring Plan
OBH	Observation Borehole

1 Introduction

1.1 Background and purpose of report

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

Affinity Water Services Ltd (Affinity Water) is updating its Statutory DMP, last published in November 2019. The DMP needs to reflect the guidance provided in the Environment Agency's Drought Plan Guideline (DPG)[1], published in April 2020 (DPG2020), which specifies that a water company must ensure that its DMP meets the requirements of the Habitats Regulations[3]. 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 DMPs 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 'Environmental Assessments for Water Resources Planning'[2]. The UKWIR report recommends that all DMPs should be subject to the first stage of HRA i.e., screening for likely significant effects (LSEs). Where LSEs cannot be ruled out, a stage 2 appropriate assessment has been undertaken.

The requirement for HRA is established through Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora, hereby referred to as the 'Habitats Directive', in Articles 6(3) and 6(4). The Habitats Directive is transposed into national legislation by the Conservation of Habitats and Species Regulations 2017, as amended[3]. Under Regulation 63, any plan or project which is likely to have a significant effect on a European site (either alone or in-combination with other plans or projects) and is not directly connected with, or necessary for the management of the site, must be subject to an appropriate assessment to determine the implications for the site, in view of its conservation objectives.

1 Environment Agency (2020) Water Company Drought Plan Guideline, April 2020.

2 UKWIR (2021). Environmental Assessments for Water Resources Planning. UK Water Industry Limited Research Limited 21/WR/02/15

3 The Conservation of Habitats and Species Regulations 2017

1.2 Requirement for Habitats Regulations Assessment

As a competent authority and Plan making authority[4,5], Affinity Water are responsible for undertaking a HRA of Affinity Water's DMP 2022, to determine if the associated drought permits could have LSEs (in a stage 1 screening) on European sites. Where LSEs cannot be ruled out, a stage 2 appropriate assessment has been undertaken.

Regulation 63 states that the Plan making authority (in this case Affinity Water) shall adopt, or otherwise give effect to, the Plan only after having ascertained that it will not adversely affect the integrity of a European site, subject to Regulation 64 of the Habitats Regulations as amended in 2017.

1.3 Approach to HRA

The HRA has been undertaken in accordance with currently available guidance[6,7,8,9,] and has been based on a precautionary approach as required under the Habitats Regulations. Independent best practice[10] encourages the use of a four-stage process to allow navigation of the tests described in the Regulations. This four-stage process consists of the following:

Stage 1 - Screening is undertaken to identify whether each drought permit in Affinity Water's DMP (either alone or in-combination with other plans or projects) is likely to have significant effects on European sites.

4 UK Government (2021). Habitats regulations assessments: protecting a European site. Accessed from: Habitats regulations assessments: protecting a European site - GOV.UK (www.gov.uk)

5 Defra (2012). Statement of Obligations, Information for Water and Sewerage Undertakers and Regulators on Statutory Environmental and Drinking Water Provisions Applicable to the Water Sector in England. 1 – 41. Accessed from: www.defra.gov.uk/environment/quality/water/industry/

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

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 Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government (2019). Appropriate Assessment, Guidance on the use of Habitats Regulations Assessment. UK Government. Accessed from: Appropriate assessment - GOV.UK (www.gov.uk)

9 UK Government (2019). The Conservation of Habitats and Species Regulations (Amendment) (EU Exit) Regulations 2019. Accessed from: The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 (legislation.gov.uk)

10 Tyldesley, D & Chapman, C. (2013). The Habitats Regulations Assessment Handbook, October 2021 edition UK. DTA Publications Limited.

Stage 2 - Where a significant effect is likely (noting the precautionary principle), an appropriate assessment will then be undertaken, to determine whether the drought permit would adversely affect the integrity of the European site(s), either alone or in-combination with other plans and projects, taking into account available mitigation measures.

Stage 3 - Where adverse effects on the integrity of a European site are identified at the appropriate assessment stage, alternative options would be examined to avoid any potential adverse effects on the integrity of the European site.

Stage 4 - If no alternative options are identified during Stage 3, 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.

Stage 3 and 4 were not completed as part of the following HRA of Affinity Water's DMP 2022 drought permits, as no adverse effects on the integrity of European sites were identified. If Stage 3 was deemed necessary, post consultation with statutory regulators, the HRA will be reviewed and amended accordingly.

The potential LSEs of a drought permit on one or more European sites, includes consideration of Special Protection Areas (SPAs) and Special Areas of Conservation (SACs). Prior to leaving the European Union (EU), SPAs and SACs formed the Natura 2000 network. The term 'national site network' was introduced into the 2017 Habitats Regulations by the 2019 Amendment Regulations. Since leaving the EU, all designated or classified UK sites and any new sites classified or designated after Exit Day have become part of the national site network11.

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 an 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).

11 Tyldesley, D. & Chapman, C. (2013). The Habitats Regulations Assessment Handbook, October 2021 edition UK. DTA Publications Limited.

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

The purpose of the screening stage is to determine whether any part of the plan in question (in this case the Final DMP 2022) is likely to have a significant effect on any European site. This refers to a possible significant effect whose occurrence cannot be excluded on the basis of objective information and would undermine the conservation objectives for the European site12. There must be credible evidence that there is a real risk of an LSE on a European site, rather than a hypothetical risk. This is judged in terms of the implications of the plan on a site's conservation objectives, which relate to its 'qualifying features' (i.e. those Annex I habitats, Annex II species, and Annex I bird populations13, 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' DMPs and Water Resource Management Plans (WRMPs), and whether these would adversely affect the integrity of a European site.

This document represents the HRA screening of Affinity Water's draft DMP 2022, i.e., stage 1 as identified above. HRA screening identifies whether the drought permits contained within Affinity Water's draft DMP 2022 will have LSEs on European sites and as such, determines the requirement for an appropriate assessment.

In April 2018[14] 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 considered as part of the HRA screening process in support of the draft DMP 2022.

1.4 Affinity Water Supply Area and Drought Planning

12 Tyldesley, D. & Chapman, C. (2013). The Habitats Regulations Assessment Handbook, October 2021 edition UK. DTA Publications Limited.

13 Annexes are contained within the relevant EC Directive.

14 Court of Justice for the European Union's ruling on People Over Wind and Sweetman ('Sweetman II') vs Coillte Teoranta, Case C-323/17.

Affinity Water supply drinking water to approximately 3.5 million people and 1.4 million properties in the south-east of England[15]. The supply area can be split into eight distinct Water Resource Zones (WRZs): six are locate in the Central Region, one in the South-East Region and one in the East Region. Area coverage includes north London, Essex, Hertfordshire, Buckinghamshire, Folkstone, Dover and Dungeness. The WRZs are named after local rivers and consist of the following: Colne, Lee, Misbourne, Pinn, Stort and Wey in the central region; Brett in the east region; and Dour in the Southeast region15 (**Figure 1.1**).

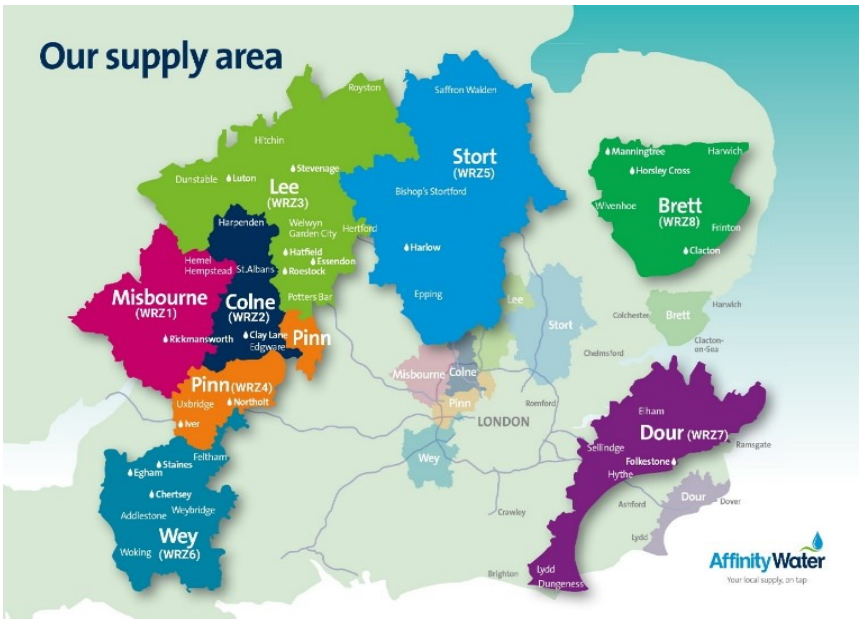

Figure 1.1 Affinity Water's supply area split into eight Water Resource Zones (WRZs).

Affinity Water have 130 groundwater sources, four river intakes on the River Thames, one impounding reservoir and a number of bulk supply imports from neighbouring water companies. Approximately 65% of the water Affinity Water abstract is from groundwater sources and the remainder is from surface water. More specifically, in the central region 60% of the water supply is from groundwater sources and 40% is from surface water or imported from neighbouring water companies. In the south-east region, 90% of the water supply is from chalk groundwater sources and 10% is supplied from a shallow gravel aquifer located in Dungeness peninsular. In the east region, 80% of the water supply comes from groundwater sources and 20% is sourced from the River Colne.

1.5 Affinity Water Drought Planning Process

Water companies in England and Wales are required to prepare and maintain Statutory DMPs under Sections 39B and 39C of the Water Industry Act 1991, as

15 Affinity Water (2019). Drought Management Plan Annual Update 2019. 1 – 130.

amended by the Water Act 2003 and in accordance with the DMP Regulations 2005 and the DMP Direction 2020.

The Water Industry Act 1991 defines a DMP 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 Drought Plan Direction 2020 states that all water company draft DMPs should be sent to the Secretary of State prior to consultation before 1 April 2021. Water companies must then publish their DMP as directed by Defra. A revised (final) DMP must be published at least every 5 years from the date the previous DMP was published.

Affinity Water's current Final DMP (update published in November 2019) covers the period 2019 - 2023 Affinity Water is currently updating its draft DMP 2022. The period encompassed by the Final DMP 2022 will be 2022 - 2027. The next revision of the DMP would be published in 2027.

Permission to abstract water, granted through licences issued by the Environment Agency and held and operated by Affinity Water, was subject to a 'Review of Consents' in accordance with Regulation 63 of the Conservation of Habitats and Species Regulations 2010 (as amended). It should be noted that these Habitats Regulations have now been superseded by the Conservation of Habitats and Species Regulations 2017. This Review of Consents was undertaken by the Environment Agency and included screening to determine a likely significant effect and appropriate assessment where likely significant effects were identified, to either affirm an abstraction licence or recommend action to amend the licence conditions. This was to ensure that the integrity of European sites was not at risk from the impacts of abstraction.

All drought permits which are relevant to the period encompassed by the Final DMP 2022 are considered in the HRA process. To this end, environmental effects of the Final DMP 2022 options are considered within the context of the current licence operating conditions.

1.6 Affinity Water Drought Options

1.6.1 Supply side actions – drought permits

Drought permits are drought management actions that, if granted, allow more flexibility for water companies to manage water resources and the effects of drought on both public water supply and the environment. Drought permits must be applied for by water companies to allow for increased abstraction during times of

drought and granted by the Environment Agency. The drought permits (when issued) allow for abstraction to occur outside the normal license conditions for a six-month period. The likelihood of applying supply-side drought permits up to 2024 is 1 in 40-year return period, which equates to a 2.5% probability in any given year16. All of Affinity Water's drought permit sites are groundwater sources, and they do not abstract directly from any chalk streams within the supply area. **Table 1.1** summarises the drought permits that have been included in Affinity Water's DMP 2022 and **Figure 1.2** and **Figure 1.3** shows the location of the drought permits in the Central and Southeast Regions. No drought permits have been proposed in the Eastern Region.

16 Affinity Water (2019). Drought Management Plan Annual Update. Affinity Water, 1 – 132.

Table 1.1 Proposed supply side actions - drought permits for Affinity Water's Drought Management Plan 2022.

Drought permit	Region	Water Resource Zone (WRZ)	Waterbody	Description
THUN	Central	Stort (WRZ5)	River Rib	Temporarily suspend the flow constraint, allowing a daily abstraction of up to 14 Ml/d – an increase of 4.91 Ml/d in comparison with the current licence.
WHIH	Central	Lee (WRZ3)	River Beane	Abstract at a rate of 16.82 Ml/d, which will require the licensed annual volume to increase from 730 Ml to 2712 Ml.
RUNGS	Central	Lee (WRZ3)	River Lea	Increase abstraction by 5.27 Ml/d under severe drought conditions – an increase of 2.54 Ml/d in comparison with the current licence. Minor construction works are also associated with this drought permit.
PICC	Central	Misbourne (WRZ1)	River Gade	Increase abstraction by 6.4 Ml/d. In combination with the current licence that would equate to 20.46 Ml/d.
AMER	Central	Misbourne (WRZ1)	River Misbourne	Increase abstraction by 8 Ml/d from the post sustainability reduction average licenced rate of 4 Ml/d to the pre-sustainability reduction peak deployable output rate of 12 Ml/d.
FULL	Central	Lee (WRZ3)	River Mimram	Suspend the Section 20 quantities for the FULL source for the permit duration and provide up to 9.09 Ml/d of additional water each day that the permit is active for flow augmentation.
SLYE	Southeast	Dour (WRZ7)	River Dour	The release of a constraint limiting abstraction to 3.5 Ml/d and allow abstraction rates of up to 7 Ml/d.
SDRE	Southeast	Dour (WRZ7)	Alkham Bourne/ River Dour	The release of a constraint limiting abstraction to 8 Ml/d (both average and peak) and allow

Drought permit	Region	Water Resource Zone (WRZ)	Waterbody	Description
				abstraction rates up to 10 Ml/d, subject to pumping water levels.
SBUC	Southeast	Dour (WRZ7)	River Dour	The removal of requirement to augment and allow the full 6Ml/d to be taken into supply.

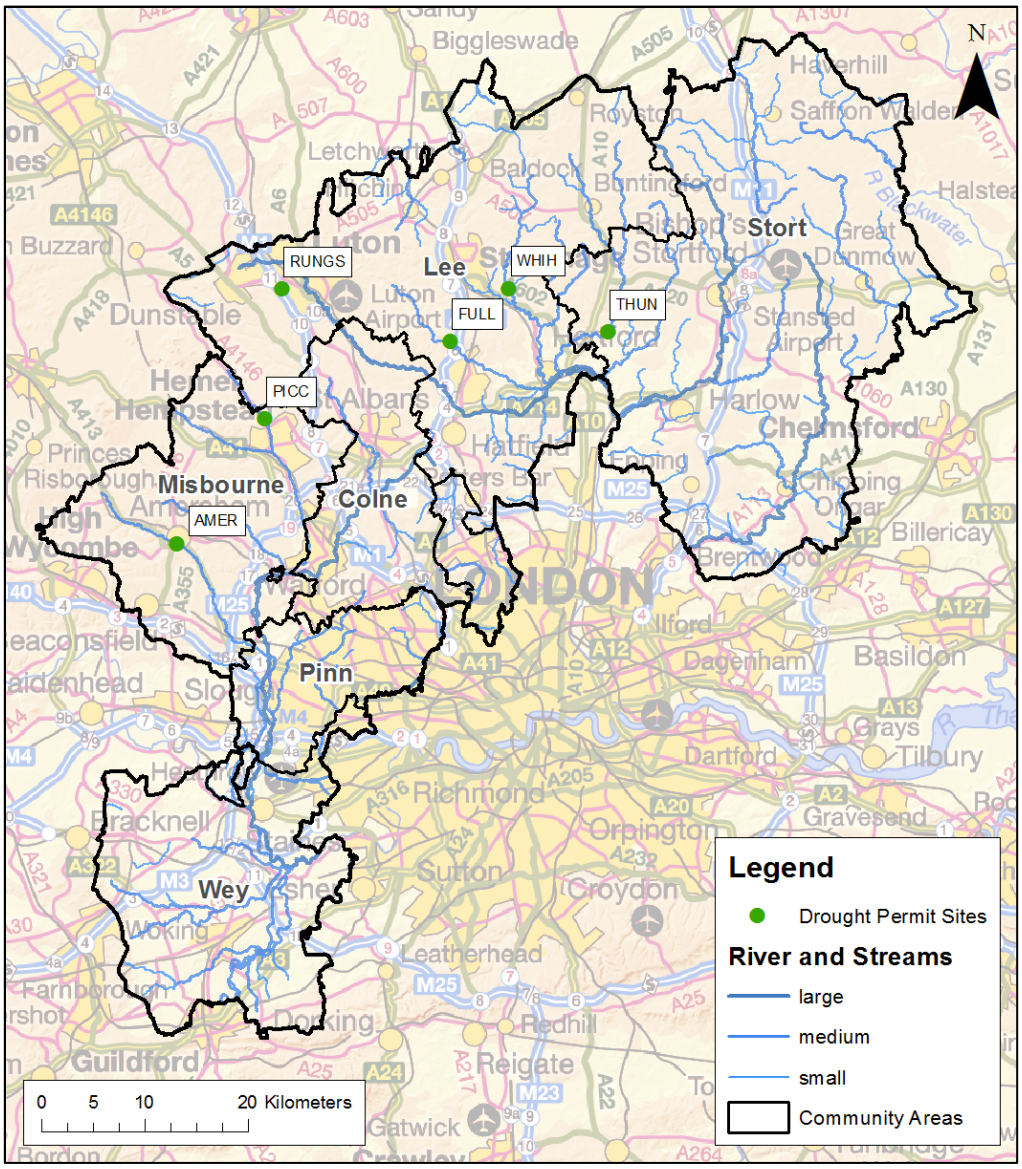

Figure 1.2 Location of drought permits in the Central Region.

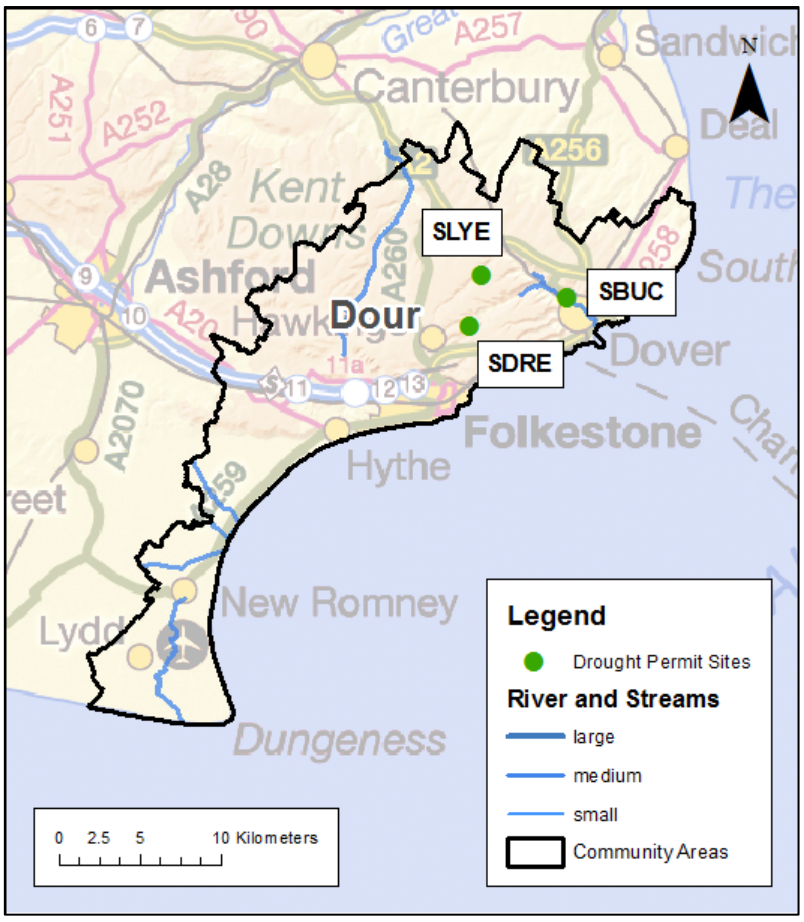

Figure 1.3 Location of drought permits in the Southeast Region.

1.7 Consultation to date

The available guidance indicates that the water company should discuss its environmental assessment and monitoring plan as early as possible with the EA and Natural England[17]. Natural England must be contacted if drought permits are likely to affect protected sites (e.g., European sites and SSSIs) in England. The National Park Authority (including the Broads Authority) should also be contacted regarding any actions that will take place within their boundaries.

In preparation for writing Affinity Water's new DMP, pre-consultation letters were sent to regulators, neighbouring water companies, Natural England and other key groups such as the Canal & River Trust in July 2020. Affinity Water has taken into account responses received as a result of this pre-consultation in the development of the DMP.

17 Environment Agency, July 2020 'Environmental Assessment for Water Company Drought Plans - supplementary guidance.

In accordance with the EA's 'Water Company Drought Plan Guideline', Affinity Water published its draft DMP for consultation on 4th June 2021, inviting views from regulators, stakeholders, individuals and organisations on its proposals for a period of eight weeks.

Following the consultation, a separate HRA has been requested by Natural England for DMP 2022 to ensure that all drought permit options are subject to a stage 1 screening and stage 2 appropriate assessment, if LSEs are identified. This includes THUN, FULL and WHIH, that have been identified in the Environmental Assessment Reports (EARs) as drought permits that have the potential to impact on qualifying features of the Lee Valley SPA and Ramsar site.

Affinity Water have also held a number of meetings during the preparation of the draft DMP, including several meetings focused on the proposed approach to the environmental assessments which are documented in the DMP 2022 Environmental Assessment Methodology18. Environmental Assessment Methodology was prepared prior to preparation of Affinity Water's new DMP and set out the methodologies for undertaking the environmental assessments to inform Affinity Water's DMP 2022 and provided a platform for the Environment Agency, Natural England and other stakeholders to influence the methods, data considerations and outputs of the environmental assessment documents.

This HRA will be updated and submitted in support of an actual application for a drought permit, should one be required in the future, and key stakeholders will be further consulted as part of the overall drought permit application process.

1.8 Structure of report

The remainder of this report is divided into the following sections:

Section 2 Methodology

Section 3 HRA Stage 1 Screening of Drought Permits

Section 4 Information to Inform Stage 2 Appropriate Assessment

Section 5 Stage 2 Appropriate Assessment

Section 6 Potential In-Combination Effects

Section 7 Conclusions and Recommendations

[18] Affinity Water (2021). Affinity Water Drought Plan 2022. Environmental Assessment Methodology. January 2021.

2 Methodology

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

HRA screening was therefore completed for all of the drought options considered in the development of the draft DMP 2022. As recommended in the UKWIR Guidance19, regarding existing abstraction licences, the HRA screening has reviewed the outcome of the Review of Consents undertaken by the Environment Agency.

2.1 Identification of European Sites for Assessment

Firstly, to provide an indication of LSEs on a European site(s), those options that are within 10km of a European site or hydrologically connected have been identified. This distance-based threshold has been used in accordance with UKWIR guidance19. Consideration was also given to the relative locations of drought permits and European site(s) 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 qualifying features including habitats and species has also been taken into account. GIS data were used to assess and map the locations and boundaries of European sites within or adjacent to the Affinity Water WRZs20 and hydrologically connected to drought permits using publicly available data from Natural England.

The locations of the drought permits were also mapped to establish their geographic proximity to the European sites.

2.2 Stage 1 Screening

The stage 1 screening was undertaken using available evidence and professional judgement, taking into account potential extent, complexity, duration, frequency, reversibility and probability of LSEs on European sites. The qualifying habitats and species of European sites are vulnerable to a wide range of impacts such as physical loss or damage of habitat, disturbance from noise, light, human presence, changes in hydrology (e.g., changes in water levels/flow, flooding), changes in water or air

19 UKWIR (2021). Environmental Assessments for Water Resources Planning. UK Water Industry Limited Research Limited 21/WR/02/15

20 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.'

quality and biological disturbance (e.g., direct mortality, introduction of disease or non-native species).

To inform the screening assessment and identify potential LSEs, the attributes and targets of European sites, which contribute to and define their integrity, were considered with reference to conservation objectives and supplementary advice (where available) for SACs and SPAs and Information Sheets for Ramsar sites21. In addition, the following data sources were also considered:

- Standard data forms;
- Relevant citation documents;
- Site Improvement Plans (SACs and SPAs);
- Review of Consents information available from the Environment Agency;
- Article 12 (SPAs) and Article 17 (SACs) status reports;
- SSSI condition assessments and Impact Risk Zones (IRZs);
- 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.

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 study area was determined through consideration of hydrological, geomorphological and/ or hydrogeological data, together with baseline ecological data to define the extent of hydrological catchments and river reaches potentially impacted by each drought permit (See Methodology Report Section 3.5 and 3.6 for more detail)22. Potential hydrological connectivity via groundwater was assessed initially by review of British Geological Society aquifer, bedrock (See **Appendix 1**) and superficial deposit datasets in relation to the drought permit location and European site(s). Hydrological connectivity by surface water was assessed by review of Ordnance Survey maps.

As set out in the methodology report and the EARs, any habitats that are considered to be potentially impacted (with respect to direct groundwater impacts) were only considered for further assessment if the following criteria were met:

21 These were obtained from the Joint Nature Conservation Committee and Natural England websites (www.jncc.gov.uk and www.naturalengland.org.uk).

22 Affinity Water (2021). Affinity Water Drought Plan 2022 Environmental Assessment, Methodology Report. Affinity Water. 1 – 41.

- The maximum additional drawdown somewhere under the site is at least 1 cm; and
- The water table somewhere under the site is within 1 m of the ground surface.

No construction works are required for the proposed drought permits and therefore, the likely significant effects of the operational phase of the drought permits has been reviewed and assessed.

Where uncertainty remains after screening, and it cannot be concluded that a drought permit is not likely to have significant effects on the qualifying features of a European site, the drought permit should be taken forward to stage 2, which requires a full appropriate assessment of that drought permit to be undertaken.

2.3 Stage 2 Appropriate Assessment

Where a risk of likely significant effect was identified for Affinity Water's drought permits at the screening stage (noting the precautionary principle), the scheme was subject to a Stage 2 appropriate assessment.

Further assessment was, therefore, undertaken to identify the specific attributes and targets of each qualifying feature that could be adversely affected by the drought permit and, if required, identify potential mitigation measures to prevent adverse effects. This considered Affinity Water's drought permits alone and in-combination.

The appropriate assessment considered the potentially damaging aspects of Affinity Water's drought permits during both construction and operation, and the potential effects on the associated European site's qualifying features and achievement of the conservation objectives and will characterise the impacts in terms of their likelihood, nature, scale, severity and duration.

The potential for adverse effects on the integrity of a European 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 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.

Groundwater modelling was completed using the Herfordshire Chalk (Herts) Environment Agency regional model23 to simulate the effect of groundwater abstraction under drought conditions and inform the appropriate assessment of the potential adverse effects on European site(s) and functionally linked habitat.

23 Stantec UK Limited (2021). Technical Note: Affinity Water Drought Permit Environmental Assessment: Groundwater Modelling and Hydrogeological Appraisal. Prepared for Affinity Water, 1 – 101.

2.3.1 Impacts

To determine adverse effect on site integrity, the following parameters were used as appropriate to define the impact (i.e., mechanism by which effects are caused):

- Impact type - direct or indirect, positive or negative
- Magnitude of impact – the 'amount' or intensity of an impact. This may sometimes be synonymous with 'extent' (see below) for certain impacts, such as habitat loss.
- Extent of impact – the area over which the impact will be felt.
- Duration of impact – how long it will occur. The guidelines suggest that ecological impact durations should be described in terms of ecological characteristics (e.g. species lifecycles/ longevity) rather than human timeframes. The definitions of duration based on this approach and using professional judgement are detailed in **Table 2.1**. In relation to drought permits, the time required to regenerate groundwater prior to implementation will determine the duration of the impact.
- Timing of impact – when it will occur, taking note of seasonality.
- Frequency of impact – how often it will occur.
- Reversibility of impact – whether recovery or reinstatement is possible.

Table 2.1 Definitions of impact duration.

Duration	Habitats	Species
Short-term	The typical regrowth period for many submerged macrophytes, grass and herb communities – as a rough guide, up to two years	Impact is measurable up to one (breeding/wintering, migration, spawning etc.) season – as a rough guide, up to a year for fauna
Medium-term	The typical regrowth period for many shrub and hedge communities, slower growing macrophytes and reedbeds – as a rough guide, two to eight years	Impact is measurable up to one typical reproductive lifespan (in the wild). This varies depending on species, but generally anything from one year to 5 years as a rough guide for most fauna
Long-term	A period lasting longer than the typical scrub/hedge regrowth period – as a rough guide, more than 8 years	Impact is measurable over several (species) generations
Permanent	An impact where no reasonable chance of recovery/restoration is evident within the foreseeable future	

These impacts then need to be considered in terms of the effects to the qualifying habitats and species.

2.3.2 Adverse Effect

Where required, the possible impacts associated with each drought option were considered in the context of their effect on the qualifying features for the sites under consideration.

An adverse effect on integrity (AEoI) is likely to be one which prevents the site from making the same contribution to favourable conservation status for the relevant feature as it did at the time of designation. In addition, an adverse effect would be one which caused a detectable reduction of the features for which a site was designated, at the scale of the site rather than at the scale of the location of the impact.

The Habitats Directive defines the conservation status of habitats as 'favourable' when:

- Its natural range and area it covers within that range are stable or increasing; and
- The species structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future.
- The Habitats Directive defines the conservation status of species as 'favourable' when:
- Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats;
- The natural range of the species is neither being reduced for the foreseeable future; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

2.3.3 Integrity Test

The integrity test is the conclusion of an appropriate assessment and requires the competent authority to ascertain whether Affinity Water's proposed drought permits (either alone or in-combination with other plans or projects), will have no adverse effect on site integrity.

The Managing Natura 2000 guidance document[24] contains helpful guidance as to the meaning of "integrity" for the purpose of addressing the provision of Article 6 of the Habitats Directive. It states at section 4.6.4 that: *"The 'integrity of the site' can be*

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usefully defined as the coherent sum of the site's ecological structure, function and ecological processes, across its whole area, which enables it to sustain the habitats, complex of habitats and / or populations of the species for which the site is designated."

The text box at the foot of page 47 of the Managing Natura 2000 guidance document goes on to state: "*The integrity of the site involves its constitutive characteristics and ecological functions. The decision as to whether it is adversely affected should focus on and be limited to the habitats and species for which the site has been designated and the site's conservation objectives.*"

Section 4.6.4 is also helpful in defining the types of effect which could constitute an adverse effect on integrity. It is stated: "*It is clear from the context and from the purpose of the Directive that the 'integrity of a site' relates to the site's conservation objectives (see point 4.6.3 above). For example, it is possible that a plan or project will adversely affect the site only in a visual sense or only affect habitat types or species other than those listed in Annex I or Annex II for which the site has been designated. In such cases, the effects do not amount to an adverse effect for purposes of Article 6(3).*

In other words, if none of the habitat types or species for which the site has been designated is significantly affected then the site's integrity cannot be considered to be adversely affected.

However, if just one of them is significantly affected, taking into account the site's conservation objectives, then the site integrity is necessarily adversely affected."

It is further stated that: "*The integrity of the site involves its constitutive characteristics and ecological functions. The decision as to whether it is adversely affected should focus on and be limited to the habitats and species for which the site has been designated and the site's conservation objectives.*"

It is also necessary to note the Holohan judgment. That judgment emphasises that it may be necessary to look wider than the listed interest features when assessing against integrity. In that case the ECJ stated: "*Article 6(3) of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora must be interpreted as meaning that an 'appropriate assessment' must, on the one hand, catalogue the entirety of habitat types and species for which a site is protected, and, on the other, identify and examine both the implications of the proposed project for the species present on that site, and for which that site has not been listed, and the implications for habitat types and species to be found outside the boundaries of that site, provided that those implications are liable to affect the conservation objectives of the site.*" *[emphasis added]*

2.4 Review of Potential In-combination Effects

Under Regulation 63 of the Conservation of Habitats and Species Regulations 2017 amended an in-combination assessment of the proposed plan with other plans or

projects is required where low level, residual effects are identified during stage 1 screening and/ or stage 2 appropriate assessment.

For the purpose of this HRA, an in-combination assessment has been completed regardless of the presence/absence of any potential low level/residual effects. This is to ensure that all relevant plans/projects are listed and considered. This will reduce the time and effort required should the HRA for any of the drought permits be updated at the time of application.

The review has therefore considered the in-combination effects of the drought permits in Affinity Water's draft DMP 2022 with a number of plans and projects that could have an impact on the European sites identified within this HRA, as follows:

- Inter-option effects within Affinity Water draft DMP 2022;
- Affinity Water WRMP19;
- Other water company WRMPs and DMPs;
- Thames River Basin Management Plan (RBMP) 2015 and the Severn RBMP 2015;
- Environment Agency Regional DMPs;
- Environment Agency River Thames Scheme;
- Other major planned infrastructure schemes; and
- Lee Valley Regional Park Authority Plans

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 DMPs and therefore further updates may be required to the HRA in-combination assessment at the time of application for any of the drought permits.

2.5 Drought Contingency Planning Environmental Assessments

EARs have been prepared for the drought permits identified in **Table 1.1**, to support Affinity Water's DMP.

The aim of these studies was 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.

3 HRA Stage 1 Screening of Drought Permits

3.1 Potential Likely Significant Effects of Drought Permits

A total of nine drought permits were screened and each drought permit was identified as being either within 10km of a European site or where a source receptor pathway beyond 10km could occur. Both WHIH and FULL are located >10km from Lee Valley SPA/ Ramsar but have been screened into the stage 1 assessment due to potential hydrological connectivity. These are shown **in Figure 3.1-3.3.** The HRA stage 1 screening matrix for this assessment is presented in **Table 3.1**.

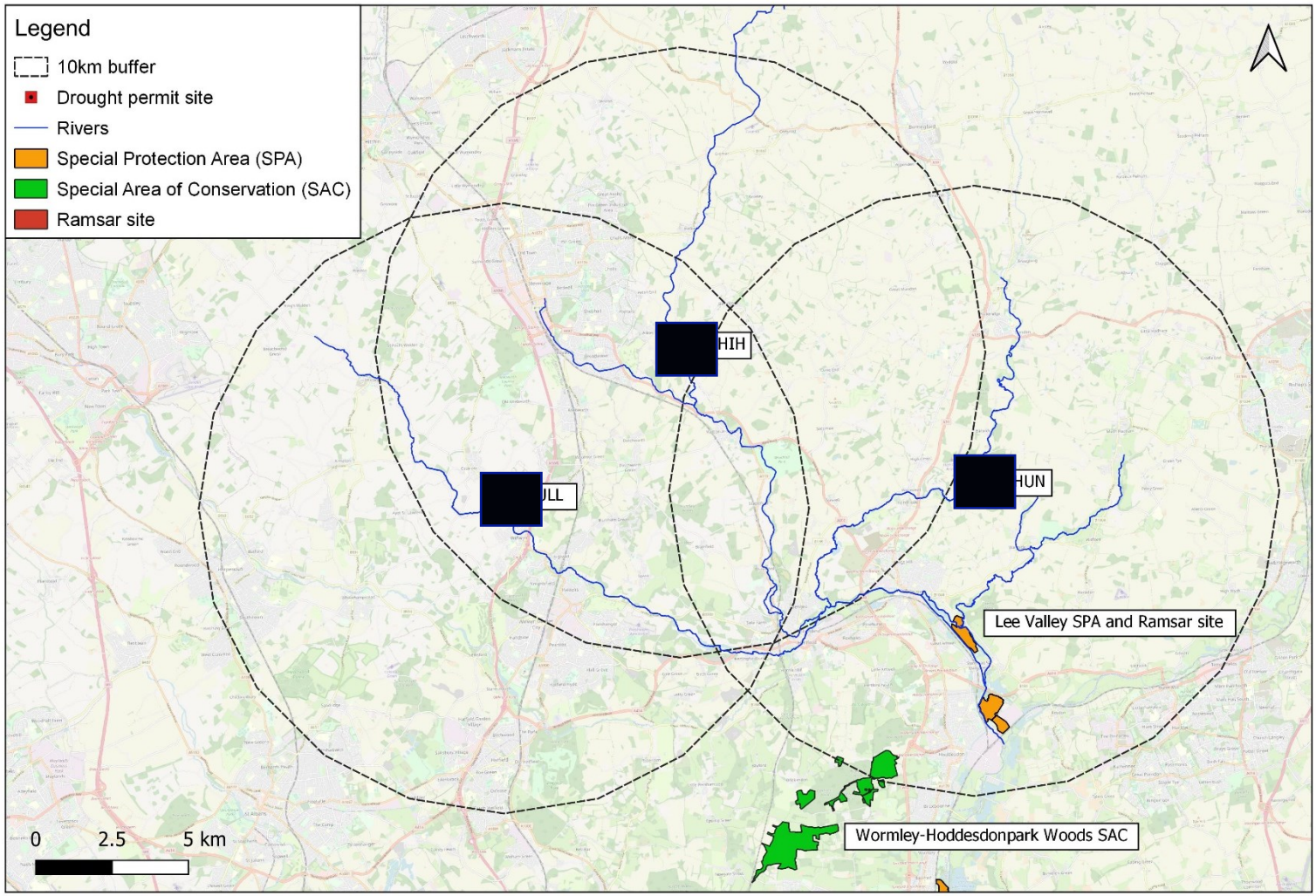

Figure 3.1 THUN, WHIH and FULL drought permit locations in relation to European sites with a 10km buffer.

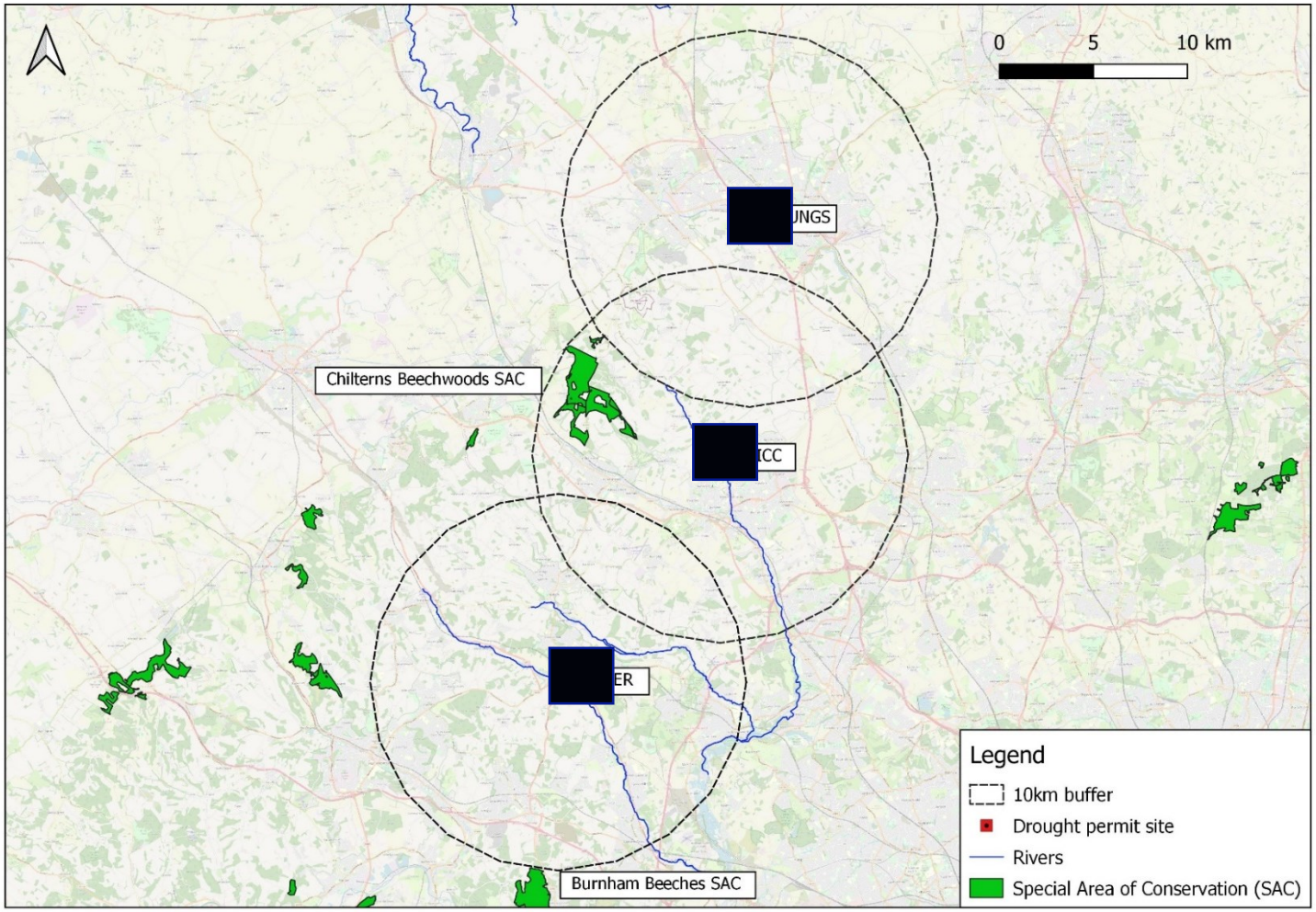

Figure 3.2 RUNGS, PICC and AMER drought permit locations in relation to European sites with a 10km buffer.

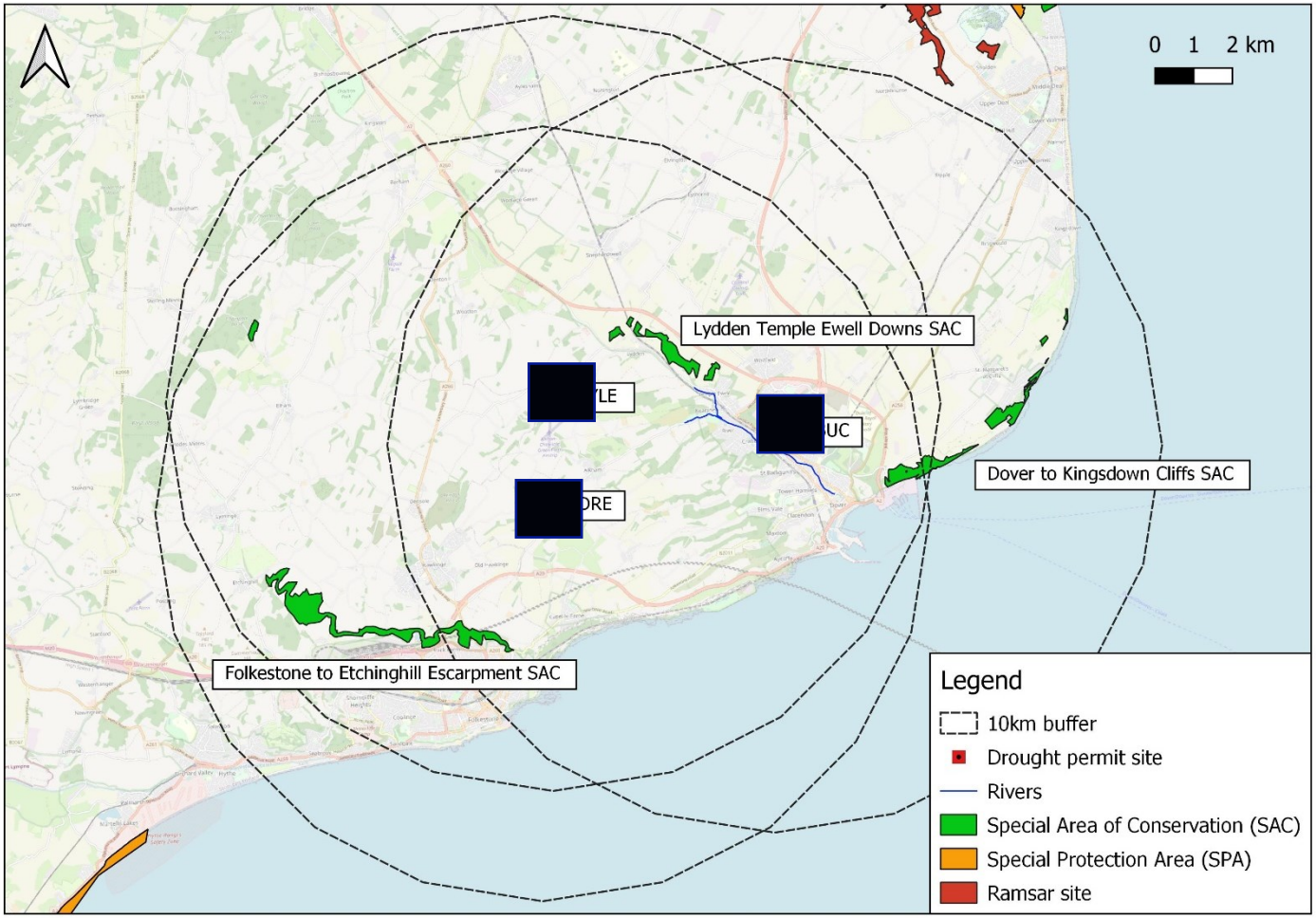

Figure 3.3 SLYE, SDRE and SBUC drought permit locations in relation to European sites with a 10km buffer.

Table 3.1 Screening assessments of identified European sites that could potentially be affected (within 10km radius and/or hydrologically connected) by Affinity Water's proposed drought permit options.

Designated site name:	**Lee Valley (UK9012111)**	
Designation type: (SAC, SPA, Ramsar):	**SPA**	
Qualifying features:	A021 *Botaurus stellaris*; Great bittern (wintering) A051 *Anas strepera*; Gadwall (wintering) A056 *Anas clypeata*; Northern shoveler (wintering)	**Water Dependency** All qualifying species of the Lee Valley SPA are water dependent25.
Current conservation status:	**A021 *Botaurus stellaris*; Great bittern** Wintering UK status: short term – increasing, long term – increasing. At Lee Valley SPA - type: non-breeding, size: minimum – 6, maximum 6, represented 6% of the British population (5-year peak mean 1993/94 – 1997/98 based on WeBS data supplied by BTO); unit: individual, data quality: good, population: 2 – 15%, isolation: population not-isolated within extended distribution range. **A051 *Anas strepera*; Gadwall** Wintering UK status: short term – increasing, long term – increasing. At Lee Valley SPA - type: non-breeding, size: minimum – 456, maximum 456, represented 1.5% of the North West European population (5-year peak mean 1993/94 – 1997/98 based on WeBS data supplied by BTO); unit: individual, data quality: good, population: <2%, isolation: population not-isolated within extended distribution range. **A056 *Anas clypeata;* Northern shoveler Wintering UK status:** short term – increasing, long term – increasing. At Lee Valley SPA - type: non-breeding, size: minimum –406, maximum 406, represented 1% of the North West/Central European population (5-year peak mean 1993/94 – 1997/98 based on WeBS data supplied by BTO); unit: individual, data quality: good, population: <2%, isolation: population not-isolated within extended distribution range.	

25 UK Technical Advisory Group on the Water Framework Directive (2003). Guidance on the Identification of Natura Protected Areas (Final). TAG Work Programme Task 4.a – Identification of Natura Protected Areas. 1 – 20.

Designated site name:	Lee Valley (UK9012111)		
Conservation objectives:	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring; • The extent and distribution of the habitats of the qualifying features; • The structure and function of the habitats of the qualifying features; • The supporting processes on which the habitats of the qualifying features rely; • The population of each of the qualifying features; and • The distribution of the qualifying features within the site.		
SSSI Condition assessment:	Amwell quarry SSSI: 100% Favourable; Rye Meads SSSI: Favourable 39.95% and Unfavourable – Recovering 60.05%; Turnford and Cheshunt Pits SSSI: 100% Favourable; and Walthamstow Reservoirs SSSI: 100% Unfavourable – Recovering.		
Site Improvement Plan:	1. Water pollution – Threat – A021 Great bittern, A051 Gadwall and A056 Northern shoveler – Investigate and agree appropriate water quality. 2. Hydrological changes – Threat - A021 Great bittern, A051 Gadwall and A056 Northern shoveler – Investigate and agree appropriate water levels. 3. Public access/ disturbance – Threat - A021 Great bittern, A051 Gadwall and A056 Northern shoveler – Investigate recreational pressure priority areas and agree management measures. 4. Inappropriate scrub control – Threat - A021 Great bittern, A051 Gadwall and A056 Northern shoveler – Manage scrub to required levels to maintain/ restore habitat. 5. Fisheries: fish stocking – Threat - A021 Great bittern, A051 Gadwall and A056 Northern shoveler – Investigate and agree appropriate fish stocking. 6. Invasive species – Threat – A021 Great bittern, A051 Gadwall and A056 Northern shoveler – Investigate and agree appropriate management responses. 7. Inappropriate cutting/ mowing – A021 Great bittern – Manage reed beds for Great bitterns. 8. Air pollution: risk of atmospheric nitrogen deposition – Threat – A021 Great bittern – Investigate the potential impacts of air pollution.		
Potential Effects			
Option	Screening assessment	Likely significant effects alone?	If no likely significant effects alone:

Designated site name:	Lee Valley (UK9012111)		
			residual low-level effect requiring in-combination assessment?
THUN	The Lee Valley SPA is approximately 4.2km south of the THUN drought permit. No construction works are proposed as part of the drought permit. During operation of the drought permit, the drawdown extent overlaps with the boundaries of the Lee Valley SPA; more specifically with the underpinning SSSI, Amwell quarry. If Amwell quarry is hydrologically connected to groundwater and therefore, reliant on groundwater supply, there is a risk that implementation of the drought permit could result in a decrease in water quantity within Amwell quarry, lowering the water depth and therefore, the suitability of the site to support wintering populations. Based on groundwater modelling results the implementation of the THUN drought permit will result in a maximum additional drawdown of 1.2cm alone. Therefore, likely significant effects cannot be ruled out alone at this stage, on the extent and distribution of standing open water non-breeding habitat and water quantity.	Yes	N/A
WHIH	The Lee Valley SPA is approximately 12.6km south-east of the WHIH drought permit. No construction works are proposed as part of the drought permit. During operation of the drought permit, the drawdown extent overlaps with the boundaries of the Lee Valley SPA; more specifically with the underpinning SSSI, Amwell quarry. If Amwell quarry is hydrologically connected to groundwater and therefore, reliant on groundwater supply, there is a risk that implementation of the drought permit could result in a decrease in water quantity	No	Yes

Designated site name:	Lee Valley (UK9012111)		
	within Amwell quarry, lowering the water depth and therefore, the suitability of the site to support wintering populations. Based on groundwater modelling results the implementation of the WHIH drought permit will result in a maximum additional drawdown of 0.1cm alone. Therefore, no likely significant effects are anticipated alone on the qualifying features of the Lee Valley SPA.		
FULL	The Lee Valley SPA is approximately 15.2km south-east of the FULL drought permit. No construction works are proposed as part of the drought permit. During operation of the drought permit, the drawdown extent overlaps with the boundaries of the Lee Valley SPA; more specifically with the underpinning SSSI, Amwell quarry. If Amwell quarry is hydrologically connected to groundwater and therefore, reliant on groundwater supply, there is a risk that implementation of the drought permit could result in a decrease in water quantity within Amwell quarry, lowering the water depth and therefore, the suitability of the site to support wintering populations. Based on groundwater modelling results the implementation of the FULL drought permit will result in a maximum additional drawdown of 0.01cm alone. Therefore, no likely significant effects are anticipated on the qualifying features of the Lee Valley SPA.	No	Yes

Designated site name:	Lee Valley (UK11034)
Designation type:	Ramsar

Designated site name:	Lee Valley (UK11034)	
(SAC, SPA, Ramsar):		
Qualifying features:	Ramsar Criterion 2 The site supports the following nationally important and rare/vulnerable species: *Myriophyllum verticillatum*; whorled water-milfoil *Micronecta minutissima*; water boatman Ramsar Criterion 6 Species/ populations occurring at levels of international importance. Species with peak counts in spring/autumn: Anas strepera; Gadwall (wintering) - 445 individuals, representing an average of 2.6% of the British population (5-year peak mean 1998/9 – 2002/3). Species with peak counts in winter: Anas clypeata; Northern shoveler (wintering) - 287 individuals, representing an average of 1.9% of the British population (5-year peak mean 1998/9 – 2002/3).	Water Dependency All qualifying features identified as water dependent26.
Current conservation status:	N/A	

26 UK Technical Advisory Group on the Water Framework Directive (2003). Guidance on the Identification of Natura Protected Areas (Final). TAG Work Programme Task 4.a – Identification of Natura Protected Areas. 1 – 20.

Designated site name:	**Lee Valley (UK11034)**		
Conservation objectives:	Information not currently available.		
SSSI Condition assessment:	Amwell quarry SSSI: 100% Favourable; Rye Meads SSSI: Favourable 39.95% and Unfavourable – Recovering 60.05%; Turnford and Cheshunt Pits SSSI: 100% Favourable; and Walthamstow Reservoirs SSSI: 100% Unfavourable – Recovering.		
Site Improvement Plan:	Information not currently available.		
Potential Effects			
Option	Screening assessment	Likely significant effects alone?	If no likely significant effects alone: residual low-level effect requiring in-combination assessment?
THUN	The Lee Valley Ramsar site is approximately 4.2km south of the THUN drought permit. No construction works are proposed as part of the drought permit. During operation of the drought permit, the drawdown extent overlaps with the boundaries of the Lee Valley SPA; more specifically with the underpinning SSSI, Amwell quarry. If Amwell quarry is hydrologically connected to groundwater and therefore, reliant on groundwater supply, there is a risk that implementation of the drought permit could result in a decrease in water quantity within Amwell quarry, lowering the water depth and therefore, the suitability of the site to support wintering birds and aquatic invertebrates. Based on groundwater modelling results the implementation of the THUN drought permit will potentially result in a maximum additional	Yes	N/A

Designated site name:	Lee Valley (UK11034)		
	drawdown of 1.2cm alone. Therefore, likely significant effects alone cannot be ruled out at this stage on the extent and distribution of standing open water habitat and water quantity that could impact on qualifying birds and invertebrates.		
WHIH	The Lee Valley Ramsar site is approximately 12.6km south-east of the WHIH drought permit. No construction works are proposed as part of the drought permit. During operation of the drought permit, the drawdown extent overlaps with the boundaries of the Lee Valley SPA; more specifically with the underpinning SSSI, Amwell quarry. If Amwell quarry is hydrologically connected to groundwater and therefore, reliant on groundwater supply, there is a risk that implementation of the drought permit could result in a decrease in water quantity within Amwell quarry, lowering the water depth and therefore, the suitability of the site to support wintering birds and aquatic invertebrates. Based on groundwater modelling results the implementation of the WHIH drought permit will result in a maximum additional drawdown of 0.1cm alone. Therefore, no likely significant effects are anticipated on the qualifying features of the Lee Valley Ramsar site.	No	Yes
FULL	The Lee Valley Ramsar site is approximately 15.2km south-east of the FULL drought permit. No construction works are proposed as part of the drought permit. During operation of the drought permit, the drawdown extent overlaps with the boundaries of the Lee Valley SPA; more specifically with the underpinning SSSI, Amwell quarry. If Amwell quarry is hydrologically connected to groundwater and therefore, reliant on groundwater supply, there is a risk that implementation of the drought permit could result in a decrease in water quantity within Amwell quarry,	No	Yes

Designated site name:	Lee Valley (UK11034)		
	lowering the water depth and therefore, the suitability of the site to support wintering birds and aquatic invertebrates. Based on groundwater modelling results the implementation of the FULL drought permit will result in a maximum additional drawdown of 0.01cm alone. Therefore, no likely significant effects alone are anticipated on the qualifying features of the Lee Valley Ramsar site.		

Designated site name:	Wormley-Hoddesdonpark Woods (UK0013696)	
Designation type: (SAC, SPA, Ramsar):	SAC	
Qualifying features:	H9160 Sub-Atlantic and medio-European oak or oak-hornbeam forests	Water Dependency Qualifying feature is not water dependent27.
Current conservation status:	**H9160 Sub-Atlantic and medio-European oak or oak-hornbeam forests: Unfavourable – bad** (range: favourable, area: favourable, structure and function: favourable, future prospects: unfavourable – bad and overall trend: stable).	

27 UK Technical Advisory Group on the Water Framework Directive (2003). Guidance on the Identification of Natura Protected Areas (Final). TAG Work Programme Task 4.a – Identification of Natura Protected Areas. 1 – 20.

Designated site name:	Wormley-Hoddesdonpark Woods (UK0013696)		
Conservation objectives:	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure 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; The structure and function (including typical species) of qualifying natural habitats; and The supporting processes on which qualifying natural habitats rely.		
SSSI Condition assessment:	Wormley-Hoddesdonpark Wood South SSSI: Favourable 100%; and Wormley-Hoddesdonpark Wood North SSSI: Favourable 88.58%, unfavourable – recovering 7.67%, unfavourable – declining 3.17% and unfavourable – no change 0.58%.		
Site Improvement Plan:	Disease – Threat – H9160 Oak-hornbeam forests – Survey SAC and adjacent woodlands for disease and advice owners. Invasive species – Threat – H9160 Oak-hornbeam forests – Survey SAC and adjacent woodlands for invasive species and advice owners. Air pollution: risk of atmospheric nitrogen deposition – Threat – H9160 Oak-hornbeam forests – Further investigate the impacts of atmospheric nitrogen deposition. Deer – Threat – H9160 Oak-hornbeam forests – Improve and extend monitoring of deer impacts and advice owners. Vehicles: illicit – Pressure – H9160 Oak-hornbeam forests – Improve and extend monitoring of deer impacts and advise owners. Forestry and woodland management – Threat – H9160 Oak-hornbeam forests – Promote Countryside Stewardship Scheme woodland management options for units requiring active management. Public access/ disturbance – Threat – H9160 Oak-hornbeam forests – Monitor site features sensitive to disturbance and take remedial action.		
Potential Effects			
Option	Screening assessment	Likely significant effects alone?	If no likely significant effects alone:

Designated site name:	Wormley-Hoddesdonpark Woods (UK0013696)		
			residual low-level effect requiring in-combination assessment?
THUN	The Wormley-Hoddesdonpark Woods SAC is approximately 8.9km south-west of the proposed drought option. As no construction is required as part of the drought option and the qualifying feature of the SAC is not water dependent, no impact pathways have been identified during operation. Therefore, no likely significant effects alone are anticipated as a result of THUN drought permit implementation.	No	No
FULL	The Wormley-Hoddesdonpark Woods SAC is approximately 3.1km south-west of potentially affected reaches as a result of the FULL drought permit. As no construction is required as part of the drought option and the qualifying feature of the SAC is not water dependent, no impact pathways have been identified during operation. Therefore, no likely significant effects are anticipated alone as a result of FULL drought permit implementation.	No	No

Designated site name:	Chilterns Beechwoods (UK0012724)
Designation type: (SAC, SPA, Ramsar):	**SAC**

Designated site name:	Chilterns Beechwoods (UK0012724)	
Qualifying features:	S1083 *Lucanus cervus;* Stag beetle H6210 Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) H9130 *Asperulo-Fagetum* Beech forests	**Water Dependency** Qualifying features are not water dependent28.
Current conservation status:	**H6210 Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*): Unfavourable - Bad** (range: favourable area: favourable, structure and function: unfavourable - bad, Future prospects: unfavourable – bad, overall trend in conservation status: stable). **H9130 *Asperulo-Fagetum* Beech forests: Unfavourable - Bad** (range: favourable area: unfavourable - inadequate, structure and function: unfavourable - bad, future prospects: unfavourable – bad and overall trend in conservation status: stable) **S1083 *Lucanus cervus;* Stag beetle: Favourable** (range: favourable, population: favourable, habitat: unknown, future prospects: favourable and overall trend in conservation status: stable)	
Conservation objectives:	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure 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.	
SSSI Condition assessment:	Naphill Common SSSI: 100% Favourable; Bisham Woods SSSI: 97.37% Favourable and 2.63% unfavourable - recovering; Windsor Hill SSSI: 26.56% Favourable and 73.44% unfavourable - recovering; Tring Woodlands SSSI: 100% Unfavourable - recovering; Hollowhill & Pullingshill Woods SSSI: 100% Favourable; Ellesborough & Kimble Warrens SSSI: 10.75% Favourable and 89.25% unfavourable - recovering; Bradenham Woods, Park Wood &	

28 UK Technical Advisory Group on the Water Framework Directive (2003). Guidance on the Identification of Natura Protected Areas (Final). TAG Work Programme Task 4.a – Identification of Natura Protected Areas. 1 – 20.

Designated site name:	**Chilterns Beechwoods (UK0012724)**		
	The Coppice SSSI: 100% Favourable; Ashridge Commons & Woods SSSI: 86.33% Favourable and 13.67% unfavourable - recovering; and Aston Rowant Woods SSSI: 100% Favourable.		
Site Improvement Plan:	1. Forestry and woodland management – Pressure/ Threat – H9130 Beech forests - Secure appropriate woodland management. 2. Deer – Pressure/Threat - H9130 Beech forests - Improve deer management. 3. Changes in species distributions – Threat - S1083 Stag beetle - Monitor stag beetle population. 4. Invasive species – Pressure/Threat - H9130 Beech forests - Investigate the impacts of grey squirrel. 5. Disease – Threat – H9130 Beech forests - Address box blight and other diseases. 6. Public access/ disturbance – Threat – S1083 Stag beetle - Reduce visitor impact on dead wood. 7. Air pollution: impact of atmospheric nitrogen deposition – Pressure - H6210 Semi-natural dry grasslands and scrubland facies, H9130 Beech forests, S1083 Stag beetle - Establish a Site Nitrogen Action Plan.		
Potential Effects			
Option	Screening assessment	Likely significant effects alone?	If no likely significant effects alone: residual low-level effect requiring in-combination assessment?
RUNGS	The Chilterns Beechwoods SAC is approximately 9.9km south-west of the proposed drought option. Minor construction works are proposed for this drought option. However, due to the distance from the European site no direct impacts to qualifying habitats have been identified. Stag beetles are known to disperse up to 1km from supporting habitat sites. Based on the distance of Chilterns Beechwoods SAC to the proposed construction works and lack of supporting habitat present, no impact pathways have been identified. Qualifying features are also not water dependent.	No	No

Designated site name:	Chilterns Beechwoods (UK0012724)		
	Therefore, no likely significant effects are anticipated alone as a result of RUNGS drought permit implementation.		
PICC	The Chilterns Beechwoods SAC is approximately 4.6km north-west of the abstraction point associated with PICC drought permit. As no construction is required as part of the drought permit and the qualifying feature of the SAC is not water dependent, no impact pathways have been identified during operation. Therefore, no likely significant effects are anticipated alone as a result of PICC drought permit implementation.	No	No
AMER	The Chilterns Beechwoods SAC is approximately 6.6km south-west of potentially effected reaches. As no construction is required as part of the drought permit and the qualifying feature of the SAC is not water dependent, no impact pathways have been identified during operation. Therefore, no likely significant effects are anticipated alone as a result of AMER drought permit implementation.	No	No

Designated site name:	Burnham Beeches (UK0030034)	
Designation type: (SAC, SPA, Ramsar):	**SAC**	
Qualifying features:	H9120 Atlantic acidophilous beech forests with Ilex	**Water Dependency** Qualifying feature is not water dependent29.
Current conservation status:	**H9120 Atlantic acidophilous beech forests with Ilex: Unfavourable - bad** (range: favourable, area: unfavourable - inadequate, structure and function: unfavourable - bad, future prospects: unfavourable – bad and overall trend: stable).	
Conservation objectives:	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure 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.	
SSSI Condition assessment:	Burnham Beeches SSSI: Favourable 62.63% and unfavourable – recovering 37.37%.	
Site Improvement Plan:	1. Air pollution: risk of atmospheric nitrogen deposition – Threat – H9120 Atlantic acidophilous beech forests with Ilex – Implementation of nutrient management strategy. 2. Public access/ disturbance – Pressure/ Threat – H9120 Atlantic acidophilous beech forests with Ilex – Continuation of the access management strategy in the National Nature Reserve.	

29 UK Technical Advisory Group on the Water Framework Directive (2003). Guidance on the Identification of Natura Protected Areas (Final). TAG Work Programme Task 4.a – Identification of Natura Protected Areas. 1 – 20.

Designated site name:	Burnham Beeches (UK0030034)		
	3. Habitat fragmentation – Pressure – H9120 Atlantic acidophilous beech forests with Ilex – Provision of clear advice to local planning authorities 4. Deer – Pressure/ Threat – H9120 Atlantic acidophilous beech forests with Ilex – Provision of advice to landowners on deer management. 5. Species decline – Pressure/ Threat – H9120 Atlantic acidophilous beech forests with Ilex – Implementation of specific management to promote future veteran trees. 6. Invasive species – Threat – H9120 Atlantic acidophilous beech forests with Ilex – Develop a survey and monitoring strategy and implement control measures as necessary.		
Potential Effects			
Option	Screening assessment	Likely significant effects alone?	If no likely significant effects alone: residual low-level effect requiring in-combination assessment?
PICC	The Burnham Beeches SAC is approximately 9.3km west potentially impacted reaches due to PICC drought permit. As no construction is required as part of the drought permit and the qualifying feature of the SAC is not water dependent, no impact pathways have been identified during operation. Therefore, no likely significant effects are anticipated alone as a result of PICC drought permit implementation.	No	No
AMER	The Chilterns Beechwoods SAC is approximately 5.7km south-west of potentially effected reaches. As no construction is required as part of the drought permit and the qualifying feature of the SAC is not water dependent, no impact pathways have been identified during operation. Therefore, no likely significant effects are anticipated alone as a result of AMER drought permit implementation.	No	No

Designated site name:	Lydden and Temple Ewell Downs (UK0012834)	
Designation type: (SAC, SPA, Ramsar):	**SAC**	
Qualifying features:	H6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (*important orchid site)	**Water Dependency** Qualifying feature is not water dependent30.
Current conservation status:	**H6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (*important orchid site): Unfavourable – bad** (range: favourable, area: favourable, structure and function: unfavourable – bad, future prospects: unfavourable – bad and overall trend in conservation status: stable).	
Conservation objectives:	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure 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; - The structure and function (including typical species) of qualifying natural habitats; and - The supporting processes on which qualifying natural habitats rely.	
SSSI Condition assessment:	Lydden and Temple Ewell Downs SSSI: 86.10% favourable and 13.9% unfavourable – recovering.	
Site Improvement Plan:	1. Overgrazing – Pressure – H6210 Semi-natural dry grasslands and scrubland – Set up and implement rabbit control programme. 2. Public access/ disturbance – Threat - H6210 Semi-natural dry grasslands and scrubland – Produce and implement an access strategy.	

30 UK Technical Advisory Group on the Water Framework Directive (2003). Guidance on the Identification of Natura Protected Areas (Final). TAG Work Programme Task 4.a – Identification of Natura Protected Areas. 1 – 20.

Designated site name:	Lydden and Temple Ewell Downs (UK0012834)		
	3. Air pollution – impact of atmospheric nitrogen deposition - H6210 Semi-natural dry grasslands and scrubland – Control, reduce and ameliorate atmospheric nitrogen impacts.		
Potential Effects			
Option	Screening assessment	Likely significant effects alone?	If no likely significant effects alone: residual low-level effect requiring in-combination assessment?
SLYE	The Lydden and Temple Ewell Downs SAC is approximately 2.2km north-east from the borehole site. As no construction is required as part of the drought permit and the qualifying feature of the SAC is not water dependent, no impact pathways have been identified during operation. Therefore, no likely significant effects are anticipated alone as a result of SLYE drought permit implementation.	No	No
SDRE	The Lydden and Temple Ewell Downs SAC is approximately 5.1km north-east from the borehole site. As no construction is required as part of the drought permit and the qualifying feature of the SAC is not water dependent, no impact pathways have been identified during operation. Therefore, no likely significant effects are anticipated alone as a result of SDRE drought permit implementation.	No	No
SBUC	The Lydden and Temple Ewell Downs SAC is approximately 2.4km north-west from the borehole site. As no construction is required as part of the drought permit and the qualifying feature of the SAC is not water dependent, no impact pathways have been identified during operation. Therefore, no	No	No

Designated site name:	Lydden and Temple Ewell Downs (UK0012834)		
	likely significant effects are anticipated alone as a result of SBUC drought permit implementation.		

Designated site name:	Folkestone to Etchinghill Escarpment (UK0012835)	
Designation type: (SAC, SPA, Ramsar):	**SAC**	
Qualifying features:	H6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (*important orchid site)	**Water Dependency** Qualifying feature is not water dependent31.
Current conservation status:	**H6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (*important orchid site): Unfavourable – bad** (range: favourable, area: favourable, structure and function: unfavourable – bad, future prospects: unfavourable – bad and overall trend in conservation status: stable).	
Conservation objectives:	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure 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; - The structure and function (including typical species) of qualifying natural habitats; and - The supporting processes on which qualifying natural habitats rely.	
SSSI Condition assessment:	Folkestone to Etchinghill Escarpment SSSI: 69.95% favourable and 25.39% unfavourable – recovering, 2.67% unfavourable – declining and 1.99% unfavourable – no change.	

31 UK Technical Advisory Group on the Water Framework Directive (2003). Guidance on the Identification of Natura Protected Areas (Final). TAG Work Programme Task 4.a – Identification of Natura Protected Areas. 1 – 20.

Designated site name:	**Folkestone to Etchinghill Escarpment (UK0012835)**		
Site Improvement Plan:	1. Undergrazing – Pressure – H6210 Semi-natural dry grasslands and scrubland – Work with White Cliffs Countryside Partnership to secure sufficient grazing levels. 2. Inappropriate scrub control – Threat - H6210 Semi-natural dry grasslands and scrubland – Undertake scrub management at Creteway Down. 3. Air pollution: impact of atmospheric nitrogen deposition - H6210 Semi-natural dry grasslands and scrubland – Control, reduce and ameliorate atmospheric nitrogen impacts.		
Potential Effects			
Option	Screening assessment	Likely significant effects alone?	If no likely significant effects alone: residual low-level effect requiring in-combination assessment?
SLYE	The Folkestone to Etchinghill Escarpment SAC is approximately 6.1km south-west from the borehole site. As no construction is required as part of the drought permit and the qualifying feature of the SAC is not water dependent, no impact pathways have been identified during operation. Therefore, no likely significant effects are anticipated alone as a result of SLYE drought permit implementation.	No	No
SDRE	The Folkestone to Etchinghill Escarpment SAC is approximately 3.3km south-west from the borehole site. As no construction is required as part of the drought permit and the qualifying feature of the SAC is not water dependent, no impact pathways have been identified during operation. Therefore, no likely significant effects are anticipated alone as a result of SDRE drought permit implementation.	No	No

Designated site name:	Folkestone to Etchinghill Escarpment (UK0012835)		
SBUC	The Folkestone to Etchinghill Escarpment SAC is approximately 8.5km south-west from the borehole site. As no construction is required as part of the drought permit and the qualifying feature of the SAC is not water dependent, no impact pathways have been identified during operation. Therefore, no likely significant effects are anticipated alone as a result of SBUC drought permit implementation.	No	No

Designated site name:	Dover to Kingsdown Cliffs (UK0030330)	
Designation type: (SAC, SPA, Ramsar):	**SAC**	
Qualifying features:	H6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (*important orchid site) H1230 Vegetated sea cliffs of the Atlantic and Baltic coasts	**Water Dependency** H1230 Vegetated sea cliffs of the Atlantic and Baltic coasts are water dependent qualifying features32.
Current conservation status:	**H6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (*important orchid site): Unfavourable – bad** (range: favourable, area: favourable, structure and function: unfavourable – bad, future prospects: unfavourable – bad and overall trend in conservation status: stable). **H1230 Vegetated sea cliffs of the Atlantic and Baltic coasts: Unfavourable – bad** (range: favourable, area: unfavourable - inadequate, structure and function: unfavourable – bad, future prospects: unfavourable – bad and overall trend in conservation status: deteriorating).	

32 UK Technical Advisory Group on the Water Framework Directive (2003). Guidance on the Identification of Natura Protected Areas (Final). TAG Work Programme Task 4.a – Identification of Natura Protected Areas. 1 – 20.

Designated site name:	**Dover to Kingsdown Cliffs (UK0030330)**		
Conservation objectives:	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure 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; - The structure and function (including typical species) of qualifying natural habitats; and - The supporting processes on which qualifying natural habitats rely.		
SSSI Condition assessment:	Dover to Kingsdown Cliffs SSSI: favourable 61.34%, unfavourable – recovering 32.31% and unfavourable – no change 6.35%.		
Site Improvement Plan:	1. Inappropriate scrub control – Pressure – H6210 Semi-natural dry grasslands and scrubland – Control scrub through funding or supporting existing local partnership. 2. Undergrazing – Pressure - H6210 Semi-natural dry grasslands and scrubland – Sustain grazing management through funding or supporting the local partnership. 3. Air pollution: impact of atmospheric nitrogen deposition – Pressure – H6210 Semi-natural dry grasslands and scrubland – Control, reduce and ameliorate atmospheric nitrogen impacts.		
Potential Effects			
Option	Screening assessment	Likely significant effects alone?	If no likely significant effects alone: residual low-level effect requiring in-combination assessment?
SLYE	The Dover to Kingsdown Cliffs SAC is approximately 8.7km south-east from the borehole site. No construction work is required as part of the drought permit. Semi-natural dry grasslands and scrubland are also not classified as water dependent. As vegetated sea cliffs are water dependent there is a potential impact pathway due to reductions in groundwater supply associated with the drought permit. Vegetation associated with this qualifying feature includes rock	No	No

Designated site name:	Dover to Kingsdown Cliffs (UK0030330)		
	samphire *Crithmum maritimum*, rock sea lavender *Limonium binervosum* and thrift *Armeria maritima*. These species are reliant on surface water supply and salt spray associated with exposure to flood tides. Therefore, no likely significant effects are anticipated alone during the operation of SLYE drought permit implementation.		
SDRE	The Dover to Kingsdown Cliff SAC is approximately 8.9km east from the borehole site. No construction work is required as part of the drought permit. Semi-natural dry grasslands and scrubland are also not classified as water dependent. As vegetated sea cliffs are water dependent there is a potential impact pathway due to reductions in groundwater supply associated with the drought permit. Vegetation associated with this qualifying feature includes rock samphire, rock sea lavender and thrift. These species are reliant on surface water supply and salt spray associated with exposure to flood tides. Therefore, no likely significant effects are anticipated alone during the operation of SDRE drought permit implementation.	No	No
SBUC	The Dover to Kingsdown Cliff SAC is approximately 3km south-east from the borehole site. No construction work is required as part of the drought permit. Semi-natural dry grasslands and scrubland are also not classified as water dependent. As vegetated sea cliffs are water dependent there is a potential impact pathway due to reductions in groundwater supply associated with the drought permit. Vegetation associated with this qualifying feature includes rock samphire, rock sea lavender and thrift. These species are reliant on surface water supply and salt spray associated with exposure to flood tides.	No	No

Designated site name:	Dover to Kingsdown Cliffs (UK0030330)		
	Therefore, no likely significant effects are anticipated alone during the operation of SBUC drought permit implementation.		

Designated site name:	Parkgate Down (UK0030338)	
Designation type: (SAC, SPA, Ramsar):	SAC	
Qualifying features:	H6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia)	Water Dependency Qualifying feature is not water dependent33.
Current conservation status:	**H6210 Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*): Unfavourable - Bad** (range: favourable area: favourable, structure and function: unfavourable - bad, Future prospects: unfavourable – bad, overall trend in conservation status: stable).	
Conservation objectives:	Ensure that the integrity of the site is maintained or restored as appropriate, and ensure 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; • The structure and function (including typical species) of qualifying natural habitats; and • The supporting processes on which qualifying natural habitats rely.	
SSSI Condition assessment:	Parkgate Down SSSI: 100% favourable.	

33 UK Technical Advisory Group on the Water Framework Directive (2003). Guidance on the Identification of Natura Protected Areas (Final). TAG Work Programme Task 4.a – Identification of Natura Protected Areas. 1 – 20.

Designated site name:	**Parkgate Down (UK0030338)**		
Site Improvement Plan:	1. Habitat fragmentation – Threat – H6210 Semi-natural dry grasslands and scrubland facies: on calcareous substrates – Secure long term conservation management of adjacent land. 2. Air pollution: risk of atmospheric nitrogen deposition - H6210 Semi-natural dry grasslands and scrubland facies: on calcareous substrates – Further investigate potential atmospheric nitrogen impacts on the site.		
Potential Effects			
Option	Screening assessment	Likely significant effects alone?	If no likely significant effects alone: residual low-level effect requiring in-combination assessment?
SLYE	The Parkgate Down SAC is approximately 7.9km north-west from the borehole site. As no construction is required as part of the drought permit and the qualifying feature of the SAC is not water dependent, no impact pathways have been identified during operation. Therefore, no likely significant effects are anticipated alone as a result of SLYE drought permit implementation.	No	No
SDRE	The Parkgate Down SAC is approximately 8.8km north-west from the borehole site. As no construction is required as part of the drought permit and the qualifying feature of the SAC is not water dependent, no impact pathways have been identified during operation. Therefore, no likely significant effects are anticipated alone as a result of SDRE drought permit implementation.	No	No

3.2 HRA Screening Conclusions

A summary of the outcomes of the HRA screening process for Affinity Water's drought permits is presented below in **Table 3.2.**

Table 3.2 Summary of the outcomes of the Habitats Regulations Assessment stage 1 screening Assessment of Affinity Water's drought permits for Drought Management Plan 2022, indicating which require stage 2 appropriate assessment due to potential likely significant effects on European sites.

European site	Drought permit	Likely Significant Effects (LSEs) alone?	If no LSEs alone: residual low-level in-combination assessment?
Lee Valley Special Protection Area (SPA)	THUN	Yes	N/A
	WHIH	No	Yes
	FULL	No	Yes
Lee Valley Ramsar site	THUN	Yes	N/A
	WHIH	No	Yes
	FULL	No	Yes
Chilterns Beechwoods Special Area of Conservation (SAC)	RUNGS	No	No
	PICC		
	AMER		
Burnham Beeches SAC	PICC	No	No
	AMER		
Wormley-Hoddesdonpark Woods SAC	THUN	No	No
	FULL		
Lydden and Temple Ewell Downs SAC	SLYE	No	No
	SDRE		
	SBUC		
Folkestone to Etchinghill Escarpment SAC	SLYE	No	No
	SDRE		
	SBUC		
	SLYE	No	No

Dover to Kingsdown Cliffs SAC	SDRE		
	SBUC		
Parkgate Down SAC	SLYE	No	No
	SDRE		

The screening has indicated that one of the drought permits requires further assessment and will be subject to the principles of appropriate assessment, to identify if it can meet the requirements of the integrity test. A summary of the qualifying features and associated drought permit being screened in for stage 2 appropriate assessment is presented below in **Table 3.3.**

Table 3.3 Summary of the outcome of the Habitats Regulations Assessment stage 1 screening assessment of Affinity Water's drought permit options for Drought Management Plan 2022, indicating which qualifying features require stage 2 appropriate assessment due to potential likely significant effects on European sites.

European site and associated drought permit	Qualifying features	Likely significant effect alone?
Lee Valley Special Protection Area		
THUN	Great bittern	Yes
	Northern shoveler	
	Gadwall	
Lee Valley Ramsar site		
THUN	Whorled water-milfoil	Yes
	Water boatman	
	Northern shoveler	
	Gadwall	

4 Information to Inform Stage 2 Appropriate Assessment

4.1 Baseline – Lee Valley SPA

The boundary of the Lee Valley SPA (central location: Latitude 51.58083333, Longitude -0.049444444)[34] covers 4.51km² and coincides with the following SSSI boundaries: Amwell quarry SSSI, Rye Meads SSSI, Turnford and Cheshunt SSSI and Walthamstow Reservoirs SSSI. The SPA consists of a series of man-made water supply reservoirs, sewage treatment lagoons and former gravel pits distributed across Essex, Hertfordshire, London Borough of Haringey and London Borough of Waltham Forest[35]. The SPA consists of a variety of habitats including shallow water basins, marshes, marginal reedbeds, wooded islands, wet meadows, grassland and scrub. The Lee Valley SPA is designated for wintering Great bittern (*Botaurus stellaris*), Northern shoveler and gadwall.

4.1.1 Great bittern

Great bitterns have a broad distribution in northern Europe but in Scandinavia, UK and central/ southern Europe their distribution remains patchy. They are listed as least concern in the IUCN Red List of Threatened Species. In the UK, their winter population is increasing with 795 individuals recorded in 2017 – 2018[36]. They only occupy extensive *Phragmites* reedbed habitat and therefore, these sites are vital for feeding, breeding and resting. In the Lee Valley SPA (and Ramsar site) Great bittern are mostly recorded in the Turnford and Cheshunt Pits SSSI and to a lesser extent at Amwell quarry SSSI, Rye Meads SSSI and Walthamstow Reservoir SSSI. Their diet largely consists of fish, amphibians and terrestrial invertebrates.

4.1.2 Northern shoveler

The Northern shoveler has a broad distribution, occupying parts of Scandinavia, Europe, UK and Northern Africa[37]. In the UK, wintering populations of Northern shoveler are increasing with approximately 20,000 individuals recorded from 2012 – 2017[36]. Currently the species is listed as least concern in the IUCN Red List of Threatened Species, but global population estimates do indicate Northern shoveler populations maybe in decline[37]. The Lee Valley SPA (and Ramsar site) supports an estimated 1% of the north-west/ central European population of Northern shoveler (based on 5-year peak mean 1993/94 – 1997/98)[38]. In winter they are distributed across the SPA, using the shallow waterbodies present in the marshes, flooded pastures, lakes and reservoirs.

[34] JNCC (2016). Natura 2000 – Standard Data Form, Lee Valley SPA. Natura 2000 database, 1 – 10.
[35] Natural England (2018). European Site Conservation Objectives: Supplementary Advice on Conserving and Restoring Site Features. Lee Valley Special Protection Area. Natura 2000 database, 1 – 23.
[36] Robinson, R. A (2005). BirdFacts: profiles of birds occurring in Britain and Ireland. BTO, Thetford. Accessed from: https://app.bto.org/birdfacts/results/bob1940.htm.
[37] Natural England (2018). European Site Conservation Objectives: Supplementary Advice on Conserving and Restoring Site Features. South West London Waterbodies Special Protection Area. Natura 2000 database, 1 – 20.
[38] English Nature (2000). EC Directive 79/409 on the Conservation of Wild Birds: Special Protection Areas (SPA). Lee Valley, Classification citation, pg 1.

4.1.3 Gadwall

Gadwalls have a broad distribution in north, central and eastern Europe but in Scandinavia, UK and southern Europe the distribution remains patchy. They are listed as least concern in the IUCN Red List of Threatened Species. In the UK, their wintering population trend is slowly increasing with approximately 31,000 individuals recorded from 2012 - 2017[36], occupying both inland and coastal wetlands. The Lee Valley SPA supports an estimated 1.5% of the north-west European population of gadwall (based on 5-year peak mean 1993/94 – 1997/98)[39]. Of the man-made habitats present in the Lee Valley SPA, gadwall show preference to the gravel pits and reservoirs particularly during the winter as they feed on seeds and foliage of aquatic vegetation.

4.2 Baseline – Lee Valley Ramsar site

The boundary of the Lee Valley Ramsar site (central location: Latitude 51.5808333, Longitude -0.0494444)[40] covers 4.48km². Like the Lee Valley SPA, the Ramsar site comprises of four SSSIs that cover 24km of the Valley and includes water supply reservoirs, sewage treatment lagoons and former gravel pits. The combination of waterbodies supports both international and national wintering bird assemblages including northern shoveler and gadwall. The site is also designated due to the presence of a nationally scarce plant species (whorled water-milfoil, *Myriophyllum verticillatum*) and a rare invertebrate (water-boatman, *Micronecta minutissima*). For descriptions of Northern shoveler and gadwall in the context of the Lee Valley designated sites, see Section 0 and 0 above.

4.2.1 Whorled water-milfoil

Whorled water-milfoil is an aquatic perennial that colonises slow flowing, calcareous waterbodies including lakes, streams, canals and ditches[41]. In the UK, the plants distribution is concentrated in eastern and southern England with no records in Scotland and <10 records in Wales. It is larger than spiked water-milfoil (*Myriophyllum spicatum*) and alternative water-milfoil (*M. alterniflorum*)[42]. The submerged plant grows in water depths from 30 – 100cm over both peaty and inorganic substrates, flowers in July – August and effectively helps oxygenate waterbodies[43]. In the Lee Valley Ramsar site, whorled water-milfoil both supports invertebrate assemblages and waterfowl as foraging sites.

4.2.2 Water boatman

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

[39] Natural England (2018). European Site Conservation Objectives: Supplementary Advice on Conserving and Restoring Site Features. Lee Valley Special Protection Area. Natura 2000 database, 1 – 23.
[40] JNCC (2008). Information Sheet on Ramsar Wetlands (RIS), Lee Valley. JNCC. Version 3.0, 1-9.
[41] 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).
[42] Rose. F (2006). The Wild Flower Key. Frederick Warne, 1 – 563.
[43] Plants for ponds (2021). Whorled Water Milfoil. Accessed from: Whorled Water Milfoil-(Myriophyllum verticillatum) - Plants for Ponds.

England and East Anglia. The northern limit of is species is around Northumberland[44]. The species rarely exceeds 2mm[45] and unlike greater water boatmen that swim on their backs, lesser water boatmen swim on their fronts[46].

[44] Natural England (2015). A review of the Hemiptera of Great Britian: The Aquatic and Semi-aquatic Bugs. Natural England Commissioned Report NECR188, 1 – 66.
[45] Greenhalgh, M. and Ovenden, D. (2007). Freshwater life, Britain and Northern Europe. Collins, 1 – 256.
[46] Freshwater Habitats Trust (2021). Water boatmen. Accessed from: Water boatmen - Freshwater Habitats Trust Freshwater Habitats Trust

5 Stage 2 Appropriate Assessment

5.1 Attributes and targets

There are number of attribute targets for qualifying bird species of the Lee Valley SPA that the 1.2 cm maximum additional drawdown could have an adverse effect on. These include the following (noting that they similarly apply to qualifying species of the Ramsar site):

- Extent and distribution of supporting and non-breeding habitat;
- Water quantity/ area/ depth;
- Conservation measures;
- Population abundance;
- Food availability within supporting habitat; and
- Landform

5.1.1 Great bittern

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 – 100cm[47]. The optimal size for a single waterbody should be >0.5ha. 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 and Ramsar site, potentially caused by milder winter weather. Food availability is also a critically important factor attracting individuals to the SPA and Ramsar site and supporting the target population abundance. As prey species associated with great bittern are aquatic (European eel *Anguilla anguilla*, common roach *Rutilius rutilus*, common toad *Bufo bufo* etc)[47], a reduction in the extent of standing open water or water depth at Amwell quarry SSSI could impact on the habitat suitability for prey species, which could reduce the overall carrying capacity of the SPA and Ramsar site.

5.1.2 Northern shoveler

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 roosting. The extent and distribution of standing open water habitat should be restored or maintained at 345ha and optimal depth maintained at <0.3m 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. Northern shoveler largely feed on zooplankton, gastropod molluscs,

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

bivalves and diving beetles which colonise littoral macrophyte communities[47]. A reduction in the extent of standing open water and water depth at Amwell quarry SSSI could impact on the habitat suitability for prey species, which could reduce the overall carrying capacity of the SPA and Ramsar site.

5.1.3 Gadwall

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 and Ramsar site. Key food sources include sweet-grass *Glyceria fluitans*, creeping bent *Agrostis stolonifera* and stoneworts *Chara*. In addition, it is important that the extent and distribution of standing open water habitat is restored or maintained at 345ha and optimal depth maintained at <0.25m over at least 50% of the total standing water area[48].

5.2 Potential adverse effects of THUN drought permit

The proposed drought permit will allow a temporary suspension of the flow constraint allowing a daily abstraction of up to 14Ml/d. It is currently assumed that no significant upgrade of the treatment works would be required as the source is already capable of achieving 11.82Ml/d and can also achieve the proposed 14Ml/d of total abstraction, which is above the current unrestricted licence.

The public water supply abstraction under the drought permit may potentially begin in any month of the year, depending on when Drought Trigger Zone 3 is forecast to be breached. However, it is more likely to be implemented between May and October once the response of the aquifer to rainfall and recharge in the previous winter is understood and in anticipation of typically higher customer demand for water in the summer months. It is expected that the drought permit will be operational for a six-month period. The assessment of the drought permit is therefore, based on the assumption that the drought permit would be in place for a six-month period from May to October.

Due to initial uncertainties regarding the drawdown extent of the THUN drought permit, groundwater modelling was conducted using the Herfordshire Chalk (Herts) Environment Agency regional model[49]. Based on groundwater modelling conducted by Stantec, an underpinning SSSI of the Lee Valley SPA, Amwell quarry, is located within the estimated drawdown extent. In addition, the modelling indicated

[48] Natural England (2018). European Site Conservation Objectives: Supplementary Advice on Conserving and Restoring Site Features. Lee Valley Special Protection Area. Natura 2000 database, 1 – 23.
[49] Stantec UK Limited (2021). Technical Note: Affinity Water Drought Permit Environmental Assessment: Groundwater Modelling and Hydrogeological Appraisal. Prepared for Affinity Water, 1 – 101.

that the water table at Amwell quarry SSSI is typically 0 – 5m below ground level (**Figure 5.1)** and that a 1.2cm drawdown is anticipated at Amwell quarry.

As noted in Section 2.2, habitats that are considered to be potentially impacted (with respect to direct groundwater impacts) where:

- The maximum additional drawdown somewhere under the site is at least 1cm; and
- The water table somewhere under the site is within 1m of the ground surface.

Therefore, further assessment is required to determine if the anticipated drawdown could have an adverse effect on qualifying features of the Lee Valley SPA and Ramsar site due to reduced water supply, water level and wetted width within Amwell quarry.

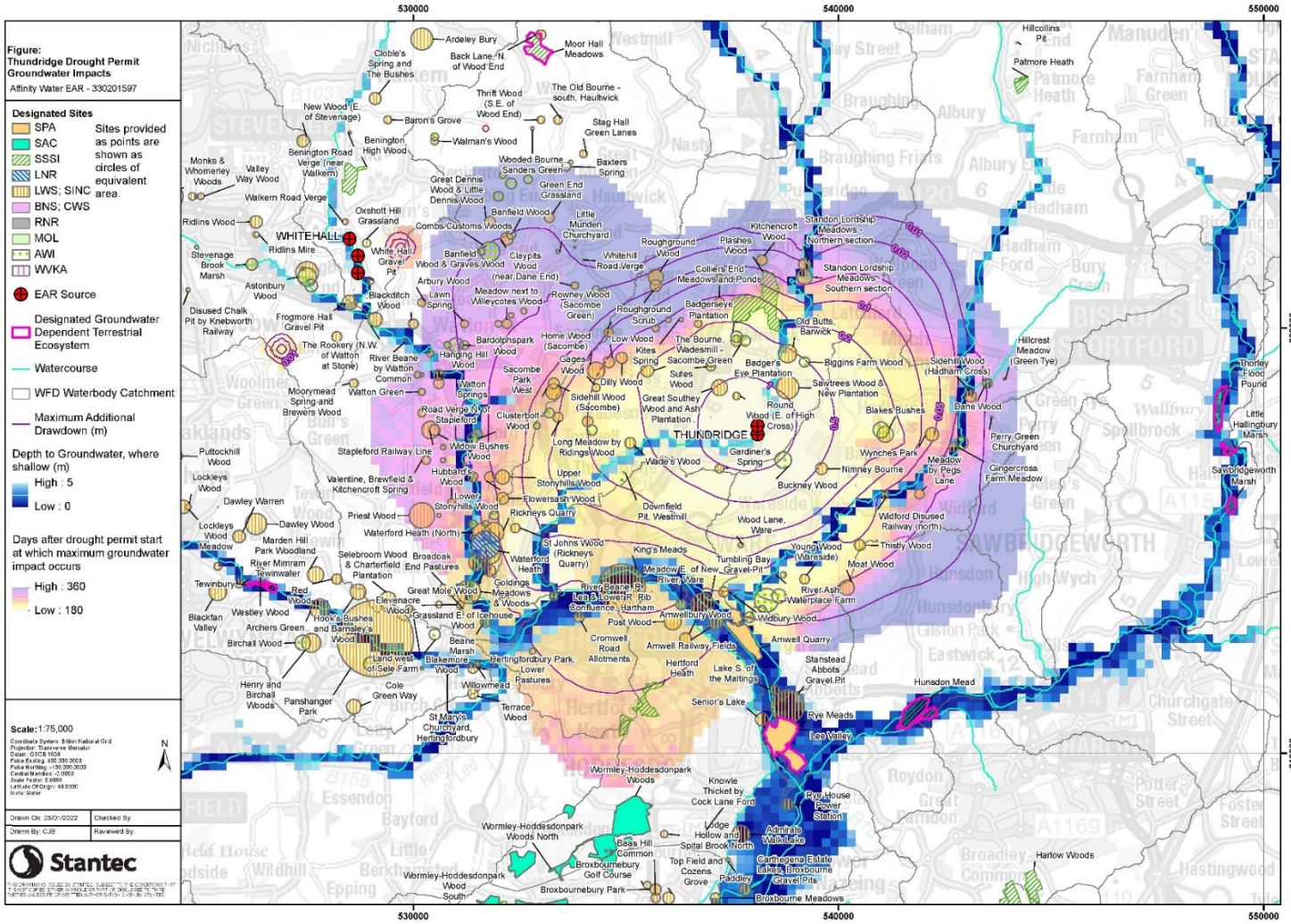

Figure 5.1 THUN drought permit modelled groundwater impacts (Stantec, 2021).

Amwell quarry is approximately 36.96ha and includes two waterbodies which were excavated in 1973 and 1990: Great Hardmead Lake and Hollycross Lake. The SSSI is notified due to the supporting nationally important wintering waterbird assemblages and dragonflies and damselflies. All SSSI units (1 and 2) have been assessed as in favourable condition[50]. As wintering waterbirds are qualifying features of both the SPA and Ramsar site, the favourable condition of Amwell quarry SSSI is indicative of the status of the European sites (although noted that the assessment was conducted in 2007).

Based on the assumed operational period of the drought permit from May to October and the months that significant numbers of qualifying overwintering bird species are likely to be present at the Lee Valley SPA and Ramsar site, there is an overlap of two months for great bittern (September and October) and one month for gadwall and northern shoveler (October). Great bittern have largely been recorded at Turnford and Cheshunt Pits SSSI and so, less likely to be exposed during the operation of the drought permit, in comparison to gadwall and northern shoveler. Whorled water-milfoil and water boatman are present throughout the year, with whorled water-milfoil flowering from July – August and adult water boatman active during spring and summer.

In order to further understand the potential adverse effects of 1.2cm drawdown during the operation of the THUN drought permit, the local geology and groundwater levels have been assessed using borehole data. Chalk bedrock is present underneath Amwell quarry, which varies in depth from 3 - 7.4m below ground level (see **Appendix 1** for the geology map of THUN drought permit). Superficial gravel deposits above the chalk bedrock varies in depth from 0 – 2.2m below ground level and intermittent clay or topsoil is present.

Based on the analysis of 10 observation boreholes (OBH) in the vicinity of Amwell quarry (Amwell OBH1 – 10) from 2003 to present, the groundwater level is typically below ground surface[51]. At the 10 OBHs, the groundwater levels are generally stable with a few anomalies (see **Figure 5.2**), which are assumed to be a typing error in the data record, as they do not align with the long-term trend. At eight out of the ten OBHs, groundwater level ranged from 0.31 – 2.83m, with one record at 0m in OBH7 in June 2018. At OBH 5 and 8, the groundwater level ranged from 13.12 – 15.44m with an outlier of 25m recorded in OBH5 in April 2019. It is noted from the borehole logs that there is an upstanding cover for each OBH, and it is assumed the dip measurement is taken from the top of this. However, the height of the upstanding cover is currently unknown. It is assumed that the upstanding is approximately 0.5m, which would be suitable for a monitoring borehole, but the borehole log does not show this information and it could be less.

This, together with a review of surface elevation contours on an Ordnance Survey map in comparison to the groundwater level in meters above ordnance datum, indicates

[50] Natural England (2007). Condition of SSSI Units for Site Amwell quarry SSSI. Accessed from: https://designatedsites.naturalengland.org.uk/ReportUnitCondition.aspx?SiteCode=S2000384&ReportTitle=Amwell quarry SSSI

[51] This is contradictory to the regional groundwater flow modelling utilised in the preparation of the 2021 THUN EAR that indicated that groundwater level was 0 m below ground level, however given the regional nature of the model this is not considered unusual.

that the groundwater level is consistently ***below*** ground level at all OBHs (and will be significantly lower during natural drought conditions).

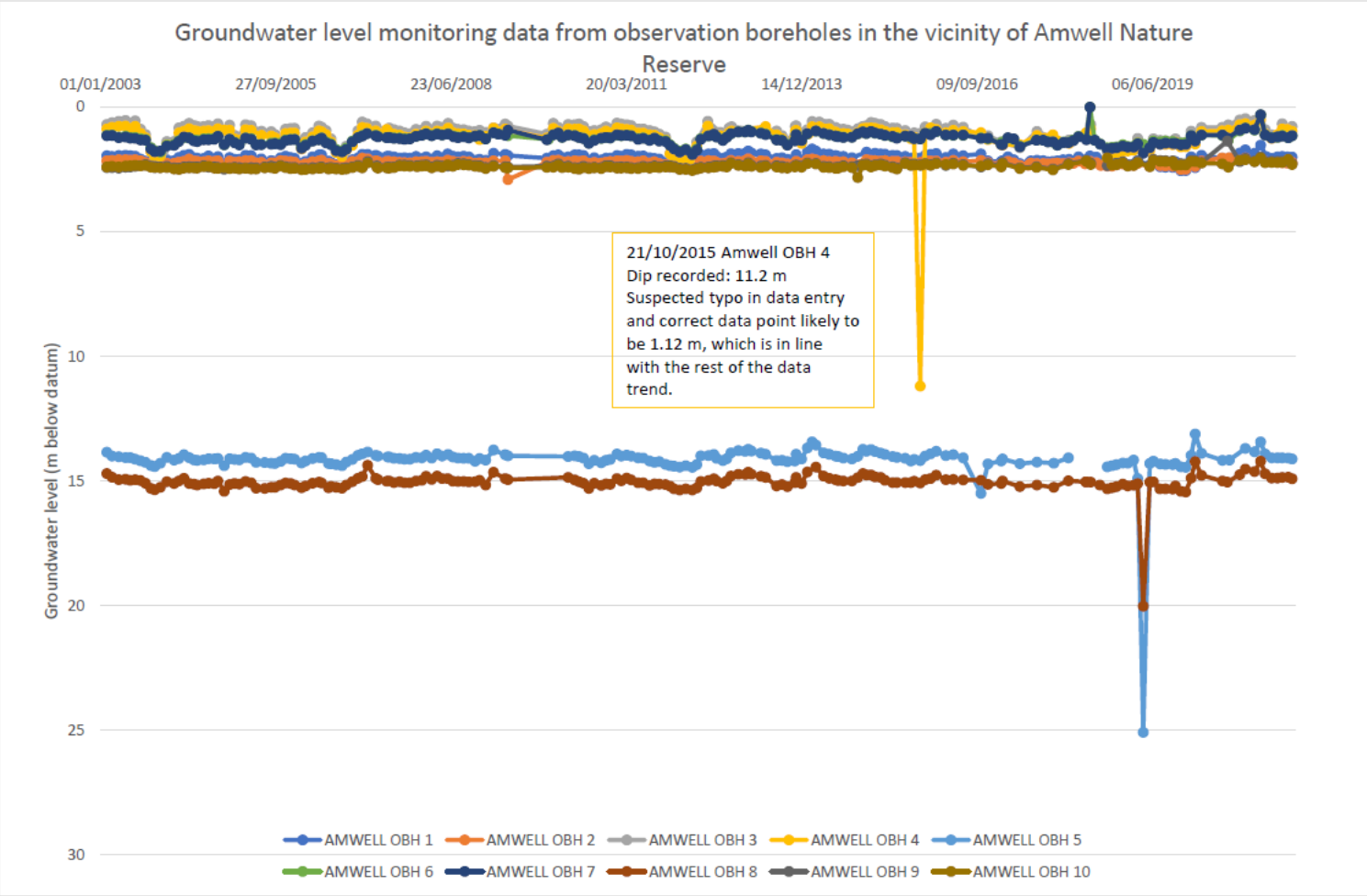

Figure 5.2 Groundwater level monitoring data from observation boreholes (OBH) 1 – 10 in the vicinity of Amwell quarry SSSI, which underpins the Lee Valley Special Protection Area (SPA) and Ramsar site (Environment Agency, 2003 – present).

Based on the assessment above, it is understood that there is intermittent hydrological connectivity between Amwell quarry and groundwater. Therefore, the 1.2cm maximum drawdown from the THUN drought permit could result in a reduction in the water levels in Amwell quarry during operation. However, as hydrological connectivity is likely to be intermittent between the groundwater level and surface water in Amwell quarry, it is not anticipated that a reduction in water level will occur throughout the 1 – 2 month overlapping period when great bittern, gadwall and northern shoveler are present. It is also noted that groundwater levels are unlikely to be at surface level under natural drought conditions. Considering the intermittent connectivity, the fact that groundwater levels are mostly below surface level and the limited drawdown, impacts on supporting habitat will not be significant. Furthermore, groundwater levels and hydrology are expected to recover quickly once the drought permit and drought have ended and so the drought permit impact is predicted to extend for the duration of drought permit implementation and short recovery to baseline period (1-3 months) only.

Amwell quarry contributes 10.7% of the total standing open water habitat attribute target of 345 ha for great bittern, gadwall and northern shoveler. For great bittern, the optimal size of open waterbodies is >0.5ha. Based on the size of Amwell quarry, the operation of the drought permit will not result in the waterbody retracting <0.5ha. For dabbling species such as gadwall and northern shoveler, the implementation of the drought permit may be of benefit, as they require shallow foraging habitat between 0.25 – 0.3m across at least 50% of the standing water area[52]. Aquatic plants are a key food source for gadwall and northern shoveler. Floating sweet grass *Glyceria fluitans* grows up to 1.2m in shallow waterbodies. The potential adverse effects of the drought permit on marginal habitats such as tall mixed fen/ wetland and marshes have also been considered. Marginal habitats consisting of common reed *Phragmites australis* and reed canary-grass *Phalaris arundinacea* provide key supporting habitat for great bittern, that feed within or near to tall mixed fen. As both common reed and reed canary-grass have a low dependency on groundwater[53], no adverse effects on the condition of tall mixed fen at Amwell quarry is anticipated. In addition, the anticipated drawdown at other underpinning SSSIs of the Lee Valley SPA is low with a 0.4cm drawdown estimated at Rye Meads SSSI and associated reedbed priority habitat, and 0.1cm at Turnford and Cheshunt SSSI. The maximum additional drawdown under the drought permit at the location of these SSSIs is displayed on **Figure 5.1**. Further details can be found in the THUN drought permit EAR, Appendix A – Physical Environment).

The location of priority wetland habitats including reedbed and lowland fen have also been reviewed and cross referenced within the maximum drawdown extent of the THUN drought permit which extends beyond the boundaries of the Lee Valley SPA and Ramsar site (see **Figure 5.1**). No priority habitats within the boundaries of the maximum drawdown extent have been identified; this includes Lee Valley Regional

[52] Natural England (2018). European Site Conservation Objectives: Supplementary Advice on Conserving and Restoring Site Features. Lee Valley Special Protection Area. Natura 2000 database, 1 – 23.
[53] UK Technical Advisory Group on the Water Framework Directive (2003). Guidance on the identification and risk of assessment of groundwater dependent terrestrial ecosystems. TAG Work Programme. 1 – 11.

Park. Whorled water-milfoil can grow in water depths of 30 – 100cm and therefore, it is deemed unlikely that a 1.2cm drawdown will have an adverse effect on habitat suitability and, therefore, distribution within Amwell quarry. In addition, it is not anticipated that the 1.2cm drawdown will impact on the habitat suitability and therefore, abundance of water boatman at Amwell quarry, as they require shallow water habitats (<3m) to feed on aquatic vegetation.

Based on the information provided above, it is deemed unlikely that a 1.2cm drawdown will result in an adverse fluctuation in the total standing open water area required to support qualifying features of the Lee Valley SPA and Ramsar site.

In addition, previous surface abstraction licences have been deemed to not have an adverse effect on the Amwell quarry SSSI This assessment was undertaken reviewing the total daily abstraction from all licences (238,816m³/d) and the total average recharge to the chalk aquifer in the catchment associated with Amwell quarry is 302,110 m³/d[54]. As daily recharge exceeded daily abstraction rates, no adverse effects from licenced abstractions were identified. In addition, water levels were monitored in Amwell quarry during the drought of 2005 – 2006, which was the 2nd driest 14-month period since records began. When exposed to drought conditions, water levels in Amwell Magna remained adequate to supply the Hollycross and Great Hardmeads Lakes[55].

Therefore, based on previous drought scenarios, short overlapping timeframes with overwintering waterbirds, the intermittent nature of hydrological connectivity and the fact that groundwater levels will be below surface level during operation (see **Figure 5.1**), no adverse effects are anticipated on the site integrity of the Lee Valley SPA and Ramsar site.

Furthermore, the water levels in Amwell quarry are regulated to some extent by a 'plug hole' mechanism installed by the Environment Agency, which drains the reservoir into the Amwell Magna Loop when required[55]. Due to uncertainties regarding the function of the 'plug hole' mechanism, this has not been considered as mitigation for the THUN drought permit and therefore, has not formed part of the final conclusion of the appropriate assessment.

In addition to the potential drawdown in groundwater, the operation of the THUN drought permit could also impact on flows in the River Ash near the confluence with the River Lee. Considering the habitat requirements for the qualifying features, the overwintering birds are not expected to be reliant on riverine habitats. Regardless, the hydrological impacts are expected to be minor and limited to a reduction in velocity with no impacts on wetted width and depth. As such, any potential functionally linked habitat will not be reduced.

[54] Upper Lee CAMS Ledger (2006).
[55] Environment Agency (2006). Habitats Directive LV App 21. Lee Valley SPA and Ramsar site assessment of abstractions. 1 – 140.

5.3 THUN, FULL and WHIH drought permits

In the stage 1 screening of FULL and WHIH drought permits, based on the estimated drawdown of each drought permit alone, no likely significant effects are anticipated.. Based on a cumulative assessment of THUN, FULL and WHIH, groundwater modelling estimated a 1.2cm drawdown at Amwell quarry, which is equal to the estimated drawdown at Amwell quarry if THUN drought permit was implemented alone. This is due to the distance between the boreholes and interaction of groundwater systems and associated hydrodynamics. On the basis that the THUN drought permit alone would not result in an adverse effect on site integrity, no in-combination effects of THUN, FULL and WHIH drought permits are anticipated.

6 Potential In-Combination Effects

Due to potential likely significant effects of the THUN drought permit, it was taken through to stage 2 appropriate assessment which concluded that the drought permit would not cause adverse effects on the site integrity of the Lee Valley SPA and Ramsar site. However, in-combination effects between the THUN drought permit and other plans and projects has been considered. This has been undertaken on a precautionary basis, following best practice, with limited low level residual effects anticipated from the THUN drought permit. As noted in Section 2, an in-combination assessment has been completed regardless of the presence/absence of any potential low level/residual effects. This is to ensure that all relevant plans/projects are listed and considered. This will reduce the time and effort required should the HRA for any of the drought permits be updated at the time of application.

6.1 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 and Affinity Water's drought permit has been undertaken.

It should be noted that DPs for other companies/ organisations are subject to review on timescales that may not be aligned with the timescales of Affinity Water's DMP 2022 revision. The information used to carry out these assessments is considered to be the most up to date information available at time of writing, but the assessments should be reviewed at the time of drought option implementation to ensure that no changes to the neighbouring water company drought options has been made in the intervening period, and that the assessment, therefore remains valid.

The following neighbouring watering company DPs were considered:

- Thames Water (Draft 2022)
- Anglian Water (2019)
- Bristol Water (2018)
- Essex and Suffolk Water (2018)
- Severn Trent (2019)
- South East Water (2018)
- Southern Water (2019)
- Sutton and East Surrey Water (2019)
- Wessex Water (2018)

6.1.1 Thames Water (Draft 2022)

The following supply side options in Thames Water's Draft DP 2022 overlap with the Lee Valley SPA and Ramsar site and these include: North London Artificial Recharge Scheme (1km), Old Ford (4.1km), Stratford Box (4.4km), Chingford Artificial Recharge Scheme (8.4km) and East London Resource Development (9.6km). As these options relate to groundwater abstractions, there is potential for in-combination effects with the THUN drought permit. However, Thames Water schemes would abstract from a

confined chalk aquifer approximately 30 – 60m below surface level and overlayed with London Clay, whereas Affinity Water's THUN drought permit would abstract from chalk closer to surface level (3 – 7.4m below surface level). In addition,, Thames Water options listed above use existing licences (they are not drought permits) and have been included in the baseline for the regional modelling conducted by Affinity Water for use in the recent Affinity Water EAR updates, where no in-combination effects were identified.

6.1.2 Anglian Water (2019)

No in-combination effects between Affinity Water's drought permits and Anglian Water's DP have been identified due to no overlapping European sites potentially being affected during implementation.

6.1.3 Bristol Water (2018)

No in-combination effects between Affinity Water's drought permits and Bristol Water's DP have been identified, due to no overlapping European sites potentially being affected during implementation.

6.1.4 Essex and Suffolk Water (2018)

No in-combination effects between Affinity Water's drought permits and Essex and Suffolk Water's DP have been identified, due to no overlapping European sites potentially being affected during implementation.

6.1.5 Severn Trent (2019)

No in-combination effects between Affinity Water's drought permits and Severn Trent's DP have been identified, due to no overlapping European sites potentially being affected during implementation.

6.1.6 South East Water (2018)

No in-combination effects between Affinity Water's drought permits and South East Water's DP have been identified, due to no overlapping European sites potentially being affected during implementation.

6.1.7 Sutton and East Surrey Water (2019)

No in-combination effects between Affinity Water's drought permits and Sutton and East Surrey Water's DP have been identified, due to no overlapping European sites potentially being affected during implementation.

6.1.8 Wessex Water (2018)

No in-combination effects between Affinity Water's drought permits and Wessex Water's DP have been identified, due to no overlapping European sites potentially being affected during implementation.

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

Based on proximity (within 10km) and hydrological connectivity, there is potential for in-combination effects with the Honeywick Rye Reservoir augmentation scheme, which involves abstracting water from the River Ouzel at Leighton Buzzard and discharging flow to the Upper Lee River at Dunstable. The augmentation is 30km upstream of the Lee Valley SPA and Ramsar site. As there will be no net change in downstream flow or volume within proximity of the European sites, no in-combination effects of Affinity Water's WRMP and the THUN drought permit are anticipated.

6.3 Other Water Company Water Resource Management Plans

Assessment of the potential for in-combination effects with Affinity Water's THUN drought permit 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 Affinity Water is holding with neighbouring water companies, in order to identify any water resource options which may have the potential to cause in-combination effects with Affinity Water's drought permits. The assessments should be reviewed at the time of Affinity Water's drought permit implementation to ensure that no changes to the WRMPs have been made in the intervening period, and that the assessment, therefore remains valid.

The following WRMPs were considered:

- Thames Water (2019)
- Anglian Water (2019)
- Bristol Water (2019)
- Essex and Suffolk Water (2019)
- Severn Trent (2019)
- South East Water (2019)
- Southern Water (2019)
- Sutton and East Surrey Water (2019)
- Wessex Water (2019)

6.3.1 Thames Water (2019)

There are 15 option elements in Thames Water WRMP 2019 that could impact on the Lee Valley SPA and Ramsar site and therefore, could have an in-combination effect with Affinity Water's THUN drought permit. However, as the identified impact pathways of Thames Water's WRMP option elements all relate to noise and visual disturbance during construction, there is no potential for in-combination effects

because of groundwater reduction due to the operation of Affinity Water's drought permits.

6.3.2 Anglian Water (2019)

No in-combination effects between Affinity Water's drought permit and Anglian Water's WRMP have been identified, due to no overlapping European sites potentially being affected during implementation.

6.3.3 Bristol Water (2019)

No in-combination effects between Affinity Water's drought permit and Bristol Water's WRMP have been identified, due to no overlapping European sites potentially being affected during implementation.

6.3.4 Essex and Suffolk Water (2019)

No in-combination effects between Affinity Water's drought permit and Essex and Suffolk Water's WRMP have been identified, due to no overlapping European sites potentially being affected during implementation.

6.3.5 Severn Trent (2019)

No in-combination effects between Affinity Water's drought permit and Severn Trent's WRMP have been identified, due to no overlapping European sites potentially being affected during implementation.

6.3.6 South East Water (2019)

No in-combination effects between Affinity Water's drought permit and South East Water's WRMP have been identified, due to no overlapping European sites potentially being affected during implementation.

6.3.7 Sutton and East Surrey Water (2019)

No in-combination effects between Affinity Water's drought permit and Sutton and East Surrey Water's WRMP have been identified, due to no overlapping European sites potentially being affected during implementation.

6.3.8 Wessex Water (2019)

No in-combination effects between Affinity Water's drought permit and Wessex Water's WRMP have been identified, due to no overlapping European sites potentially being affected during implementation.

6.4 Other Plans and Projects

6.4.1 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 with the Lee Valley SPA and Ramsar site. 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 European site individually, the plan has

assessed the potential impacts on the qualifying feature as a collective i.e., 'birds of coastal and estuarine habitats'.

The following measures within the RBMP have been identified that could have an impact on 'birds of coastal, estuarine and lowland wet grassland habitats' which are relevant to the qualifying species of the Lee Valley SPA: improvement to condition of channel/ bed, banks/ shoreline, riparian zone and/ or wetland habitats. The RBMP HRA has concluded that none of the measures identified would have significant negative effects on any European 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[56].

Therefore, no in-combination effects with Affinity Water's THUN drought permit have been identified and no LSEs anticipated.

6.4.2 Severn River Basin Management Plan (2015)

As the 10 management catchments included in the Severn RBMP do not overlap with Affinity Water's drought permit, no in-combination effects have been identified.

6.4.3 Lee Valley Regional Park Authority Park Development Framework Strategic Policies

No in-combination effects with strategic policies in the Lee Valley Regional Park Development Framework have been identified with the THUN drought permit as the impact pathways differ. Potential likely significant effects from policy implementation were identified due to public access and disturbance, as a result of increased visitor numbers.

6.4.4 Environment Agency River Thames Scheme

The footprint of the River Thames Scheme (new river channel) does not overlap with Affinity Water's drought permit and therefore, no in-combination effects have been identified.

6.4.5 Thames Tideway Tunnel Project

No in-combination effects during operation of the Thames Tideway Tunnel Project and Affinity Water's drought permit have been identified.

6.4.6 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[57]. The proposed route of Crossrail 2 is 0.2 km west of the Lee Valley SPA and Ramsar site therefore, there is potential for likely significant effects due to noise and visual disturbance during construction and operation of the railway. As the impact pathway is not in relation to groundwater supply, no in-combination effects have been identified with Affinity Water's THUN drought permit.

[56] Environment Agency (2015). River basin management plan for the Thames River Basin District Habitats Regulations Assessment Updated December 2015. Water for life and livelihoods. Environment Agency 2016, 1 – 58.
[57] Crossrail 2 (2020) What are the next steps for Crossrail 2? Accessed from: https://crossrail2.co.uk/next-steps/

6.4.7 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[58]. The proposed location of the Edmonton EcoPark is approximately 2.6 km north of the Lee Valley SPA and Ramsar site therefore, there is potential for likely significant effects due to noise and visual disturbance during construction and operation of the railway. As the impact pathway is not in relation to groundwater supply, no in-combination effects have been identified with Affinity Water's THUN drought permit.

6.4.8 North London (Electricity Line) Reinforcement

As the North London (Electricity Line) Reinforcement runs adjacent to the Chingford and Banbury Reservoirs, there is potential for likely significant effects on the Lee Valley SPA and Ramsar site due to noise and visual disturbance during construction. As the impact pathway is not in relation to groundwater supply, no in-combination effects have been identified with Affinity Water's THUN drought permit

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

7 Conclusions and Recommendations

Affinity Water has completed an HRA stage 1 screening Assessment to identify if any of the draft DMP 2022 drought permits could lead to likely significant effects on European sites. The HRA stage 1 screening concluded that only the THUN drought permit had potential to cause likely significant effects on European sites and it was taken through to stage 2 appropriate assessment. A stage 2 appropriate assessment was required to determine whether the drought permit would result in an adverse effect on site integrity of European sites, in light of Conservation Objectives.

The potential impact pathway that could lead to likely significant effects on the Lee Valley SPA and Ramsar site from the THUN drought permit was a reduction in groundwater supply. This could impact on water depth/ levels and the suitability of the reservoir to support qualifying bird and aquatic invertebrates which include great bittern, gadwall, northern shoveler, whorled water-milfoil and water boatman. Groundwater modelling results identified a 1.2 cm reduction in groundwater supply at Amwell quarry SSSI, which underpins the European site.

On the basis that the OBH data within the vicinity of Amwell quarry SSSI shows intermittent hydrological connectivity between groundwater and surface water, the short-term and temporary nature of drought permit implementation, the fact that groundwater levels will not be at surface level during operation, and information on water level control via a 'plug hole' system, no adverse effects on the Lee Valley SPA and Ramsar site are anticipated as a result of the implementation of the THUN drought permit. In addition, water levels were monitored in Amwell quarry during the drought of 2005 – 2006, which was the 2nd driest 14-month period since records began and this monitoring showed no issues with regards to water levels beneath the SSSI.

No in-combination effects are anticipated.

A summary of the conclusions of the HRA stage 1 screening Assessment and stage 2 appropriate assessment are provided in **Table 7.1.**

Table 7.1 Summary of Habitats Regulations Assessment stage 1 screening assessment and stage 2 appropriate assessment of Affinity Water's draft Drought Management Plan 2022 drought permits.

Drought Permit	Likely significant effects alone?	Appropriate assessment required?	Adverse effect on integrity of European site?	Residual low-level effect that requires in-combination assessment?	In-combination effect with other plans and projects?
THUN	Yes	Yes	No	Yes	No
WHIH	No	No	N/A	Yes	No
FULL	No	No	N/A	Yes	No
RUNGS	No	No	N/A	No	N/A
PICC	No	No	N/A	No	N/A

Drought Permit	Likely significant effects alone?	Appropriate assessment required?	Adverse effect on integrity of European site?	Residual low-level effect that requires in-combination assessment?	In-combination effect with other plans and projects?
AMER	No	No	N/A	No	N/A
SYLE	No	No	N/A	No	N/A
SDRE	No	No	N/A	No	N/A
SBUC	No	No	N/A	No	N/A

Appendix

Appendix 1 BGS: bedrock geology map of the Rib catchment (as shown in the THUN drought permit EAR, Appendix A – Physical Environment