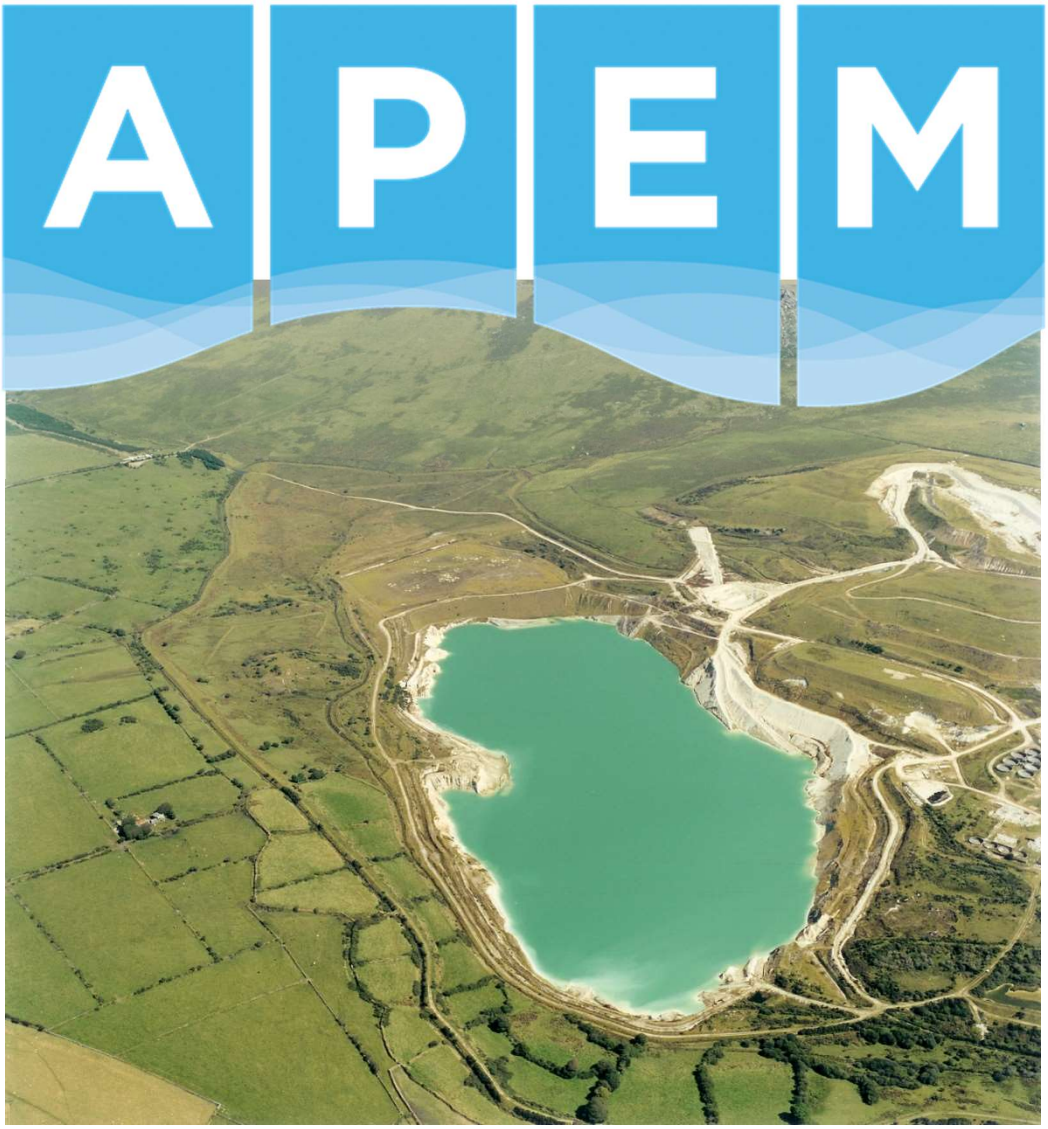

Stannon Lake Drought Permit

Shadow Habitat Regulations Assessment Report

APEM Ref: P00010564

October 2022

Nicola Teague, Harvey Walsh, Elisa Phillips

Client:	**South West Water Limited**
Address:	**Peninsula House, Rydon Ln, Exeter EX2 7HR**
Project reference:	**P00010564**
Date of issue:	**October 2022**

_____

Project Director:	**Nicola Teague**
Project Manager:	**Elisa Phillips**
Other:	**Harvey Walsh**

_____

APEM Ltd
Riverview
A17 Embankment Business Park
Heaton Mersey
Stockport
SK4 3GN

Tel: 0161 442 8938
Fax: 0161 432 6083

Registered in England No. 02530851

Revision and Amendment Register

Version Number	Date	Section(s)	Page(s)	Summary of Changes	Approved by
1.0	19/10/2022		39	First draft for SWW review	HW
2.0	20/10/2022			Inclusion of updated hydrology and water quality data	HW
3.0	26/10/2022			Final draft. Response to Paul McNie comments.	RH/HA

Contents

List of Figures

List of Tables

1. Introduction

1.1 Overview

Proposed plans or projects that have the potential to affect European and Internationally designated nature conservation sites (detailed below) are required to be considered through the Habitats Regulations Assessment (HRA) process as required by The Conservation of Habitats and Species Regulations 2017 (as amended[1]) (the Habitats Regulations).

This report (hereafter referred to as the shadow HRA Screening Report (sHRA)) considers the proposed abstraction activities (hereafter referred to as 'the proposed activities') required for the Stannon Lake Drought Permit (the 'Drought Permit'). This HRA Screening Report has been provided to support the Drought Permit application. The purpose of the assessment is required to determine if the abstraction activities could have a Likely Significant Effect on any European Sites or designated conservation features of those sites.

1.2 Background to the Project

South West Water (SWW) supplies water to the Isles of Scilly, Cornwall, Devon, Bournemouth and parts of Hampshire, Dorset, Somerset and Wiltshire. Water resource planning is based on five water resource zones (WRZ) – Colliford, Roadford, Wimbleball, Isles of Scilly and Bournemouth – with Devon and Cornwall supplied primarily by Colliford, Roadford and Wimbleball.

Stannon Lake is an important source of water supply in SWW's Colliford Water Resource Zone (WRZ) in South West England.

This HRA Screening Report has been prepared to support the Drought Permit application that will involve an increase in the currently permitted abstraction volume and rate from Stannon Lake. The objective of the Permit sought is to increase available supply in the Colliford WRZ. By providing additional water from Stannon Lake, SWW will be able to reduce volumes being taken from Colliford Lake Reservoir.

In parallel with this Screening Report an Environmental Assessment Report (EAR) has been prepared (in accordance with best practice guidance, as issued by the EA) which includes a monitoring plan and mitigation measures for the proposed Drought Permit. The EAR provides details of baseline flow conditions, assess the potential impacts of the proposed changes to the abstraction regime, due to implementation of the Drought Permit, and provides an Environmental Monitoring Plan (EMP) to support the requirement for baseline (pre-permit), during and post drought permit implementation monitoring.

[1] The legal provisions that amend the 2017 Regulations are:
The Conservation of Habitats and Species and Planning (Various Amendments) (England and Wales) Regulations 2018 [Statutory Instrument 2018 No 1307]
The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 [Statutory Instrument 2019 No 579]

1.3 Stannon Lake abstraction licence

The abstraction licence for Stannon Lake (SW/049/0281/001/R01) was issued to SWW on 26/01/2010 and was renewed on 20/11/2016 with an expiry date of 31/03/2028.

The abstraction licence permits abstraction at up to 262.8 m^3/hr, 4000 m^3/day (4 Ml/d) with a total annual abstraction limit of 1,464,000 m^3 (equivalent to 4 Ml/d). At an instantaneous rate not exceeding 73 l/s.

No abstraction is allowed to take place unless the level of water in Stannon Lake as measured at the Stannon Lake outfall is equal to or greater than 3.0 m below the outfall's invert level and the abstraction shall not cause the level to fall below that point. There is no compensation flow requirement from Stannon Lake or downstream hands-off flow requirement within the licence.

A map of the Stannon Stream water body (GB108049007040) is presented in Figure 1.1, showing the location of Stannon Lake (Stannon Quarry) and Crowdy Reservoir water body. Aerial imagery of Stannon Lake is presented in Figure 1.2.

For completeness, and as the operation of Crowdy Reservoir is linked to the operation of Stannon Lake abstraction licence, the abstraction licence details for Crowdy Reservoir are provided in Section 1.4.

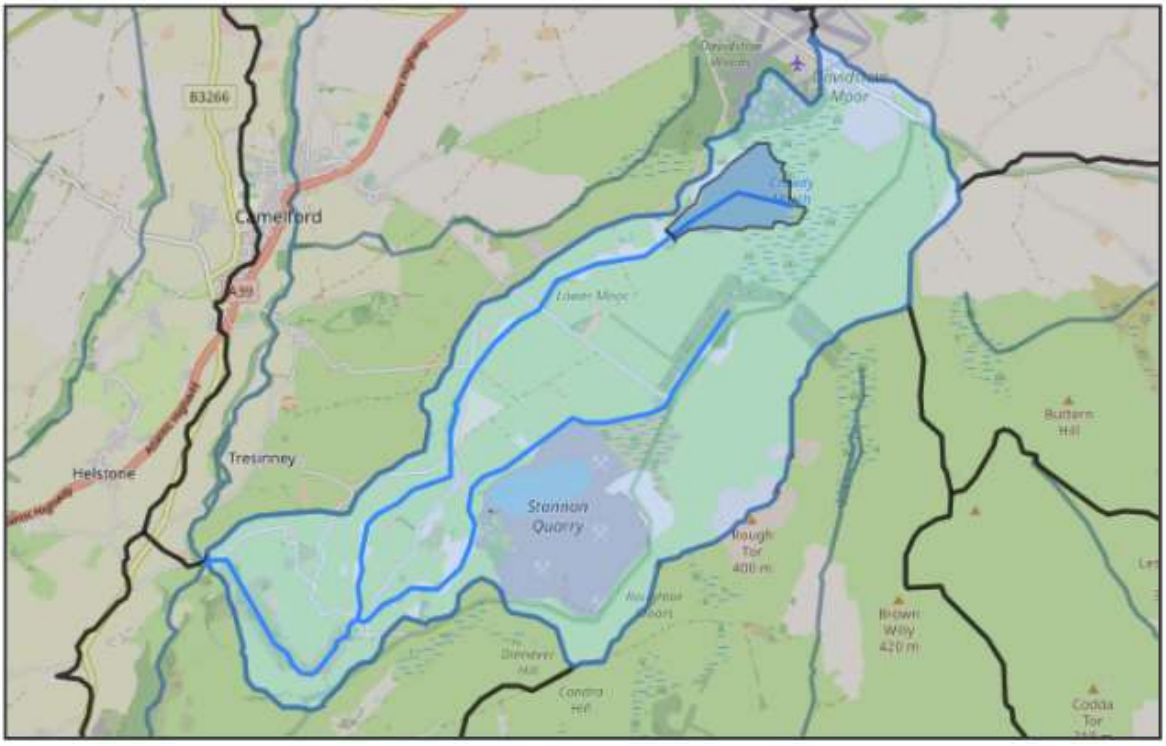

Figure 1.1 Map of the Stannon Stream (GB108049007040) water body

Source: https://environment.data.gov.uk/catchment-planning/WaterBody/GB108049007040 © Crown Copyright 2021

1.4 Crowdy Reservoir abstraction licence

The abstraction licence for Crowdy Lake (15/49/281/S/23) was issued to SWW on 22/10/1984 (date of last revision).

The abstraction licence permits abstraction at up to 9,092 m^3/day (9.1 Ml/d) with a total annual abstraction limit of 2,204,840 m^3 (equivalent to 6 Ml/d). A compensation release is required to be released at a rate of 0.016 m^3/s (1.38 Ml/d).

It should be noted that no changes to the Crowdy Reservoir abstraction licence are proposed for the during the duration of the proposed Drought Permit e.g. the compensation release will be maintained at 1.38 Ml/d.

Figure 1.2 Aerial imagery of Stannon Lake

1.5 Habitats Regulations Assessments

The Habitats Regulations require that an Appropriate Assessment of the implications of any abstraction licence application must be made by the relevant competent authority, in this case the Environment Agency, if a project (or plan) is likely to have a significant effect on the conservation objectives of a European Site (defined below), either alone, or in-combination with other plans or projects.

HRA is a progressive, staged process which first determines if there is potential for Likely Significant Effect (LSE) and, where appropriate, assesses potential adverse impacts on the integrity of a European Site. Further detail on the process followed and the definition of particular terms, is provided in the methodology (Section 3).

1.6 Structure and purpose of the report

This report provides information on the proposed activities and the HRA process. It then carries out the different stages in that process (where required) and presents the results and conclusion.

This report provides information to allow the Environment Agency (as the competent authority) to determine whether there will be any adverse effect on the integrity of any sites within the National Site Network in view of their conservation objectives, as a result of the project.

In the context of a HRA, where the potential for LSE cannot be excluded, a competent authority must make an Appropriate Assessment of the implications of the plan or project for that site, in view of the Site's conservation objectives. The competent authority may agree to the plan or project only after having ruled out adverse effects on the integrity of the site/s within the National Site Network. Where an adverse effect on the site's integrity cannot be ruled out and where there are no alternative solutions, the plan or project can only proceed if there are imperative reasons of over-riding public interest (IROPI) and if the necessary compensatory measures can be secured.

2. The Proposed Activities

2.1 Drought permit proposals

The proposed Drought Permit can be summarised as follows:

- The current licensed abstraction rate from Stannon Lake to be increased from 4 Ml/d to 6 Ml/d;
- Duration: application for full 6 months initially (November 2022 to April 2022).

Note that all other conditions of the Stannon Lake abstraction licence will continue to be adhered to, including the cessation of abstraction (the Hands-off Level) at 3 m below the outfall's invert level.

3. Methodology

3.1 Legislative and policy context

This section describes the legislation as it applies now that the UK has left the European Union (EU). Guidance from Defra has been provided on the application of the relevant legislation in the post-Brexit period in their policy paper published on 1st January 2021[2]. The Habitats Regulations provide for the protection of particular habitats, plants and animals through the creation of, and specific decision-making procedures applied to, the 'national site network' (Regulation 3 'Interpretation'). This 'national site network' consists of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) that were designated both in that period when the UK was a member of the EU and since the UK left the EU.

2 https://www.gov.uk/government/publications/changes-to-the-habitats-regulations-2017/changes-to-the-habitats-regulations-2017

Since those particular parts of the Habitats Regulations relating to the HRA process continue to refer to the designated sites collectively as 'European Sites', rather than as the 'national site network', that approach has been followed in this report.

3.1.1 UK (domestic) HRA legislation

The Habitats Directive (92/43/EEC) on the conservation of natural habitats and of wild fauna and flora, protects habitats and species of European nature conservation importance. Together with the Council Directive (2009/147/EC) on the conservation of wild birds (the 'Birds Directive'), the Habitats Directive established a network of internationally important sites, designated for their ecological status: Special Areas of Conservation (SACs), under the Habitats Directive to promote the protection of flora, fauna and habitats; and Special Protection Areas (SPAs), under the Birds Directive to protect rare, vulnerable and migratory birds. These sites combined to create a Europe-wide 'Natura 2000' network of designated sites, which are referred to as 'European sites'.

The above Directives were transposed into UK legislation through a series of Regulations. Terrestrial areas of the UK, and territorial waters out to 12 nautical miles (nm), are covered under The Conservation of Habitats and Species Regulations 2017, with waters beyond 12 nm, to the extent of the British Fishery Limits and UK Continental Shelf Designated Area, covered under The Conservation of Offshore Marine Habitats and Species Regulations 2017 (collectively referred to here as the Habitats Regulations). The Habitats Regulations incorporate all SPAs into the definition of 'European sites' and, consequently, the protections afforded to European sites under the Habitats Directive apply to SPAs designated under the Birds Directive. The UK left the European Union (Brexit) on Exit day, 31st January 2020, followed by Completion Day on 31st December 2020.

3.1.2 Policy requirements additional to domestic legislation

It is UK Government policy that all competent authorities should treat candidate SACs (cSACs) and potential SPAs (pSPAs) as being within the requirements of the Habitats Regulations. In the UK this is identified in paragraph 176 of the National Planning Policy Framework (Ministry of Housing, Communities and Local Government, 2019).

Accordingly, in this report the term 'European Site' is used to refer collectively to SACs, cSACs, SPAs and pSPAs.

3.1.3 International legal and policy obligations

The UK is a contracting party to the Convention on wetlands of international importance especially as waterfowl habitat, Ramsar, Iran, 1971 (the 'Ramsar Convention') which seeks to protect wetlands of international importance, especially those wetlands utilised as waterfowl habitat.

It is UK Government policy that all competent authorities should treat Ramsar Sites in their decision-making processes as if they are SACs or SPAs and hence Ramsar Sites are considered within the requirements for HRA of the Habitats Regulations. In the UK this is identified in paragraph 176 of the National Planning Policy Framework (MHCLG 2019). As a consequence, in this report Ramsar Sites are referred to alongside European Sites collectively as European and Ramsar Sites. UK Government policy (ODPM Circular 06/2005) states that internationally important wetlands designated under the

Convention on Wetlands 1971, called the Ramsar Convention (Ramsar sites) are afforded the same protection as SPAs and SACs for the purpose of considering development proposals that may affect them.

3.1.4 Land that is functionally linked to European and Ramsar Sites

Animals that are interest features of European and Ramsar Sites may be mobile and not confined to the boundary of the designated site. For example, wintering waterbirds may forage or roost on agricultural land outside of the designated site. Although that agricultural land is not part of the European or Ramsar Site, it is 'functionally linked' because it serves a function for waterfowl that are interest features of the designated site. Account has to be taken of such functionally linked land in the HRA process since, for instance, the loss of such land to development could potentially adversely affect the survival of those wintering waterbirds and lead to a reduction in the population of birds within the designated site.

Functionally linked land has been defined as follows (Chapman & Tyldesley 2016):

> '*the term 'functional linkage' refers to the role or 'function' that land or sea beyond the boundary of a European Site might fulfil in terms of ecologically supporting the populations for which the site was designated or classified. Such land is therefore 'linked' to the European Site in question because it provides an important role in maintaining or restoring the population of qualifying species at favourable conservation status*.'

3.2 The Habitats Regulations Assessment process

3.2.1 Overview

The requirements of the Habitats Regulations with regard to the implications of plans or projects are set out within Regulation 63. The step-based approach implicit within this Regulation is referred to as a 'Habitats Regulations Assessment' (HRA), which is the term that has been used throughout this report.

It is a requirement of any public body, referred to as a 'competent authority' within the Habitats Regulations, to carry out a HRA when they are proposing to carry out a project, implement a plan or authorise another party to carry out a plan or project. Competent authorities are required to record the process undertaken, ensuring that there will be no adverse effects on the integrity of any European or Ramsar Site as a result of a plan or project whether alone or in combination with other plans or projects.

The HRA can be carried out by others on behalf of the competent authority or the competent authority can chose to 'adopt' the HRA (also known as a Shadow HRA), providing the competent authority agrees with the assessment and the conclusion. This Shadow HRA has been prepared on behalf of SWW to address Natural England's (the 'competent authority' in relation to the conservation objectives of designated sites) concerns in relation to the proposed Drought Permit.

3.2.2 *Assessment stages*

The assessment of a plan or project goes through a number of stages, with published guidance available to aid competent authorities to fulfil their responsibilities. Those stages are summarised in Table 3.1.

Table 3.1 Stages in the HRA process

Stage	Description	Legislative Context
Purpose	Determines if the purpose of the plan or project is directly connected with, or necessary, to the management of a European or Ramsar Site. If it is, then no further assessment is necessary	Regulation 63(1)(b)
Scoping	The identification of any European or Ramsar Site that might be within scope of an HRA i.e. those sites that should be taken forward to the screening stage based on a wide consideration of spatial and ecological factors. Such a site may be located within the plan or project area but may also include sites located in neighbouring authority areas.	
Screening	Assessment of whether a plan or project, either alone or in combination with other plans or projects, is likely to have a significant effect on any qualifying feature (habitats and species) and the achievement of the conservation objectives of a European or Ramsar Site. This is also known as the 'test of likely significant effect' (ToLSE).	Regulation 63(1)(a)
Appropriate Assessment	Consideration of the effects of the proposals to determine whether or not it is possible to conclude with certainty that the development will not result in any adverse effect on the integrity of European or Ramsar Site, either alone or in combination with other plans or projects and with reference to the conservation objectives of the European or Ramsar Site. This is also known as the test of 'adverse effect on integrity' (AEoI). At this stage consent may be granted for the plan or project if it is possible to conclude with certainty that the proposal will not result in any adverse effect on the integrity of any European or Ramsar Site, either alone or in combination with other plans or projects.	Regulation 63(5)
If it cannot be concluded with certainty that the proposal will not result in any adverse effect on the integrity of any European or Ramsar Site then proceed to:		
Assessment of alternative solutions	Assess whether there is an alternative solution to the plan or project i.e. one that better respects the integrity of European or Ramsar sites. If no such alternative solution exists, the process continues to Assessment of IROPI.	Regulation 64(1)
Assessment of IROPI	Assess whether a plan or project can be justified as being needed for 'imperative reasons of overriding public interest' (IROPI).	Regulation 64(1)
Compensatory measures	Identify and secure any necessary compensatory measures to ensure that the overall coherence of the 'national site network' is protected.	Regulation 68

3.2.3 In-combination assessment

The Habitats Regulations, taken with Government policy, require the consideration of the potential effects of a plan or project on European and Ramsar Sites both alone and in-combination with other plans or projects.

The identification of plans and projects to include in the in-combination assessment will be based on:

- approved plans;
- constructed projects;
- applications to change an existing permission;
- granted permissions that not begun or been completed;
- granted permissions that need renewing;
- plans that have been drafted but not yet adopted
- approved, but as yet unconstructed projects; and
- projects for which an application has been made, are currently under consideration and will be consented before the proposed development begin.

3.3 Guidance on the HRA process

In preparing this report, consideration has been given to the relevant guidance issued by a number of Governmental, statutory and industry bodies.

Guidance from Government bodies includes:

- Ministry of Housing, Communities and Local Government online Guidance on the use of Habitats Regulations Assessment https://www.gov.uk/guidance/appropriate-assessment
- Defra, NE, Welsh Government and NRW guidance on Habitat Regulations Assessments https://www.gov.uk/guidance/habitats-regulations-assessments-protecting-a-european-site

In addition to recent guidance are a series of notable recent rulings by the European Court of Justice (ECJ), referred to here as Sweetman II or 'People over Wind'[3], and Holohan[4]. The People over Wind ruling relates to how screening for potential LSE is carried out, specifically that mitigation cannot be taken into account at that stage (but remains applicable for the determination of adverse effects on integrity). The Holohan ruling relates to the importance of species and habitats which are not a reason for the designation of the site but are relevant to the conservation objectives of the site (e.g. prey items of a designated species). Both these rulings have been taken into consideration during preparation of this sHRA Screening Report.

The application of the precautionary principle and standard of investigation has also been considered in a number of cases including *Waddenzee* (Case C-127/02) and the *Dutch Nitrogen* case. In *Waddenzee*, Advocate General Kokott stated that the burden on the competent authority was to prove that there would be no adverse effects, not to a standard of absolute certainty but to being "at least satisfied that there is no reasonable doubt as to the absence of adverse effects on the integrity

[3] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A62017CJ0323
[4] http://curia.europa.eu/juris/liste.jsf?language=en&td=ALL&num=C-461/17

of the site concerned". A requirement of absolute certainty would be impossible to scientificly attain, as well as being disproportionate.

4. Identification of European and Ramsar Sites and features potentially affected by the proposed activities

4.1 European and Ramsar Site identification process

For the screening process, European Sites, Ramsar Sites, and Sites of Specific Scientific Interest (SSSIs) in the vicinity of the proposed activities which could potentially be influenced by the activities were identified. The different interest features within these sites were then considered individually.

Although SSSI sites are not a requirement for HRAs, the River Camel Valley and Tributaries SSSI will be included for consideration as this designation unpins the River Camel SAC.

It only requires one site interest feature to be considered to be potentially impacted by the proposed activities for the European and/or Ramsar Site to be screened into the HRA, along with each of its associated interest features.

The HRA screening process for this project used the conceptual 'source-pathway-receptor' model. The model was used to identify potential environmental effects resulting from the proposed activities. This process provides an easy to follow assessment route between impact sources and potentially sensitive receptors ensuring a transparent impact assessment. The parameters of the model are defined as follows:

- source – the origin of a potential effect (noting that one source may have several pathways and receptors);
- pathway – the means by which the effect of the activity could impact a receptor; and
- receptor – the element of the receiving environment that is impacted.

Where there is no pathway, or the pathway is so long that the effect from the source has dissipated to a negligible level before reaching the receptor, there is justification for the screening out of that particular receptor.

Where the receptor (site interest feature) only occurs in the area on a seasonal basis and/ or that receptor is not present in the period in which particular activities of the proposed activities are a source of a potential effect, there is justification for the screening out of that particular receptor.

4.2 Potential European and Ramsar Sites (receptors)

An initial screening exercise was undertaken for all European and Ramsar Sites within 10 km of the site of the proposed activities. Given the nature of the activities, the Zone of Influence (ZoI) is anticipated to be very limited, however a precautionary approach was taken and a 10 km buffer from the proposed activities was included for screening.

The European and Ramsar Sites that fall within the screening criteria described above are:

- Crowdy Marsh SAC;
- River Camel SAC.

The boundaries of these sites in relation to the proposed activities are indicated in Figure 4.1.

4.3 European and Ramsar Site features of interest

The interest features screened in from each European and Ramsar site are indicated in Table 4.1

Table 4.1 Features of interest of the European and Ramsar Sites within 10 km of the proposed development

Site	Interest feature	Pathway
Crowdy Marsh SAC	**Annex I habitats that are a primary reason for selection of this site** • 7140 Transition mires and quaking bogs	There is no plausible impact pathway between the proposed Drought Permit (as the SAC is upstream of the Stannon Lake abstraction operation) so this SAC will not be considered further in this assessment.
River Camel SAC	**Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site** • 4030 European dry heaths • 91A0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles • 91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) **Annex II species that are a primary reason for selection of this site** • 1163 Bullhead *Cottus gobio* • 1355 Otter *Lutra lutra* **Annex II species present as a qualifying feature, but not a primary reason for site selection** • 1106 Atlantic salmon *Salmo salar*	The proposed Drought Permit (and Stannon Lake) is approximately 4km upstream of the River Camel SAC and is directly hydrologically linked via the Stannon Stream watercourse. Additionally, Stannon Stream is considered to be a functional habitat of the River Camel SAC by the Environment Agency (pers. comms.). Therefore, the River Camel SAC will be included in the assessment.

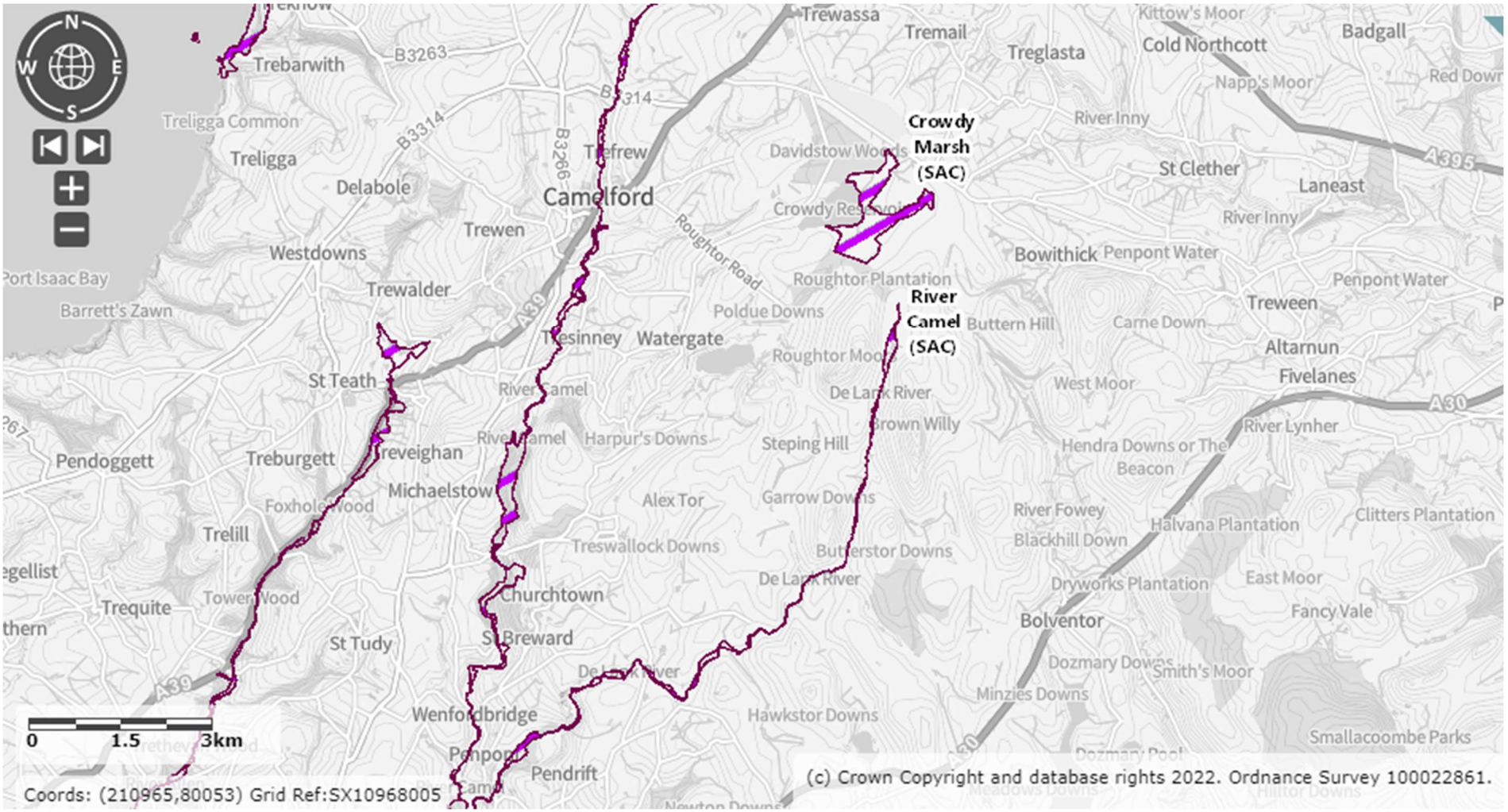

Figure 4.1: Location of the proposed activities in relation to nearby designated sites

4.4 River Camel SAC

4.4.1 Overview of the River Camel SAC

The River Camel, with its associated woodlands, willow carr, wet meadows, wet heath and mire habitats, is the largest river catchment on the North Cornwall coast, flowing between Bodmin Moor and Wadebridge. The main river rises on Hendraburnick Down, at a height of 280m, near Camelford, and discharges into the Atlantic Ocean through the Camel Estuary and Padstow Bay, a distance of approximately 50 km.

The tributaries included within the SAC are the Ruthern, the Allen, the Clerkenwater and the De Lank which drain acid moorland on Bodmin Moor, falling steeply as it flows off the moorland plateau into the Cornish Killas National Character Area[5]. The catchment geology consists predominantly of low or impermeable rock (Upper and Middle Devonian slate), which is intruded by an area of granite to the east, forming Bodmin Moor. The geology and topography of the catchment results in the rapid drainage of watercourses and, as a result, stream levels rise and fall quickly, in response to rainfall. The underlying substrate of the river channel is boulder, cobbles, pebbles and gravel with some sandstone and slate bedrock.

The River Camel and its tributaries are particularly important for otters, bullhead and salmon. The site represents the full range of conditions used by the otter in freshwater, ranging from the upland headwaters of the De Lank to lowland reaches of varying sizes, flow rates and cover. The lower reaches of the Camel and Allen are tidal providing added diversity while the wooded lower reaches of the catchment provide excellent habitat for resting and breeding. The clean, fast-flowing, relatively oligotrophic waters with their stony bottoms are also particularly suitable for bullhead, which forms an important part of the total fish biomass. The Camel SAC represents bullhead in the extreme south-west of its range in England (as part of a designation; however, they are present further west than this). Salmon are an Annex II species present as a qualifying feature, but not a primary reason for site selection.

The following Annex I habitats are present as qualifying features, but are not a primary reason for selection of this site:

- **H4030 European dry heaths**

Dry heaths are particularly abundant in uplands, where they may form extensive stands, which dominate the landscape. They are more localised in lowland areas, especially in south and central England, where they have declined in extent due to afforestation, agricultural improvement and other land uses. European dry heaths typically occur on freely-draining, acidic to circumneutral soils with generally low nutrient content. Ericaceous dwarf-shrubs dominate the vegetation. The most common is heather *Calluna vulgaris*, which often occurs in combination with gorse Ulex spp., bilberry Vaccinium spp. or bell heather *Erica cinerea*, though other dwarf-shrubs are important locally. Nearly all dry

[5] http://publications.naturalengland.org.uk/publication/5032336

heath is seminatural, being derived from woodland through a long history of grazing and burning. Most dry heaths are managed as extensive grazing for livestock or, in upland areas, as grouse moors.

The River Camel SAC supports a small area of lowland heathland, comprising the UK NVC H4 *Ulex gallii - Agrostis curtisii* heath community, primarily in the Ruthern valley.

- **H91A0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles**

In the UK, this Annex I habitat type comprises a range of woodland types dominated by mixtures of oak (*Quercus robur* and/ bor *Q. petraea*) and birch (*Betula pendula* and/ or *B. pubescens*). It is characteristic of base-poor soils in areas of at least moderately high rainfall in northern and western parts of the UK.

Frequently the oak woodland occurs as part of a mosaic of woodland types that varies with position on the slope, occurrence of streams or other waterbodies, and local soil enrichment. These transitions are important in maintaining the structure and function of the habitat type and differ across the country. Within the EU, old sessile oak woods with holly *Ilex aquifolium* and hard-ferns *Blechnum* spp. are virtually confined to the UK and Ireland. They are widespread and locally extensive throughout the western part of the UK.

Within the River Camel SAC, this habitat is primarily represented by W10 *Quercus robur–Pteridium aquilinum–Rubus fruticosus* woodland, with particularly good examples along the Camel at Helsbury Park and fringing the De Lank. A feature of the oak woodlands is that they are dominated by *Quercus robur*, rather than *Q. petraea*, generally lack *Pteridium* in the herb layer, and sometimes have abundant *Fagus sylvatica* in the canopy. There is also one stand of W17 *Quercus petraea–Betula pubescens–Dicranum majus* woodland, in the De Lank catchment, where there are extensive rocky boulders covered with mosses.

- **H91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)**

This feature comprises woods dominated by alder *Alnus glutinosa* and willow *Salix* spp. on flood plains, typically on moderately base-rich, eutrophic soils subject to periodic inundation. Many such woods are dynamic, being part of a successional series of habitats. Their structure and function are best maintained within a larger unit that includes the open communities, mainly fen and swamp, of earlier successional stages. On the drier margins of these areas other tree species, notably ash *Fraxinus excelsior* and elm *Ulmus* spp., may become abundant. In other situations the alder woods occur as a stable component within transitions to surrounding dry-ground forest, sometimes including other Annex I woodland types.

These transitions from wet to drier woodland and from open to more closed communities provide an important facet of ecological variation. The ground flora is correspondingly varied. Some stands are dominated by tall herbs, reeds and sedges, while others have lower-growing communities with creeping buttercup *Ranunculus repens*, common marsh bedstraw *Galium palustre*, alternate-leaved goldensaxifrage *Chrysosplenium oppositifolium* and marsh-marigold *Caltha palustris*.

The main alder woodland vegetation type on the River Camel SAC is W7 *Alnus glutinosa-Fraxinus excelsior-Lysimachia nemorum* woodland, at least in the upper part of the catchment where soils are relatively oligotrophic. Most of the stands are referable to the W7b *Carex remota-Cirsium palustre* subcommunity. W6 *Alnus glutinosa–Urtica dioica* woodland is also present, primarily on the richer alluvial soils in the lower part of the catchment and represented by the W6a typical subcommunity, often with nettles in the ground layer under alder. Small areas of W5 *Alnus glutinosa–Carex paniculate* woodland occur, for example, at Helsbury and Colquite.

The following Annex II species that are a primary reason for selection of this site:

- **1163 Bullhead *Cottus gobio***

The bullhead is a small bottom-living fish that inhabits a variety of rivers, streams and stony lakes. It appears to favour fast-flowing, clear shallow water with a hard substrate (gravel/ cobble/ pebble) and is frequently found in the headwaters of upland streams. However, it also occurs in lowland situations on softer substrates so long as the water is well-oxygenated and there is sufficient cover. It is not found in badly polluted rivers. Bullheads spawn from February to June and up to four times within this period (although typically once for females in less productive upland streams) (see Table 4.3).

Bullhead are widely distributed with in the SAC, but are not recorded in the Clerkenwater tributary, at least since 1985, nor from the De Lank river above De Lank quarry. There are a number of bedrock outcrops in the lower sections of the Clerkenwater watercourse that would be natural barriers to bullhead colonisation. The De Lank river is blocked by rubble at the De Lank quarry, from historic mining operations, but it is unclear whether there are also natural barriers to bullhead at this point as well.

- **1355 Otter *Lutra lutra***

The Camel represents otter in its main stronghold in England in the south-west of the country. Records show that these populations persisted even during the period when the otter was in serious decline over much of the rest of its range in England, and this area has acted as a nucleus for recolonisation of other parts of England. The river and its tributaries represent the more upland as well as lowland habitat types utilised by otters, satisfying requirements for adequate food supply throughout the year. The wooded lower reaches of the river provide excellent habitat for resting and breeding.

Otters are widely distributed within the River Camel catchment.

The following Annex II species are a qualifying feature, but not a primary reason for site selection:

- **1106 Atlantic salmon Salmo salar**

The Atlantic salmon is an anadromous species (i.e. adults migrate from the sea to breed in freshwater). Spawning takes place in shallow excavations called redds, found in shallow gravelly areas in clean rivers and streams where the water flows swiftly (see Table 4.3). The young that emerge spread out into other parts of the river. After a period of 1-6 years the young salmon migrate downstream to the

sea as 'smolts'. Salmon have a homing instinct that draws them back to spawn in the river of their birth after 1-3 years in the sea. This behaviour has resulted in genetically distinct stock between rivers and even within individual rivers, with some evidence of further genetic distinctiveness in the tributaries of large rivers.

Salmon occur in the main river and all main tributaries within the SAC, except that they cannot currently access the De Lank river above the De Lank Quarry. It is unclear whether they would be able to access above the quarry in the absence of the rubble blockage (which may conceal a natural blockage, e.g. a waterfall). The River Camel is also designated as a principal salmon river[6].

Supplementary Advice for all the Qualifying Features has been provided and is available[7].

4.4.2 Baseline data for the River Camel SAC fish qualifying species

Monitoring for fish has been carried out by the EA on both Stannon Stream and Camel (De Lank to Stannon) water bodies; survey data from the most recent 5-year period (2017 – 2022) have been incorporated into the assessment. A total of five EA monitoring locations were identified across the two river waterbodies between 2017 – 2022 (Figure 4.2; Table 4.2).

[6] Cefas/EA/NRW (2021). Salmon Stocks and Fisheries in England and Wales in 2020. Preliminary Assessment Prepared for ICES, March 2021. Cefas, Lowestoft. 91pp.

[7] http://publications.naturalengland.org.uk/publication/5116409273122816

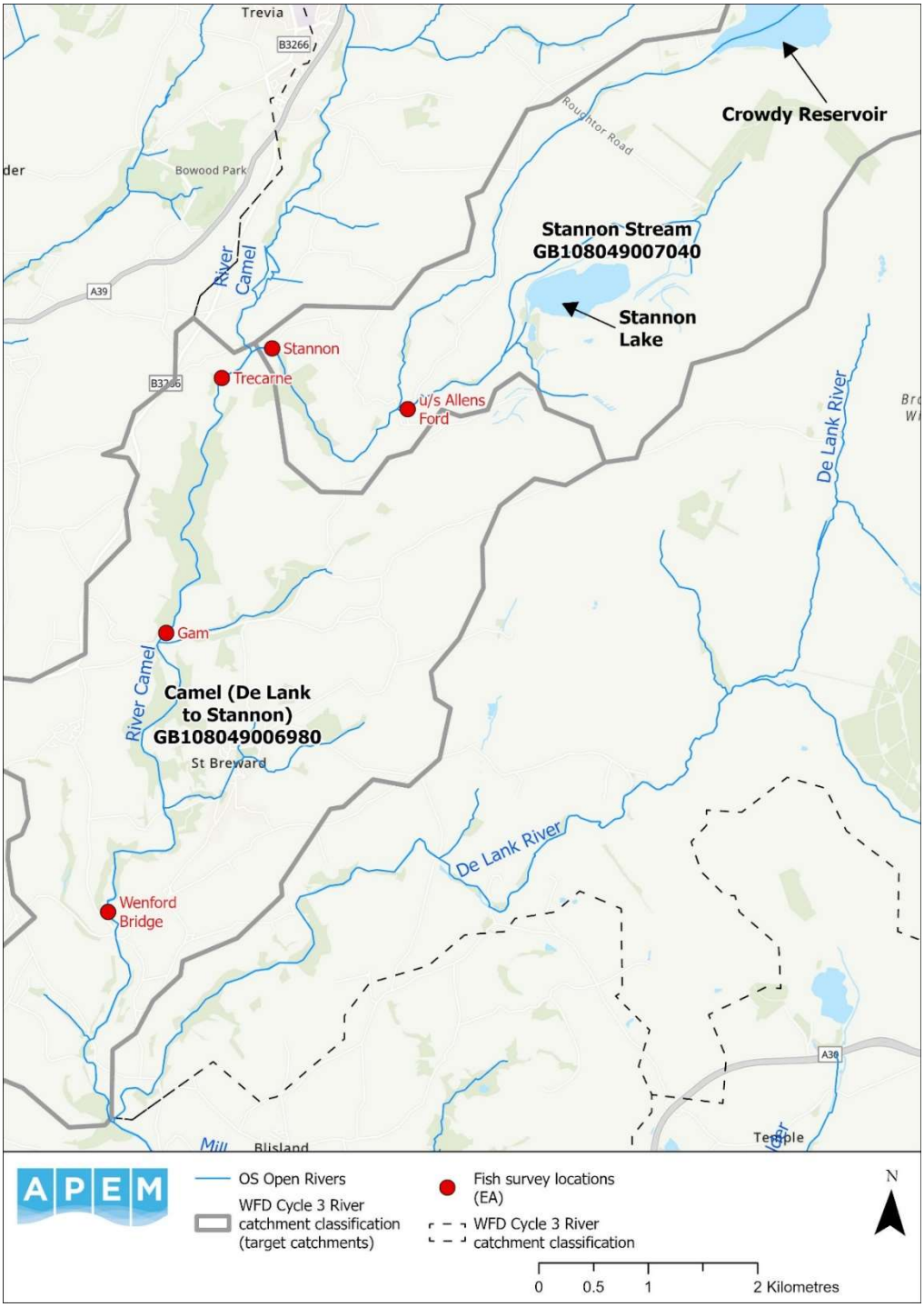

Figure 4.2: An overview of the historic EA fish survey locations on Stannon Stream and Camel (De Lank to Stannon) water bodies, 2017 – 2022

Table 4.2 Summary data for EA electric fishing surveys, 2017 – 2022

Site name	NGR	Survey years	Species recorded
Stannon Lake (GB30846165)			
Stannon Lake	SX1271481056	N/A	N/A
Stannon Stream (GB108049007040)			
u/s Allens Ford	SX1115879995	2017	Brown/ sea trout, European eel, minnow.
Stannon	SX0988080500	2017-2019, 2021	Atlantic salmon, brown/ sea trout, bullhead, European eel, minnow, ruffe.
Camel (De Lank to Stannon) (GB108049006980)			
Gam	SX0895077950	2017-2018	Atlantic salmon, brown/ sea trout, bullhead, European eel.
Trecarne	SX0946080280	2017	Atlantic salmon, brook lamprey, brown/ sea trout, bullhead, European eel, minnow.
Wenford Bridge	SX0842075400	2017	Atlantic salmon, brook lamprey, brown/ sea trout, bullhead, European eel, stone loach.

The assessment across all fish species shown in Table 4.2 is contained within the EAR.

4.4.3 Fish habitat requirements

Impacts on the qualifying fish species fish vary in accordance with the life history characteristics of individual species. Accordingly, impacts of the Drought Permit period are considered against the temporal periods of sensitivity for each species under assessment, presented in Table 4.3.

Table 4.3 River Camel SAC Annex II fish species sensitivity table

	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
Bullhead spawning																								
Bullhead residence																								
Adult salmon migration																								
Salmon smolt migration																								
Salmon spawning																								
Salmon eggs																								

Similarly, it is necessary to establish the ecological requirements of individual species/ species groups to determine whether any changes arising from the proposed Drought Permit (e.g. hydraulic changes in depth or velocity in the channels, and/ or changes relating to water quality) are likely to result in an adverse impact on fish populations. An overview of preference ranges for each species/ species group is provided in Table 4.4.

Table 4.4 Water depth and velocity requirements of key and sensitive species under consideration in the assessment. Source: Cowx et al. (2004).

Species	Life stage	Water depth requirements	Velocity requirements
Atlantic salmon	Fry	<10 – 40 cm (=20 cm preferred)	5 - 65 cms^{-1}
	Parr	>10 - <100 cm (~25 – 60 cm preferred)	4 - <120 cms^{-1} (~10 - 60 cms^{-1} preferred)
	Adult	40 - 75 cm	~25 cm
	Spawning	15 – 91 cm (~25 – 50 cm preferred)	>15 - 90 cms^{-1} ~20 - 50 cms^{-1} preferred)
Bullhead	Juvenile	Shallow	Elevated
	Adult	>5 - 40 cm	10 - >40 cms^{-1}
	Spawning	>5 cm	N/A

4.4.4 Baseline data for Otter Lutra lutra

The European otter is a nocturnal predator, feeding on fish, waterbirds, amphibians and crustaceans[8]. It therefore requires clean water and an abundant food supply. Otter breeding is generally considered to be aseasonal, and therefore disturbance impacts can occur at any time of year.

Relevant species data returned from the Environmental Records Centre for Cornwall and the Isles of Scilly (ERCCIS) is summarised in Table 4.5.

Table 4.5 Baseline mammal data (year 2012 onwards)

Species	Latin Name	NGR	Location	Number of Records	Record Duration
Eurasian otter	*Lutra lutra*	SX139818 SX09227855 SX08867785	Rough Tor Hamatethy Gam bridge	4	2016 – 2022

It is likely that Stannon Lake supports foraging otters, however the immediate surrounding habitat is sub-optimal to support otter holts. Otters are a highly mobile species with large territories, encompassing multiple prey sources. Fish are a staple food source for otter and so any changes which

[8] Chanin (2003). Ecology of the European Otter. Conserving Natura 2000 Rivers Ecology Series No. 10. English Nature, Peterborough.

may impact fish may in turn impact foraging otters in Stannon Lake and across the Stannon Steam and Camel (De Lank to Stannon) water bodies.

Holts located above the ground level within the two water bodies are likely to be undisturbed by the abstraction of water. Should there be a significant reduction of the water level in the surrounding rivers (reduction in water level of ~0.5m), underwater holt entrances may be exposed.

5. Potential Effects of the Proposed Activities

5.1 The Assessment Process

The process of testing for significant effects considers the adverse effects that might arise from the proposed activities and identifies whether or not there is a probability that each adverse effect can affect each European or Ramsar site and their interest features.

The process that is followed is to identify if the proposed activities generate effects that could affect any of the interest features of the relevant European and Ramsar Sites. At this point, the pathway will be identified and what may reduce or prevent the effects reaching the relevant European and Ramsar sites. Only when there is a source, a pathway and an effect that reaches the interest feature is it judged that there is an LSE that requires the more detailed assessment that is carried out at the Appropriate Assessment stage.

Potential adverse pressures of the proposed Drought Permit on European (post Brexit) Sites and Ramsar Sites have been identified using a combination of:

- Information provided by SWW relating to the proposed Drought Permit;
- Professional judgement based on experience of conducting numerous assessments of proposed development in the vicinity of European Sites and Ramsar Sites;
- Expertise relating to the features for which the SAC is designated;
- Baseline ecological information relating to the Drought Permit.

5.2 In-combination assessment

A series of individually modest effects may in-combination produce effects that are likely to adversely affect the integrity of one or more European Sites. Article 6(3) of the Habitats Directive attempts to address this by considering the combination of effects from other Plans or Projects, as outlined in Section 3.2.3.

The online planning portal for Cornwall Council[9] was searched for any new Plans or Projects, or those that may act in-combination with the proposals at Stannon Lake. SWW was also consulted to determine whether there were any new Capital Projects with the potential to act in combination with the current Project. Due to the nature of the works, and the likely impacts that could arise, it was deemed appropriate to consider Plans and Projects within an approximate 4 km radius of the site (to the confluence with the River Camel). The search and consultation produced no current or relevant results within this radius.

5.3 Hydrological context

5.3.1 Background

Stannon Lake is located in the upland headwaters of the River Camel catchment and is fed by a combination of groundwater and local surface water runoff. The natural surface water catchment

[9] https://planning.cornwall.gov.uk/online-applications/

directly draining to the lake has been heavily modified given the past use as a China Clay pit with much of the surface water runoff generated being intercepted by drainage channels – or leats - around running around the lake perimeter. These leats were excavated historically during the operation of the pit to keep the working area dry, as such, the leats are elevated above the top water level (TWL) of the lake, as shown in Figure 5.1. The lake overflows into Perimeter Leat that is joined by New North Leat from the north. Dragon's Teeth Leat also joins Perimeter Leat where it becomes Stannon Stream roughly 500m downstream of the lake outflow. Crowdy Stream joins Stannon Stream a further 1.8km downstream before joining River Camel approximately 4km downstream of the Stannon Lake outflow.

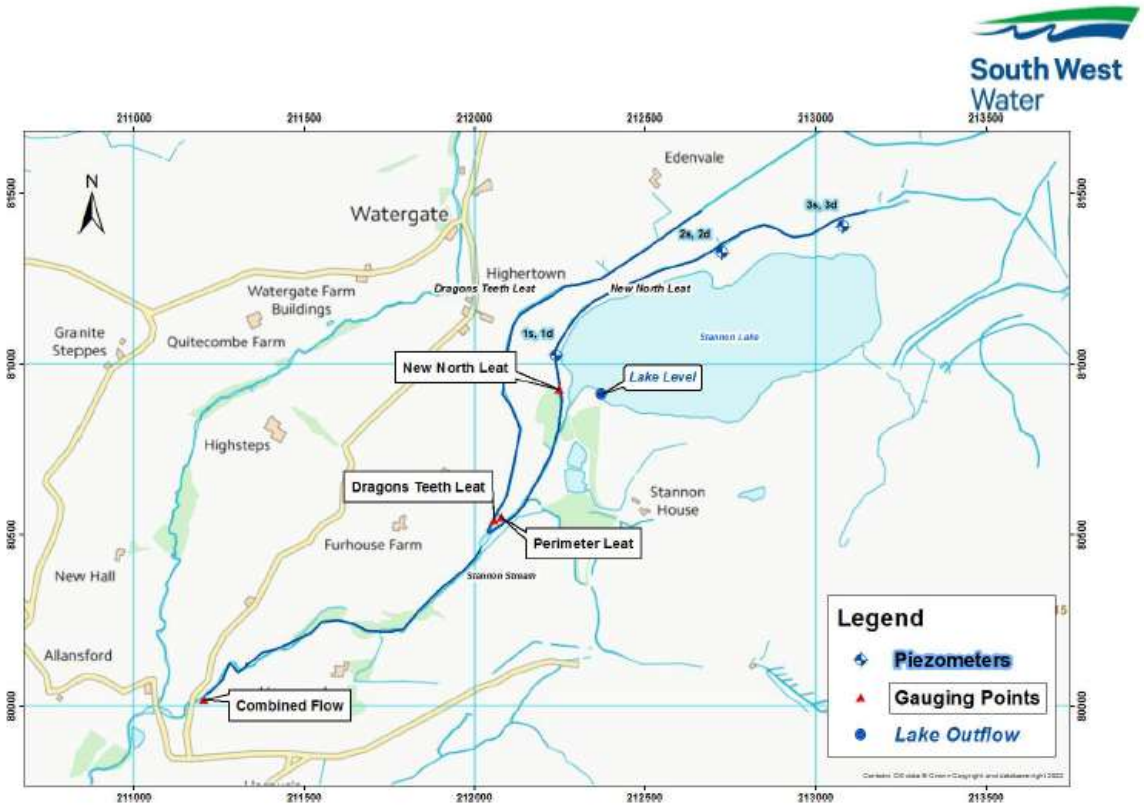

Figure 5.1: Stannon Lake and leat locations (taken from the Stannon Lake test pumping report, SWW October 2022)

The open water surface area of the lake is 32ha. An unnamed actively eroding channel enters the lake on the southeast bank and has a contributing catchment of approximately 25ha. The natural surface water runoff and shallow groundwater catchment is generally open moorland and regenerating mining features i.e. reprofiled earthworks. The contributing surface water catchment is roughly 95ha. The catchment has underlying solid geology consisting of granite with several fault lines and fractures running throughout. The superficial geology consist of alluvial deposits of clays, gravels and sand, along with frequent patches of peat. The upper slopes often contain granite boulder fields. The quarried China Clay – Kaolin– is derived from the weathering process of granite and creates a fine low-permeability "liner" to the lake allowing slow groundwater seepage and recharge along with a potentially flashy catchment response to rainfall events.

5.3.2 Water abstractions

Raw water abstracted from Stannon Lake is pumped into the De Lank to Lowermoor WTW raw water main. The TWL of the lake is controlled by an overflow structure to an elevation of 219.1m AOD (Above Ordnance Datum). The licensed hands-off water level is set at 216.1m AOD, where by, if the water level in the lake reaches this, abstraction will cease (see Section 1.3).

5.3.3 Compensation Flow Release & Storage

The abstraction licence states no requirement to release compensatory flow from Stannon Lake. The total available storage was estimated in the 2017 Stannon Lake Monitoring Report to be 8020 Ml. It has been derived by SWW that the upper 3m of storage in the lake i.e. the maximum allowable drawdown, has 840 Ml of available water for abstraction. This would provide 148 and 99 days of pumping at 4 Ml/d and 6 Ml/d respectively - not accounting for any recharge from rainfall and groundwater seepage or evaporation.

5.3.4 Potential Routes of Impact

Under the proposed drought permit, increased abstraction from Stannon Lake will reduce the volume of stored water within the lake thus decreasing lake water levels and potentially the spill frequency of the lake into downstream water bodies relative to the baseline condition.

Though a reduction in lake spill frequency under a drought permit would affect the whole flow regime, reductions will be most noticeable at low river flows where these spills contribute a larger proportion of total flow.

Superficial geology within the catchment is generally impermeable and modified (clays, peat and past quarrying activities) providing both groundwater seepage and surface water runoff recharge. The nature of the superficial deposits and the drainage associated with the past quarrying provide some degree of hydraulic disconnection between surface water flows and lake groundwater interactions.

Impacts on hydrogeology are expected to be minimal in the context of streamflow and are considered further within this assessment based on hydrological monitoring taking place within the catchment and pump tests.

5.3.5 Hydrological Zone of Influence

The zone of influence (ZoI) is intended to indicate how far downstream any changes in the flow released from Stannon Lake is a significant part of downstream flow, and at what point the majority of river flow (>50%) is sourced from elsewhere in the catchment. The guide thresholds for the zone of influence will vary and are site specific, depending on the extent of modifications and potential inflows from artificial sources.

Stantec undertook an assessment of the ZoI during water balance modelling in March 2019 (Report Ref: 64944.01 MA006: Stannon Lake: Updated assessment of effect on stream flow) of the fully licensed abstraction rate of 4 Ml/d, along with the proposed 6 Ml/d pump test and abstraction rate. The model was calibrated against monitored hydrological data.

The modelling showed that:

- The effect of the Stannon Lake abstraction on outflows from the lake is fairly substantial relative to the estimated natural outflows, with flows generally occurring 62% of the time under the recent actual scenario, compared to 100% of the time under the naturalised scenario;
- As a large portion of the summer abstraction is derived from lake storage, the actual reduction in summer flows downstream under the recent actual regime has been relatively small (1.73 Ml/d at Q70, 0.83 Ml/d at Q95) compared to typical summer abstraction rates of 2.5 to 4 Ml/d;
- Stannon Stream is a relatively small river and the effect of reductions in flow is relatively small (3% at Q95 and 8% at Q50 for the 4 Ml/d scenario, and 9% at Q95 and 10% at Q50 for the 6 Ml/d scenario).

Additionally to the above modelling, the ZoI was further assessed based on contributing catchment areas at the fish easement (see Section 5.3.6) and the low flows (Q95) estimations used in the design. Stannon Lake surface water catchment equates to less than 1% of the overall contributing catchment area at the easement and the reduction in flow would be insignificant to fish passage.

To conclude, it was assessed that the ZoI would not extend to the River Camel waterbody and increased abstraction rates modelled would have a less than 10% impact on flow accretion downstream of the confluence with Crowdy Stream waterbody.

5.3.6 Fish Easement Hydraulics

During June 2018, the West Country Rivers Trust commissioned a hydrological and hydraulic assessment of fish passage easement design for a weir on Stannon Stream watercourse at Allensford, Cornwall (SX 11035 79982), roughly 1.8km downstream of Stannon Lake outfall. The proposed adjustments to the weir included the lowering of the mid-section of the weir and additional notch cut from the existing weir that is located just downstream of the confluence between the New North Leat & Dragon's Teeth Leat watercourses.

The hydraulic design incorporated the minimum Q95 low flows of 0.068m^3/s and Qmean of 0.462 m^3/s.

5.3.7 Hydrological Monitoring Review

Hydrological monitoring has been undertaken as a Condition of the abstraction licence for Stannon Lake. Condition 9.10 stated that "*The Licence Holder shall undertake a programme of investigation into the nature and characteristics of any potential hydraulic inter-linkage between the Stannon Stream and the adjacent Stannon Lake. The investigations also to include gathering data on the local groundwater table conditions in the intervening area. The programme may include installing piezometer sets, undertaking groundwater level logging over time, carrying out seepage inspections during dry weather and under differing Lake drawdown conditions*".

Data has been collected from instream loggers on local watercourses, an installed flume on Stannon Stream and three pairs of piezometers to monitor both shallow and deeper groundwater levels at strategic locations around the lake. The piezometers were installed with the knowledge that Stannon Lake would not be drawdown greater than the 3m hands off water level. The original abstraction licence has been renewed since 2010 and the hydrological monitoring data and monitoring reports

were reviewed during this process. Monitoring data was reviewed and calibrated against long term rainfall data at De Lank rain gauge (Station Number: 49129, NGR: SX1326276556).

The monitored flows within the leats for 2022 are shown in Figure 5.2 indicate that the flows within the leats have a flashy response to rainfall events i.e. the flow rate increases quickly after rainfall. This is expected given that the leats were historically excavated to intercept surface water runoff from the modified catchment and divert water around and away from the quarry. It is also expected based on the relatively impermeable superficial geology that consists of deposits of clays and peat within the upper catchment. Figure 5.2 spans the period of the pumped drawdown test (see Section 5.3.8). It is shown that during the pumping test, with an increased abstraction rate up to 6 Ml/d, the response of flows in the leats to rainfall events was not significantly impacted. This indicates that the flow in the leats are not heavily dependent on the water resources contained in the lake or spill events.

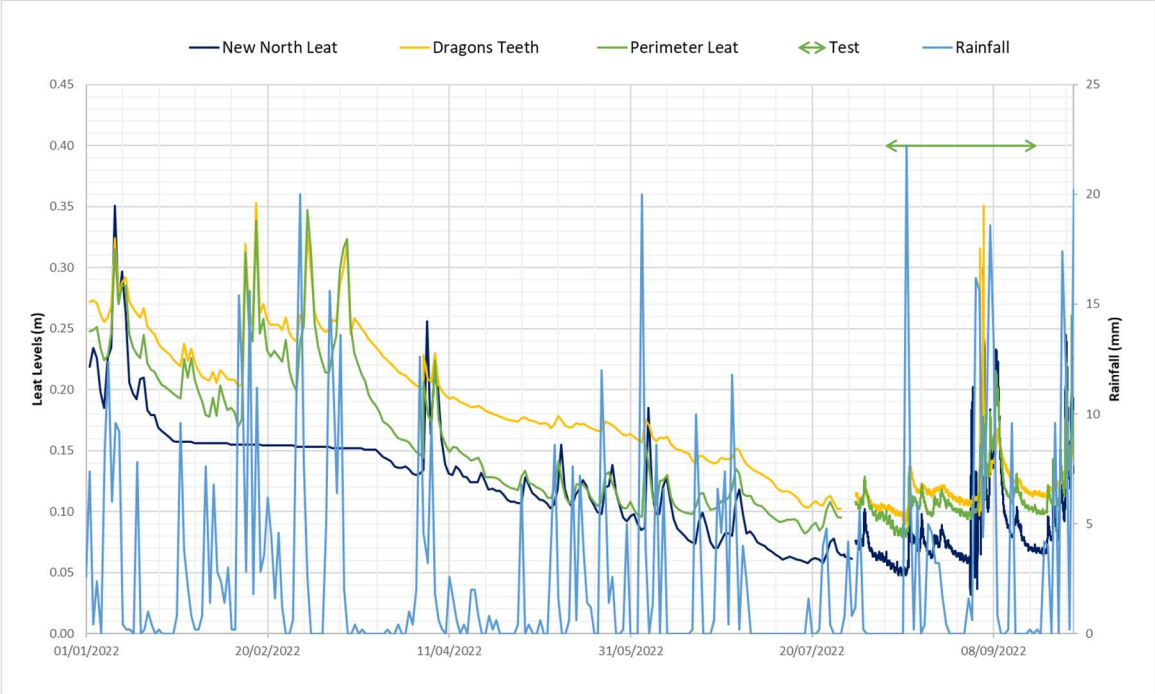

Figure 5.2: Stannon Lake leats water levels and rainfall January 2022 to September 2022

Monitored data of Stannon Lake level recorded between April 2018 and September 2022 is presented in Figure 5.3 along with the actual abstraction rates, TWL and Hands Off Water Level. As is expected from the local geology and the catchment's hydrological response to rainfall events, the lake water level increases through periods of frequent rainfall events which typically coincide with reduced abstractions i.e. wetter months. The water level does not reduce by more than 0.5m in any given period including the drawdown test.

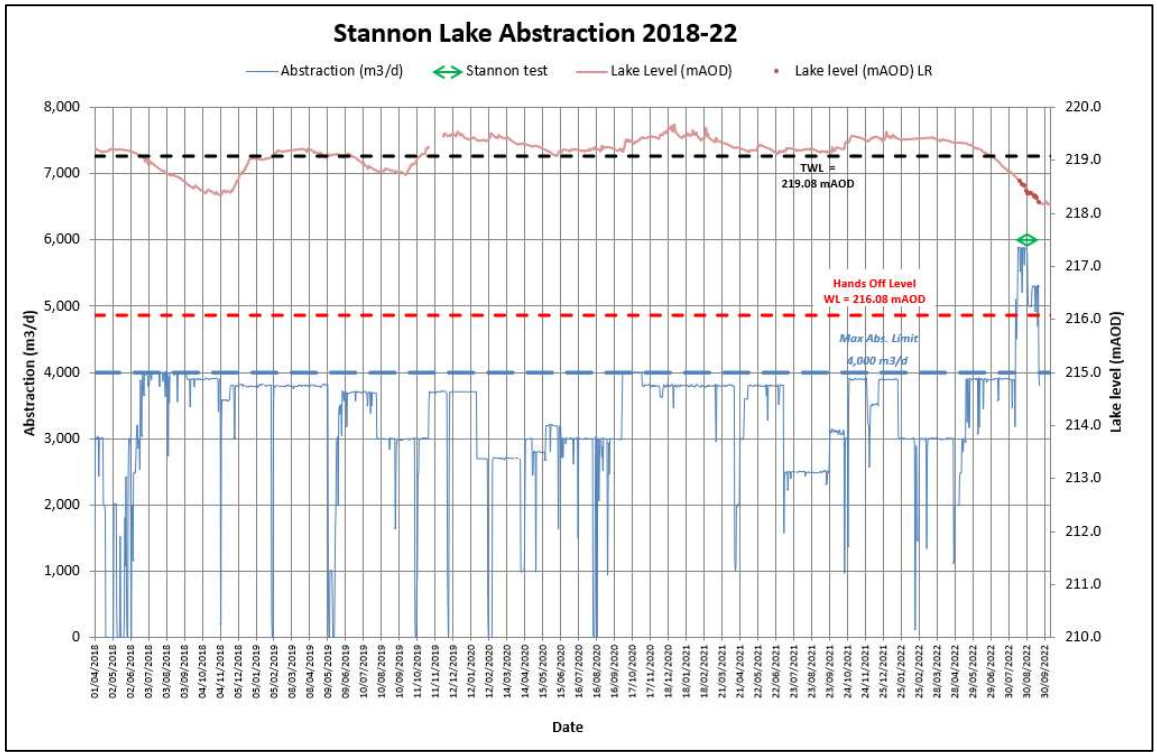

Figure 5.3: Stannon Lake abstraction 2018 to 2022

Attempts have been made to identify and quantify groundwater seepage inflows in the past by visual inspection around the lake perimeter, however, these were to be reviewed when the lake TWL reduced by 3m, to the hands-off water level, but this reduction in level has not occurred to date. To make a meaningful estimation of lake recharge a comparison between the rate of abstraction minus the rate of drawdown during a period of zero or low rainfall was undertaken. This occurred within the operational range of the licenced 4 Ml/d abstraction rate, during the only period of significant lake drawdown (at the time).

The period from 2/7/11 to 21/9/11 (83 days) when the rainfall was limited, a total of 310 Ml was abstracted compared to a fall in volume in the lake equivalent to 95 Ml. Thus the total recharge at this time was of the order of 2.65 Ml/d. Examining specific periods of zero rainfall between these two dates and the lake fall relative to abstraction which took place suggests that between 1.5 Ml/d and 2 Ml/d of recharge typically took place which is assumed to be groundwater recharge.

Taking the lower, more conservative figure of 1.5 Ml/d implies that at a maximum abstraction rate of 4 Ml/d this would generate an impact on lake storage equivalent to 2.5 Ml/d. Thus, from a full storage position (840 Ml available storage) it would require a minimum of 336 days abstraction to drawdown the lake by the maximum 3m. To re-iterate this assumes a period of no rainfall.

5.3.8 Pumping test (August to September 2022)

A Consent to investigate a Groundwater Source (GIC) was issued by the EA SWW to:

"..abstract an additional 2000m^3/day of water (to that already authorised under Abstraction Licence: SW/049/0281/001/R01) from Stannon Lake for testing purposes at National Grid Reference: SX 12381 80929, subject to the further details and conditions set out in Schedules 1 and 2 of this consent."

The Schedule 2 conditions (of the Consent) outlined a period of increased abstraction of no more than six weeks, at which point the abstraction should revert back to the maximum of 4000 m^3/day (4 Ml/d). Therefore the test ran for a period of six weeks between the 9/08/2022 and 20/09/2022.

The EA requested consideration that a trigger level be included on flow rates in the adjacent leat as a condition of the consent (Section 6 of Schedule 2) to undertake the drawdown test to safeguard downstream ecology. The trigger level was set as 0.005 m^3/s (5 l/s) in the New North Leat based on analysis of the recent available flow record from the leat with rainfall influenced peak flows removed to show the base flow recession. The analysis indicated that in an extreme scenario with no further rainfall over three months, base flows in the leat would decline to approximately 5 l/s. The condition stipulated that if flow in the New North Leat fell below 5 l/s either naturally or as a result of the pumping test, the pumping test should be halted, and the abstraction rate revert to 4 Ml/d. Selected monitoring locations and piezometers used for monitoring during this test are shown Figure 5.1.

Stannon Lake

- Lake levels went below Top Water Level (TWL – essentially spill level) 219.08 mAOD on the 07/07/2022, 33 days prior to the test. Throughout the test the lake levels dropped from 218.7 mAOD on 09/08/22 (start date), to 218.2 mAOD on 20/09/22 (end test date), a resultant total drop of 0.5m in lake levels (See Figure 5.4 and Figure 5.5). This end test value is the lowest recorded water level recorded since 2011, only on the 03/11/18 were these close when the water levels were 218.314 mAOD, 0.1m higher than at the end of the current test described here. Figure 5.5 shows that as abstraction increases, lake water level drops accordingly whilst the water level in leats remains relatively reflective of the rainfall events. As both the leat and lake water levels are represented in mAOD, it can be assumed that as the New Northern Leat is elevated more than a meter above the TWL, that there is limited hydraulic connectivity between the two.
- Prior to the test commencing, a consistent downward trend in lake water levels was noted, likely due to lack of rainfall. This downward trend continued throughout the testing period and has continued to persist after the test ended.
- Abstraction, as observed in the annual totals, is generally 0.1 Ml/d less than the licensed amount of 4 Ml/d, this was also applicable during the test where the abstraction levels were initially ~5.8Ml/d.
- A rainfall event on 29 - 30/09/22 led to a decrease in demand and abstraction dropped from around 5.8 to 5 Ml/d on 01/09/22, this abstraction remained around this rate for a week, then increased to around 5.3 Ml/d on the 08/09/22, continuing till the 20/09. As a result of the demand decrease during the test, the average abstraction was 5.308 Ml/d.

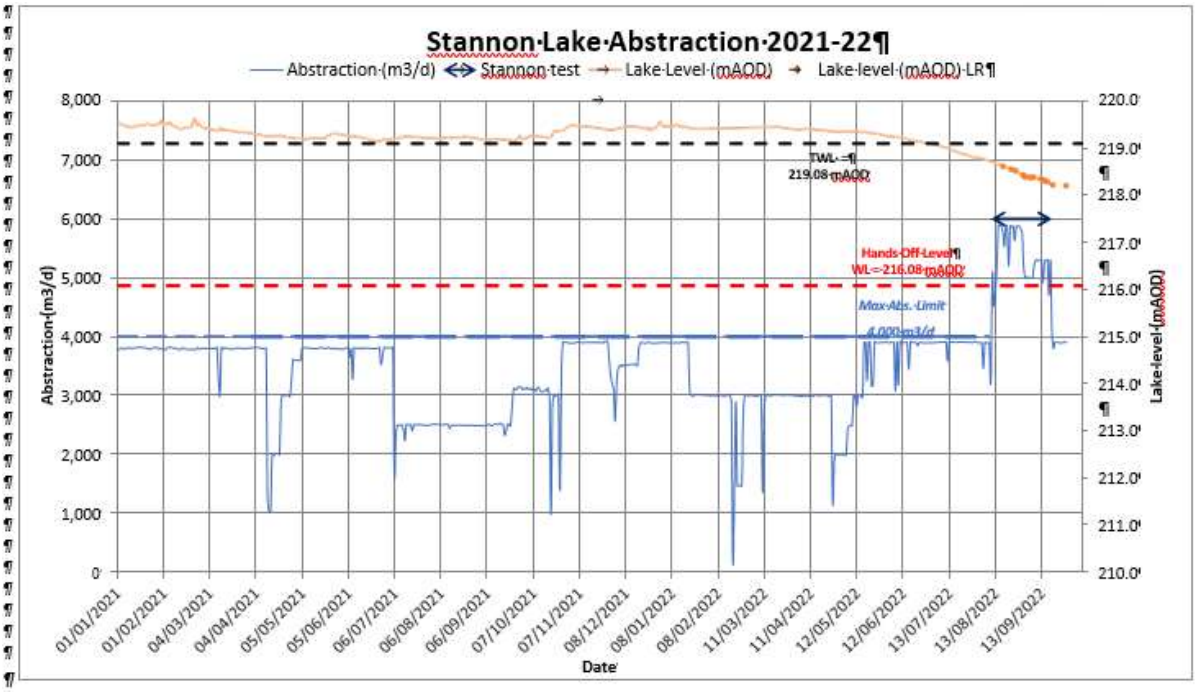

Figure 5.4: Stannon Lake abstraction March 2021 to September 2022

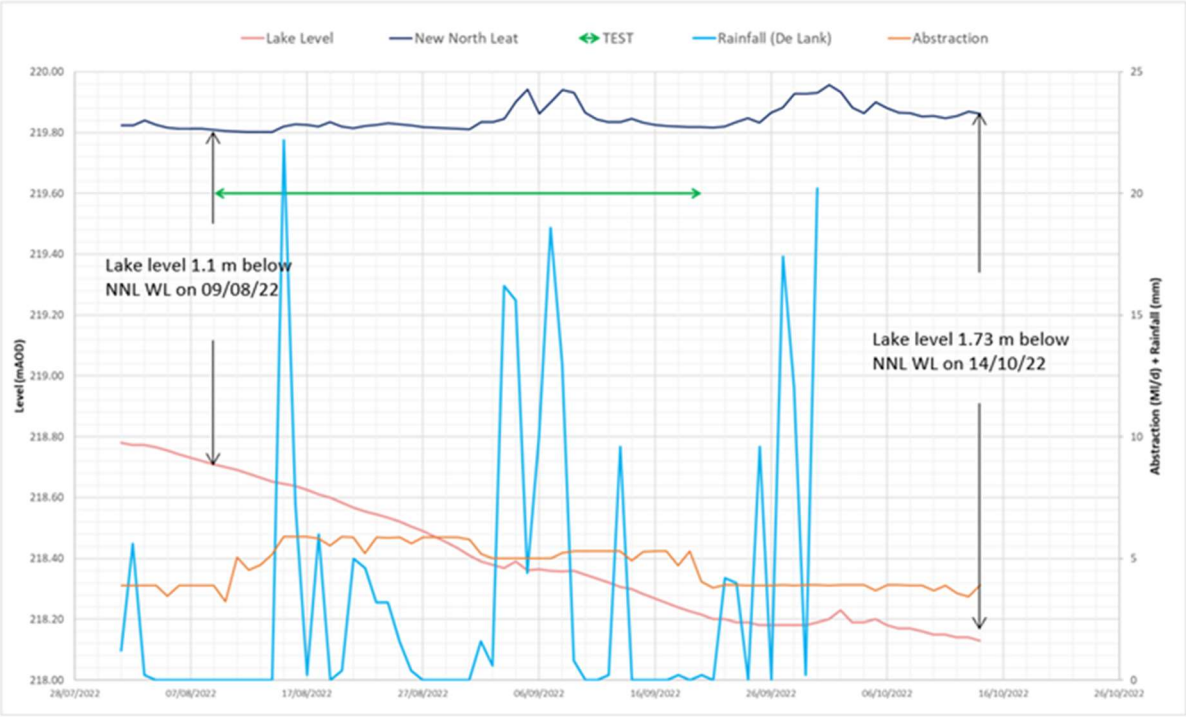

Figure 5.5: Stannon Lake abstraction August 2022 to September 2022

The monitored flow rates in each of the local watercourses is provided in Figure 5.6 along with the De Lank rain gauge date throughout the pumping test. This data showed there was little response/correlatoin of the flows to the increased abstraction rate.

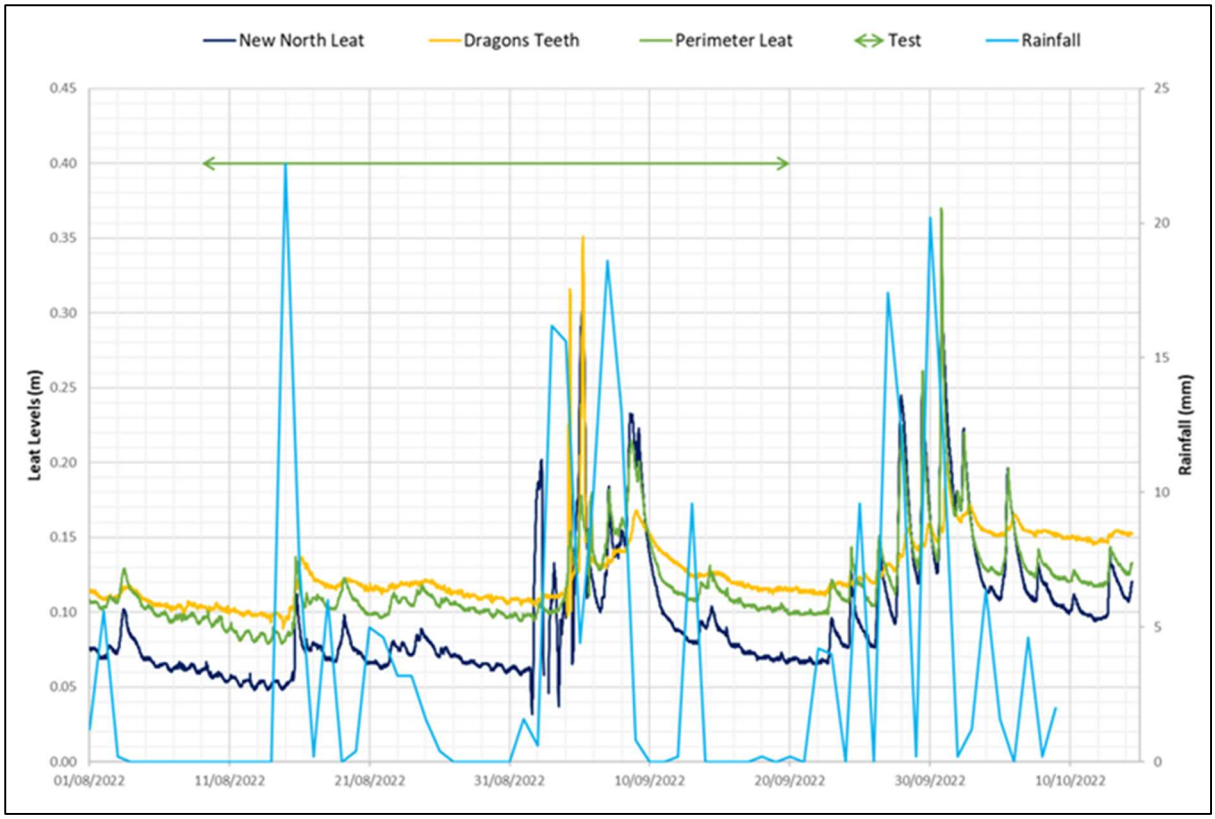

Figure 5.6: Stannon Lake leats water levels August 2022 to September 2022

New North Leat

- During the test the leat levels fluctuated between 5 and 86 l/sec with an average level of 13.4 l/sec;
- A clear response to the rainfall event on 01/09/22 through to 10/09/22 was observed.
- The average ground level in the leat was 219.75 mAOD, which is 0.67m above Stannon lake level at the beginning of the test, and 1.55m above lake level at the end of the test.

Perimeter Leat

- The flow responses in the Perimeter Leat (PL) are similar to that in the NNL which is to be expected given the PL is downstream of the NNL;
- A clear response was observed in the leat to the significant rainfall event on the 01/09/22.

Dragons Teeth Leat

- Other than on 04/09/22 and 05/09/22, the levels in Dragons Teeth were less flashy than in the NNL. During the test, the minimum flow achieved was 12 l/sec on the 31/08/22, the maximum was 29.2 l/sec on the 29/09/22, and the average was 17.6 l/sec. Flow changes associated with rainfall rainfall were significantly less obvious than in the responses from the NNL and Perimeter Leat.

Combined Flow

- The combined flow (of all leats) demonstrated the same rainfall driven peaks as those observed in the NNL, PL and DT, particularly on the 07/09/22 at 59.9 l/sec and on the 29/09/22 at 143 l/sec. As these were spot flow gaugings, not loggers, the detail is not comparable, but these captured the peaks and troughs.
- No logger was installed at the combined flow location;

Leat Levels vs Lake levels

- Throughout the test, the lake levels decreased, while the leat levels which, although were at relatively low flows, remained relatively consistent before, during and after the testing period;
- The rainfall event on the 01/09/22 correlates with a spike in the leat levels, but was only observed as a levelling-off in the Lake levels;
- The slowing in the downward trajectory of the lake levels began slowly on the 01/09/22 likely a slight response from rainfall on that day. The decline subsequently levelled off from 05/09/22 to 09/09/22 at around 218.36 mAOD, most likely attributed to being a response to the decrease in abstraction by around 0.9 Ml/d, driven by lowered demand at this time (unavoidable due to operational needs).
- Following on from 09/09/22, the lake levels continued to slowly decrease, likely as a result of the increase in abstraction from around 5 Ml/d in the previous few days, to 5.2 Ml/d, again due to the increasing demand again.

Full factual account of the pump test is within the report (Stantec, 06/10/2022).

5.3.9 Summary of the pertinent hydrological issues

- The Stannon Lake levels went below Top Water Level (TWL – essentially spill level) 219.08 mAOD on the 07/07/2022 i.e. the Drought Permit would not in isolation cause the Lake to stop spilling;
- The downward trajectory of the Lake storage was observed to be the same pre-, during and post-pump testing (August to September 2022) i.e. the increased abstraction rate (of 6 Ml/d) had negligible impact on the decline;
- The water levels in the leats respond to rainfall events and are hydrologically isolated from the Lake level;
- The SWW 2017 monitoring report estimated a Lake recharge rate (under no rainfall scenario) of 1.5 Ml/d to 2.0 Ml/d;
- The SWW 2017 monitoring report showed the main variations in Lake levels were due to rainfall events (and seasonal variations), with abstraction from the Lake only being a minor compounding factor;
- The SWW 2019 report assessed that the ZoI would not extend to the River Camel waterbody and increased abstraction rates modelled would have a less than 10% impact on flow accretion downstream of the confluence with Crowdy Stream waterbody;
- Crowdy Reservoir compensation release will be maintained at the licensed rate throughout the Drought Permit.

5.4 Environmental Assessment Report

To support the proposed drought permit an EAR has been prepared which includes a monitoring plan and mitigation measures. The EAR provides details of baseline flow conditions, assess impacts of potential changes to the flow regime due to implementation of the drought permit, and provides an Environmental Monitoring Plan (EMP) to support the requirement for baseline (pre-permit), during and post drought permit implementation monitoring.

The implementation of the proposed drought permit is predicted to have a 'worst case' Moderate potential impact on the Stannon Stream (GB108049007040) flows, but only upstream of the Crowdy Stream confluence, in comparison with the baseline scenario on the spawning life stages of Atlantic salmon, brown/ sea trout and bullhead.

The effect of the drought permit is predicted to be minor or negligible on all other receptors in comparison with the baseline.

6. Screening: Testing for LSE

The potential effects on features of the designated site are considered sequentially below.

6.1 Interest features

The interest features for the designated site are listed in Section 4.3. Taking a precautionary approach it has been assumed that all elements of the proposed Drought Permit could have a LSE on the site's features.

6.2 Testing for LSE

A recent decision by the Court of Justice of the European Union (CJEU) '*People Over Wind and Sweetman v Coillte Teoranta*' (C-323/17) (CJEU 2018) dictates that measures intended to avoid or reduce the harmful effects of a proposed Project on a European site may no longer be taken into account by competent authorities at the HRA screening stage when judging whether a proposed Plan or Project is likely to have a significant effect on the integrity of a European designated site.

Consistent with C-323/17, the potential for interest features to be adversely impacted by the proposed Drought Permit is initially assessed in the absence of design mitigation i.e. in the absence of those measures which are accepted or known impact reducing measures. Examples of design measures include those elements associated with an agreed surface water management strategy. By assessing LSE initially in this manner a transparent assessment is ensured.

If any interest features fail the screening test, the entire site is taken through to Stage 2 of the HRA process.

The LSE testing of the Project on the site interest features of River Camel SAC in the absence of mitigation measures, is shown in Table 6.1.

Table 6.1 HRA Screening Process for the River Camel SAC

SAC qualifying feature	Description of feature	Potential impacts of proposals in the absence of mitigation measures	Probability, magnitude, likelihood and reversibility of potential impact	In-combination effects	Conclusion
Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site					
4030 European dry heaths	Nearly all dry heath is seminatural, being derived from woodland through a long history of grazing and burning. Most dry heaths are managed as extensive grazing for livestock or, in upland areas, as grouse moors. The River Camel SAC supports a small area of lowland heathland primarily in the Ruthern valley; see Section 4.4.1.	Given that the potential impacts of the Drought Permit will be confined to the river corridors (Stannon Lake, Stannon Stream, River Camel) it is not considered there will be a reasonable impact pathway to this terrestrial habitat.	Given the location and characteristics of the Project it is not considered that a plausible impact pathway exists.	Not applicable	No Likely Significant Effect
91A0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles	Frequently this oak woodland type occurs as part of a mosaic of woodland types that varies with position on the slope, occurrence of streams or other waterbodies, and local soil enrichment. Within the River Camel SAC, this habitat is primarily represented by W10 *Quercus robur–Pteridium aquilinum–Rubus fruticosus* woodland, with particularly good examples along the Camel at	Given that the potential impacts of the Drought Permit will be confined to the river corridors (Stannon Lake, Stannon Stream, River Camel), and that a significant hydrological change/ impact on the Stannon Stream and River Camel are not anticipated (Section 5.3.5), it is not considered there will be a reasonable impact	Given the location and characteristics of the Project it is not considered that a plausible impact pathway exists.	Not applicable	No Likely Significant Effect

SAC qualifying feature	Description of feature	Potential impacts of proposals in the absence of mitigation measures	Probability, magnitude, likelihood and reversibility of potential impact	In-combination effects	Conclusion
	Helsbury Park and fringing the De Lank; see Section 4.4.1.	pathway to this terrestrial habitat.			
91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae*)	This feature comprises woods dominated by alder *Alnus glutinosa* and willow *Salix* spp. on flood plains, typically on moderately base-rich, eutrophic soils subject to periodic inundation. The main alder woodland vegetation type on the River Camel SAC is W7 *Alnus glutinosa-Fraxinus excelsior-Lysimachia nemorum* woodland, at least in the upper part of the catchment where soils are relatively oligotrophic; see Section 4.4.1.	Given that the potential impacts of the Drought Permit will be confined to the river corridors (Stannon Lake, Stannon Stream, River Camel), and that a significant hydrological change/ impact on the Stannon Stream and River Camel are not anticipated (Section 5.3.5), it is not considered there will be a reasonable impact pathway to this terrestrial habitat.	Given the location and characteristics of the Project it is not considered that a plausible impact pathway exists.	Not applicable	No Likely Significant Effect
Annex II species that are a primary reason for selection of this site					
1163 Bullhead *Cottus gobio*	The bullhead is a small bottom-living fish that inhabits a variety of rivers, streams and stony lakes. It appears to favour fast-flowing, clear shallow water with a hard substrate (gravel/ cobble/ pebble) and is frequently found in the headwaters of upland streams.	Given that significant hydrological change/ impact on the Stannon Stream and River Camel is not anticipated (Section 5.3.9), it is not considered there will be a reasonable impact pathway to this feature.	It is not considered that a plausible impact pathway exists to bullhead, either within the River Camel SAC designated extent or within the supporting functional habitat i.e. the Stannon Stream.	Not applicable	No Likely Significant Effect

SAC qualifying feature	Description of feature	Potential impacts of proposals in the absence of mitigation measures	Probability, magnitude, likelihood and reversibility of potential impact	In-combination effects	Conclusion
	However, it also occurs in lowland situations on softer substrates so long as the water is well-oxygenated and there is sufficient cover. It is not found in badly polluted rivers. Bullhead are widely distributed with in the SAC, but are not recorded in the Clerkenwater tributary, at least since 1985, nor from the De Lank river above De Lank quarry; see Section 4.4.1.				
1355 Otter *Lutra lutra*	The River Camel holds the densest and most well-established otter populations in South West England. The river has bank-side vegetation cover, abundant food supply, clean water and undisturbed areas of dense scrub suitable for breeding, making it particularly favourable as otter habitat. The local population remained even during the lowest point of the UK decline, confirming that the site is particularly favourable for this species and the	Given that significant hydrological change/ impact on the Stannon Stream and River Camel is not anticipated (Section 5.3.9), there is not considered to be a reasonable impact pathway to this feature or a significant impact to its key prey species.	It is not considered that a plausible impact pathway exists to otter, either within the River Camel SAC designated extent or within the supporting functional habitat i.e. the Stannon Stream.	Not applicable	No Likely Significant Effect

SAC qualifying feature	Description of feature	Potential impacts of proposals in the absence of mitigation measures	Probability, magnitude, likelihood and reversibility of potential impact	In-combination effects	Conclusion
	population likely to be highly stable.				
Annex II species present as a qualifying feature, but not a primary reason for site selection					
1106 Atlantic salmon Salmo salar	The Atlantic salmon is an anadromous species (i.e. adults migrate from the sea to breed in freshwater). Spawning takes place in shallow excavations called redds, found in shallow gravelly areas in clean rivers and streams where the water flows swiftly; see Section 4.4.1.	Given that significant hydrological change/ impact on the Stannon Stream and River Camel is not anticipated (Section 5.3.9), it is not considered there will be a reasonable impact pathway to this feature.	It is not considered that a plausible impact pathway exists to salmon, either within the River Camel SAC designated extent or within the supporting functional habitat i.e. the Stannon Stream.	Not applicable	No Likely Significant Effect

7. Conclusions

7.1 Screening stage

Screening for LSE on European and Ramsar sites in an area around the proposed Drought Permit has been carried as required under European and UK law.

The screening process has concluded that implementation of the proposed Drought Permit will not result in any Likely Significant Effects on the interest features of River Camel SAC (or the Crowdy Marsh SAC).

7.1.1 River Camel Valley and Tributaries SSSI

Through the base line assessment, hydrological ZoI assessment and the screening for LSE on the River Camel SAC, it is concluded that there would be no impact on the features of the under pinning SSSI designation. This is covered in the Stannon Lake Drought Permit EAR, which has been prepared in support of the proposed Drought Permit (Section 5.4).

8. References

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