

3.0 Environmental Impact Review

November 2022



Park Lake Drought Permit Application 2022

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1.0 Executive Summary

This document sets out our assessment of the potential environmental impacts of increased abstraction from Park Lake as part of the proposed drought permit.

This water body is currently used for public water supply and has a clear set of operating parameters including a maximum drawdown and level monitoring designed to manage the environmental impacts of abstraction.

The changes set out in the proposed permit will increase the total volume of water which can be abstracted from the lake, whilst maintaining the maximum drawdown limit, and allow the lake to be held at a lower level for a longer period.

As such the aquatic life within the lake is unlikely to be significantly impacted by the permit. Similarly, there is no material link between the lake level and flow in the adjacent stream, they are hydrologically isolated, as such there will be no impact on downstream communities. Water transferred from Park Lake into Colliford Reservoir will have similar chemical and biological characteristics, and as such is unlikely to adversely impact the aquatic life of the reservoir.

We will nevertheless implement a range of monitoring and mitigating actions, set out below, to understand any changes which do arise from the proposed permit.

The monitoring plan precludes the completion of a more detailed Environmental Assessment Report drawing on field work which is currently underway. This document will be published by 31 December 2022 and will, if required, generate a refreshed assessment of ongoing mitigations

2.0 Introduction

2.1 Aim and Objective

The purpose of this report is to provide a desktop assessment of the potential environmental impacts that may occur because of implementing a drought permit for increased abstraction at Park Lake to support the storage recovery of Colliford Reservoir, until a full EAR is concluded by 31st December 2022.

2.2 Scope and basis of the report

South West Water have commissioned an Environmental Assessment Report that will follow a 'source-pathway-receptor' approach. As an interim measure this report draws upon numerous sources to understand the likely impact of the increase in abstraction from 8MI/d to 14MI/d and provide justification for proposed interim monitoring and mitigation steps.

The following sources were used:

- NNIS Survey at Park Lake (Cornwall Environmental Consultants, 2015)
- Park Lake Abstraction Licence Renewal Report (EA, 2018)
- Park Lake Monitoring Report (SWW, 2017)
- *Licence Renewal Supporting Information (November 2015) embedded*
- Park Lake Phase 1 Habitat Survey (Code 7 Consulting, 2022)
- Park Pit Fish Passage Investigation (SWW, 2022)

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2.3 Background

Park Lake, a former China Clay pit on Bodmin Moor, was acquired by South West Water (SWW) in 2007 as a water resource (Figure 1). An abstraction licence for Park Lake (15/048/018/118) was issued to SWW on 3rd July 2008 with an expiry date of 31st March 2016. The licence was subsequently extended in 26/01/2018 to 31/03/2028 (15/48/018/G/118/R01).

Figure 1. Park Lake on Bodmin Moor



Use of Park Lake within the Colliford Water Resources Zone

Park Lake is a key source in SWW Water Resources Strategy and will be for the whole planning horizon within our current published Water Resources Management Plan (WRMP) which considers the period 2015 to 2040.

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Since acquiring the site significant restoration has taken place, comprising removal of legacy mining infrastructure, reshaping of spoil heaps, vegetative re-seeding, and natural regeneration.

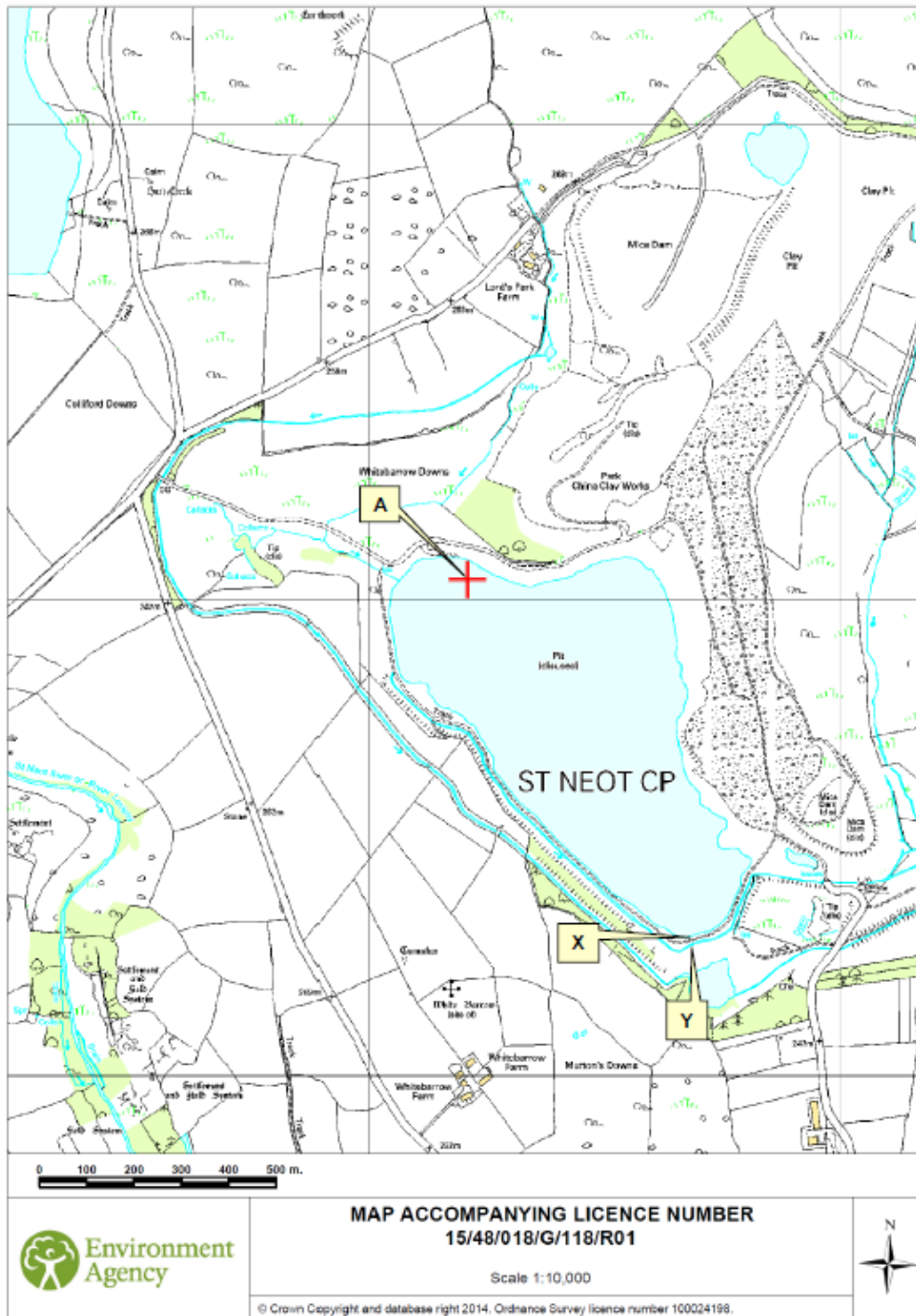
Restoration work has included:

- Re-routing the headwaters of the Tenant Stream around the works along the western edge of the valley floor, so that flow from the headwater area upstream of the works bypasses the extraction pit (see Map 1).
- Constructing a high-level leat system across the higher slopes of surrounding land to the north and east of the lake to intercept down-slope drainage and lead this around the works site and into the Tenant Stream well below the works site.
- Incorporating sub-surface drainage systems within and/or downstream of spoil tips and mica dams as they were developed to encourage spoil drainage and ensure the long-term stability of these tips.

The restoration works culminated in a 125-hectare area surrounding the lake being established as a County Wildlife Site in 2012.

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Map 1 – OS map of Park Lake (EA, 2018)



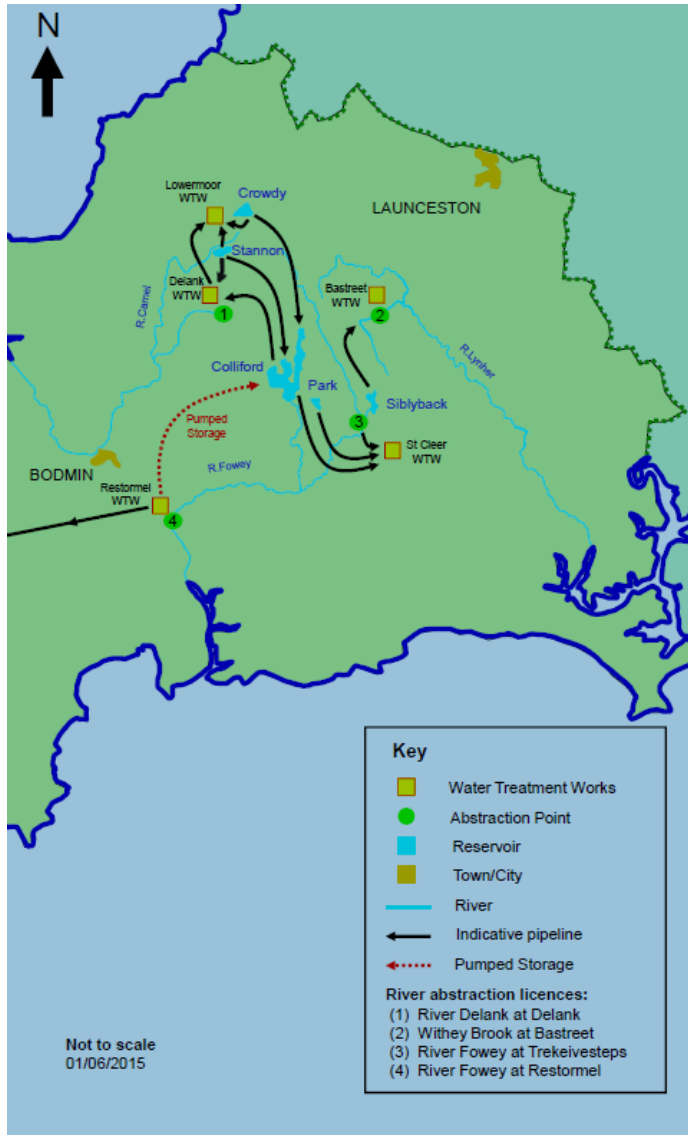
A = Point of Abstraction (SX19189 71001)

X = Outfall (SX19681 70294)

Y = Gauging Structure (SX19668 70268)

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The source is included in the calculation of the Water Available For Use (WAFU) within the 2014 WRMP as a whole, and within the Colliford Water Resources Zone specifically. Within the WRMP, Park Lake is assumed to contribute its fully licensed rate.



Under current licenced operation Park Lake is operated in conjunction with Colliford Reservoir and the River Fowey intake at Trekeivesteps to supply parts of East Cornwall. Water is abstracted from Park Lake and then pumped and treated at St Cleer Water Treatment Works (WTW), as shown in Figure 2.

The use of Park Lake influences the volume of water abstracted from Colliford mainly by minimising the need to transfer from Colliford to De Lank WTW or Lowermoor WTW. Hence it influences the volume of water stored in Colliford at any time. The water can also be pumped directly into Colliford Reservoir,

This permit would grant abstraction from Park Lake to be predominantly pumped directly into Colliford Reservoir, using existing infrastructure, to support storage

recovery. It will also be available to abstract for treatment.

Under the proposed permit SWW will continue to utilise abstracted water in the same way as currently licenced.

Figure 2. The Colliford Water Resource Zone showing the main raw water network and supply options for Park Lake and St Cleer WTW

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3.0 Hydrology

Park Lake is a deep, groundwater-fed excavation into underground strata comprising low permeability, weathered and kaolinised granite. It has a small, residual, surface water catchment that mainly comprises spoil and made ground - the result of historic land modification and drainage activities when the site was Park Pit China Clay Works.

In the valley area in the immediate vicinity of the pit the underlying bedrock comprises kaolinised and weathered granite. This is overlain in the Whitebarrow Downs area to the north-west of the Lake by peat cover. Sloping land draining to this valley is underlain by less weathered bedrock granite, in places covered by low permeability head. The low permeabilities of these substrates severely constrain the extent of the lake's groundwater catchment.

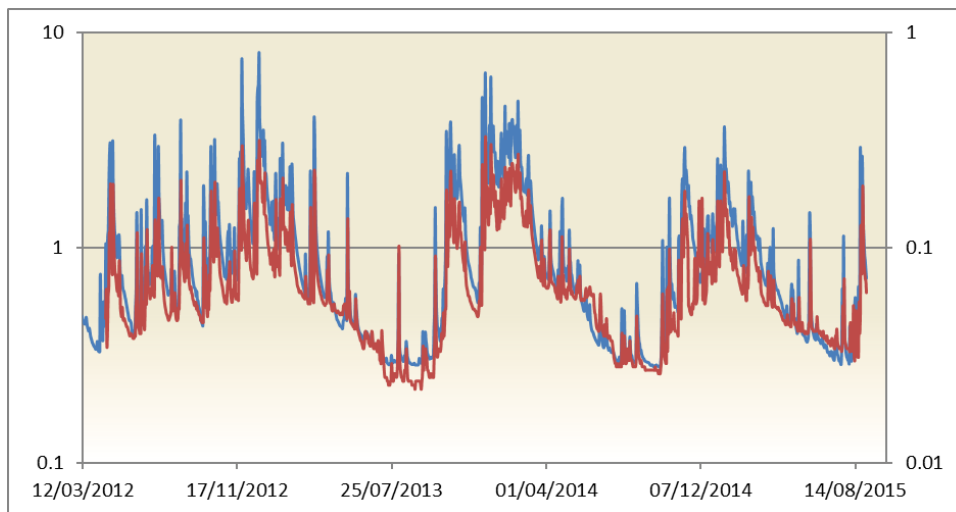
There is no obvious hydraulic inter-linkage between the lake and the peripheral streams as the Tenant Stream is diverted in a man-made watercourse around Park Lake in an artificial channel, which is situated at a higher elevation than the lake waterbody itself.

Results of SWW Monitoring Report (2017) showed that there was negligible hydrological connection between the Tenant Stream and water level in the lake, with flows in the stream responsive to rainfall rather than changes in lake level.

Deployed piezometers, within 10 to 20 m of the lake edge, showed good hydrological connectivity between the granite bedrock and lake locally (pg.36). Yet, lake drawdown from abstraction only had a coupling ratio of 34%, **consistent with groundwater having 'limited hydraulic interconnectivity' with the adjacent lake.** Additional verification of this has provided by both the Tenant Stream and nearby Warleggan River both showing similar patterns of flow response to rainfall 2012-2015, see Figure 3 (pg.39).

Figure 3- Tenant Stream flows (red) and Warleggan Stream flows (blue)

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Y axes in cumecs (semi log); Warleggan stream left axis, Trenant Stream right axis

When the pit was abandoned and allowed to fill, outfall arrangements were engineered at SX19681 70294 at its southern end so that when the lake became full in high flow conditions, overflow could occur into the Trenant Stream through an outfall structure that would maintain lake level slightly above that of the adjacent stream. This outflow arrangement ensures that the lake effectively remains isolated from adjacent stream system, except under extreme flood conditions (2017: PG.9).

The current abstraction license (EA, 2018) at Park Lake does not require a compensation flow. This means that under a non-drought permit operating regime the lake does not *typically* spill into the Trenant Stream, even though this has occasionally occurred. i.e., no spill recorded for an extended period from July 2014 to March 2020. See Figure 6 below.

3.1 Groundwater

Correlation of piezometer responses in SWW Monitoring Plan (2017) show stream and lake levels also tied in with expectations:

- The site within the Whitebarrow Downs wetland showed responses typical of low permeability aquiclude material, consistent with the underlying mica spoil material that underlies this wetland,
- Despite being sited on land within 10 to 20 m of the lake edge, the deeper piezometers in sites within areas of weathered granite showed some response to lake drawdown with a coupling ratio of 34%, consistent with limited hydraulic interconnectivity with the adjacent lake.
- Sites on land close to the lake in the areas where underlying bedrock granite may be present that is unweathered or less weathered locally show close correlations with lake drawdown changes, with a high coupling ratio. This is consistent with local fissure interconnection between the lake and the granite here.

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Following investigations in 2015 our conceptual understanding of the groundwater regime associated with this area remains as follows:

- Permeability for granite is naturally low;
- The only mechanism for groundwater flow within bedrock granite is within its fissure system;
- However, fissure density and width decreases rapidly with depth and interconnectivity tends to be limited;
- This means that not only are fissure storativity and transmissivity properties generally low, both can be expected to fall off rapidly with depth;
- This means that rates of lateral groundwater flow are likely to be very low, and to recess rapidly to minimal rates as groundwater drains and water levels fall;
- This can be clearly seen away from valley areas where the limited fissure storativity means that groundwater heads can fluctuate rapidly; fissures refill quickly under winter recharge conditions, but rapidly recess again by a few metres as soon as soil drainage ceases. This drainage mechanism explains why overlying acid upland soils can remain saturated in wet winters winter, but locally be freely draining after a few days with no rainfall;
- The limited fissure interconnectivity and fall in fissure transmissivity and storativity with depth also explains why down slope groundwater drainage falls back to minimal values in drier periods and why emergent seepage areas can occur mid-slope, rather than all being concentrated towards valley bottoms;
- This in turn means that groundwater catchments of valley bottom areas may only extend a few tens or hundreds of metres up slope as groundwater from beneath higher slopes drains to local seepage areas where it emerges as intermittent issues;
- Given the above limitations to lateral flow, the undulating nature of the moorland topography in this area ensures that the groundwater flow regimes tends to be self-limiting in extent and restricted in the area. In areas with steeper slopes their effective may be significantly smaller that the surface catchment might suggest.

Rates of recession to stream systems from the granite groundwater regime will therefore be high. Where recession rates are somewhat gentler, it is likely that these have been mitigated by the buffering effects of higher local storage availability within local made ground or valley infill deposits.

3.2 WFD status

The Trenant Stream system lies within the catchment of the River Fowey and flows into the Upper Fowey. Stream flow will include any outflow from the overflow of Park Lake during extreme floods. Historically, it also included discharges from the Park China Clay Works site before the river was circumvented around Park Lake Pit.

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As part of the licence renewal in 2015 the following water reaches were assessed:

- Fowey (Warleggan to St Neot) WFD Ref: GB108048001420
- Lower River Fowey WFD Ref: GB108048007650
- Fowey (Upper) WFD Ref: GB108048001410

To consider the following parameters:

Ecological, Chemical, Fish, Invertebrates, Macrophytes etc., Ammonia, BOD, Dissolved Oxygen, pH, Phosphate, Temperature, Priority Hazardous Substances, Other Pollutants and Specific Pollutants.

All three of the above sites were assessed as 'Good' or 'High' status (2017, pg. 50).

The output of this assessment suggested **Park Lake produces no significant negative impacts on the status of these parameters and hence the achievement of compliant WFD objectives** for the River Fowey and its tributaries.

3.3 Summary

This original conceptualisation of the lake and the limited degree of hydraulic linkage with the peripheral stream system is supported by the outcomes of the investigations undertaken since the licence was granted. **In essence, drawdown of the lake level appears to have minimal impact on the lake itself, and this includes impact on flow in the adjacent Trenant Stream itself.**

Calculations of the scale of impact of the loss of overflow on stream flows downstream were also presented with the original abstraction permit application in 2008. The impact was shown to be quickly mitigated by flows from other tributaries as one progressed downstream. This situation has not changed.

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4.0 Park Lake water quality

The in-situ quality of the water in the Lake reflects its geological and hydrological setting. It is soft and slightly acidic in nature. The Lake's nutrient load matches the quality generally found in headwater streams on the Bodmin granite upland such as the Trenant Stream or Colliford Reservoir (2017, pg. 41).

The similarity of the Lake's in-situ water quality with that within headwater streams on the Bodmin granite means that as before, when overflow occurs, its effect on the River Fowey system downstream can be considered benign.

Similarly given its geographic proximity to Colliford Reservoir the two sites share comparable water quality parameters. SWW has water quality monitoring data for Park Lake since 2009 and the results show it is of similar quality to the water in Colliford Reservoir.

Being very similar in nature, the impact of the proposed increase in abstraction from Park Lake for the purpose of improving Colliford Reservoir recovery is considered to have a negligible impact on the blended raw water quality. The existing raw water quality risks are fully mitigated by the blending and the current multi-barrier treatment process at Restormel, St Cleer and De Lank Water Treatment works. **Increasing the abstraction from Park Lake does not increase the raw water quality risks and is not considered likely to cause any adverse impact on the treated water quality.**

SWW have been monitoring and treating the water from Park Lake for many years as a source of drinking water at St Cleer WTW, De Lank WTW and Restormel WTW. Raw water from Park Lake is blended with water from Colliford Reservoir in the raw water main supplying St Cleer WTW. Additionally, raw water from Park Lake is pumped into Colliford Reservoir and the blended water is abstracted for treatment at De Lank WTW. The blended water in Colliford Reservoir is also released from the dam to the River Fowey from which it is subsequently abstracted and treated at Restormel WTW.

In conclusion, the drought permit is not expected to have any impact on water quality in either Park Lake or Colliford Reservoir, with the existing licence 7.5m below outfall hands-off level remaining in place.

5.1 Park Lake Environmental Surveys & Designations

Initial environmental surveys and their outcome

The 2017 Environmental Monitoring Report and supportive data provided with the licence renewal application provided details of environmental surveys undertaken at the site and a detailed discussion of the environmental impacts of the scheme on the ecology and fisheries. The environmental surveys included surveys of higher plants and bryophytes, fish, birds, invertebrates and mammals.

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The conclusion then was that the abstraction proposal would not have any significant impact on the environment in the wider area, as there was no impact mechanism by which this could occur. Furthermore, there were no designated conservation sites in the vicinity could be affected by the proposed abstraction. We consider this remains the case for the proposed permit.

Initial concerns were expressed by fisheries interest groups about the potential for fish movement to occur from the Trenant Stream into the lake via the lake outfall structure under high river flow conditions (e.g., when local headwater flood events). This was addressed by incorporating a fish screen at the intake, and this remains in place (see section 8.0).

As restoration of the Park Lake site is now well advanced, the County Wildlife site non-statutory award is in recognition of these improvements to its various habitats and its essentially undisturbed nature since establishment of the lake. The site is becoming highly regarded as an exemplar of post-development remediation. Hanson Aggregates and Cornwall County Council are both interested in Park as an example of good practice in landscape restoration.

5.2 Recent environmental surveys

Environmental survey information for the Park Lake site with relevant conclusions and recommendations is included within the following recent environmental datasets in addition to the documents listed in section 2.2:

- Quantitative Fish Survey – Park Lake, St. Neot, Cornwall; Westcountry Rivers Trust; September 2015
- Breeding Bird and Wintering Bird Survey Report – Park and Stannon Lakes; Code 7 Consulting; March 2014;
- Ecological Surveys Report – Park Lake, Cornwall; Code 7 Consulting; March 2014.

5.3 Designated Sites

The site falls within the County Wildlife Site Brownelly Downs (NC/CN7/S6.1), a non-statutory designation.

The Trenant Stream connects directly to the River Fowey which is within the Upper Fowey Valley Site of Special Scientific Interest (SSSI) located c2.5-km to the south of the site.

A summary of the nature conservation sites located within a 2-k radius from the survey area are provided in Table 1, below and are shown on Plan 4.

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Table 1 Nature Conservation Site	Distance from Park Pit survey area	Location
Statutory sites		
Upper Fowey Valley Site of Special Scientific Interest (SSSI)	c2.3-Km	North-East of site
Draynes Wood Site of Special Scientific Interest (SSSI)	c2.4-Km	South of site
Non-Statutory sites		
Browngelly Downs County Wildlife Site (NC/CN7/S6.1)	Park Pit lies entirely within this CWS	Within site
Colliford Reservoir County Wildlife Site (NC/CN7/S4)	364M	North-West of site
Carpuan and Bowden Woods County Wildlife Site (CN17)	c1.2-Km	South of site
Draynes & Hendergrove Wood County Wildlife Site (CN4.11)	c2.5-Km	South of site
Fowey Valley Mire County Wildlife Site (NC/CN7/S6.2)	842M	East of site

The hydrology assessment in the 2017 Monitoring report shows that the impact of reduced reservoir levels on the ground water level and downstream flows in the Tennant stream are minimal (pg.51). As a result, **the impact of the drought permit on local designated sites is expected to be negligible.**

6.0 Macrophytes and phytobenthos

This section addresses macrophyte and phytobenthos (diatom) communities of the rivers, the assessment is based on a review of the existing data in the hydrological Regime as assessed in 2015. Likely impact is judged to be low given the lack of a link between river flow and lake levels.

The WFD combined macrophyte and phytobenthos element is intended to reflect the ecological significance of nutrient status of a given water body. The macrophyte and phytobenthos combined biological element of the upper Fowey (GB108048007650) is classified as 'Good' status. The classification for the downstream waterbody, the Fowey (Warleggan to St Neot) (GB108048001410), is 'High' status.

In the event of rare overflow events from Park Lake, potential effects on macrophytes and phytobenthos can arise from changes in flow, wetted width and water quality. In drought conditions lower flow

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velocities can alter the macrophyte and diatom community directly or indirectly, for example, siltation can increase, potentially smothering benthic species. Siltation can also impact nutrient availability, resulting in increased algal growth. Macrophyte groups with different ecological niches can then become established, taking over from the original species balance. These effects may be currently evident in the wider catchment further downstream from Park Lake yet not linked to current water levels in Park Lake as an overflow is not occurring.

A reduced wetted width can expose marginal plants and reduce overall habitat area, whilst changes in water depth can potentially result in increased light penetration, which can impact algal growth. Any increase in nutrients resulting from reduced flows, attributable to a change in dilution, might also indirectly lead to modification of macrophyte/phytobenthos communities.

The Agency undertook monitoring of diatoms (a major component of phytobenthos) on the Northwood Brook, between 2003 and 2015. This sample point was at SX2097068310, around 3.5 km downstream of the outlet at Park Lake.

Changes in the hydrological regime due to the drought permit on Trenant Stream may result in increased fine sediment deposition, reduced fluvial scour, decreased spills from Park Lake and reduced water levels. However, no macrophyte or diatom data exist for Trenant Stream, which can be addressed in the full EAR to be published by 31st December 2022.

The drought permit predicts little impact, which can be mitigated against further by carrying out surveys. Diatom sampling should be undertaken in spring (March - May) and autumn (September to November) and macrophyte surveys undertaken July to September.

7.0 Macroinvertebrates

The Agency undertook monitoring of invertebrates on the Northwood Brook, until 2015. This sample point was at SX2097068310, around 3.5 km downstream of the outlet at Park Lake. Park Lake has previously been surveyed for invertebrates and is considered to qualify as a key Odonata site. Several notable solitary bees and wasps are understood to have been recorded over area of bare and sparsely vegetated ground over the spoil tips and marsh fritillary butterfly (*Euphydryas aurinia*) breeds within the site (CEC, 2012, Saunders, 2015, Davies, 2019)

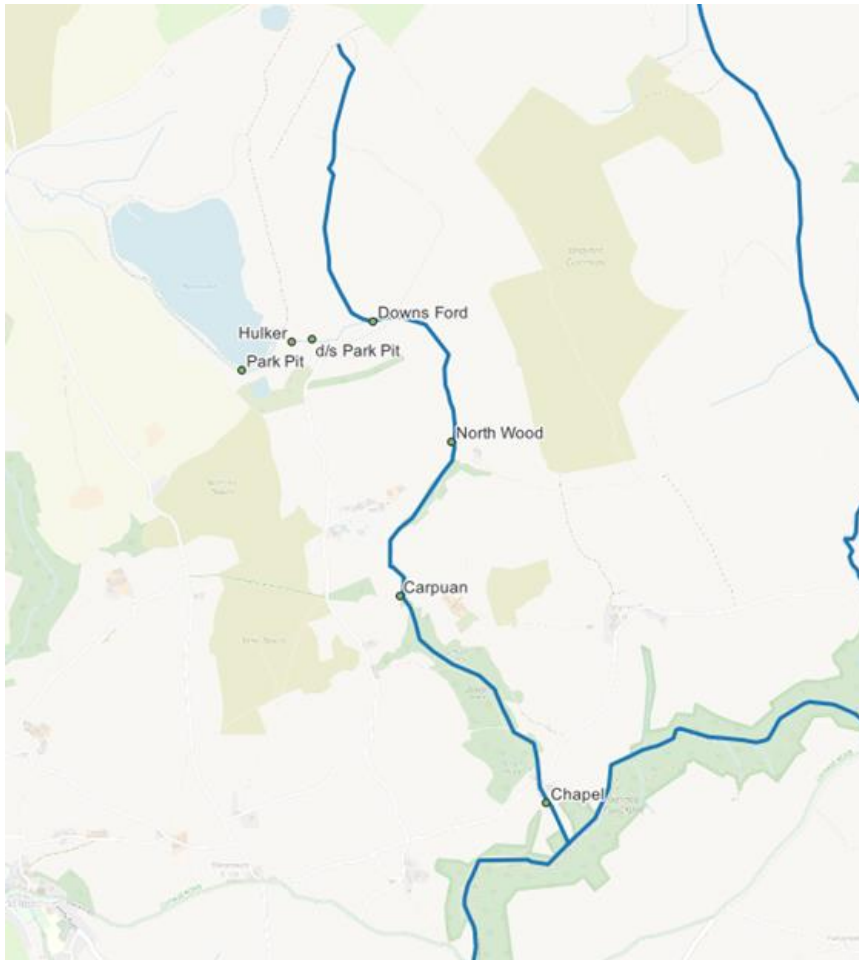
However, there are no recorded macroinvertebrate data for Park Lake, which can also be addressed in the upcoming EAR. Therefore, a precautionary approach has been taken when assessing the impact on this receptor. In the absence of survey data, the macroinvertebrate community has been determined as a **Medium** sensitivity receptor. The magnitude of impact on Park Lake is predicted to be **negligible**, therefore potential impacts of the drought permit were determined to be of **Negligible** significance.

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8.0 Fish

The Fowey Upper waterbody is classified as 'Good' for fish (WFD classification, 2019: cycle 3), supported by electric fishing surveys undertaken by The Environment Agency at seven sites within the Trenant Stream catchment, locations shown on Figure 4 (EA Ecology & Fish Data Explorer, 2022).

Figure 4 – Map of electric fishing survey sites along the Trenant Stream



As a result, a total of four fish species have been recorded as present in the catchment: Atlantic salmon (*Salmo salar*), Brown trout (*Salmo trutta*), Minnow (*Phoxinus phoxinus*) and European eel (*Anguilla Anguilla*). See Table 2, below.

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Table 2 - Summary of fish species present at each survey site in the Trenant Stream catchment

Site	NGR	Atlantic Salmon	Brown trout	Minnow	European eel
Chapel	SX2101068190	y	y	y	y
Hulker	SX1988070410	n	y	n	y
d/s Park Pit	SX1997670416	n	y	n	n
Carpuan	SX2035069190	n	y	n	y
Downs Ford	SX2027070490	n	y	n	y
North Wood	SX2062069910	n	y	n	y
Park Pit	SX1964270284	n	y	n	n

Atlantic Salmon and Minnow are only present at Chapel, the furthest downstream site close to the confluence with the River Fowey. Furthermore, EA records of the density of Atlantic Salmon (no. fish / 100m²) show a slight downward trend at this site, with the species being absent in recent surveys. Whereas Brown Trout are recorded at every site with consistent density results accounting for annual variations and European eel are recorded at Hulker the site immediately downstream of the pit outlet.

Survey work in October 2022, using the seine netting method, confirmed the presence of Brown Trout in the lake, however they were only captured at low densities and based on the fish population in the surrounding Trenant Stream catchment it is *assumed* that European eel may also be present in the lake (Park Lake NNIS Survey, CEC, 2015). This baseline data for the lake suggests that migratory movements of Atlantic salmon is restricted to the lower reaches of the catchment, beyond the influence of the proposed permit changes.

For any fish populations present in the lake there is a risk of entrainment into the abstraction pumps, which can be mitigated with the use of appropriate screens, meaning that the magnitude of this impact is thought to be **negligible**.

An outlet screen (see Figure 5) was placed on the lake outfall as a requirement of the abstraction licensing, with a 20mm coarse mesh screen to prevent movement of adult brown/sea trout into the lake during high flow. Therefore, the movement of fish populations between Park Lake and the wider catchment is likely to be limited.

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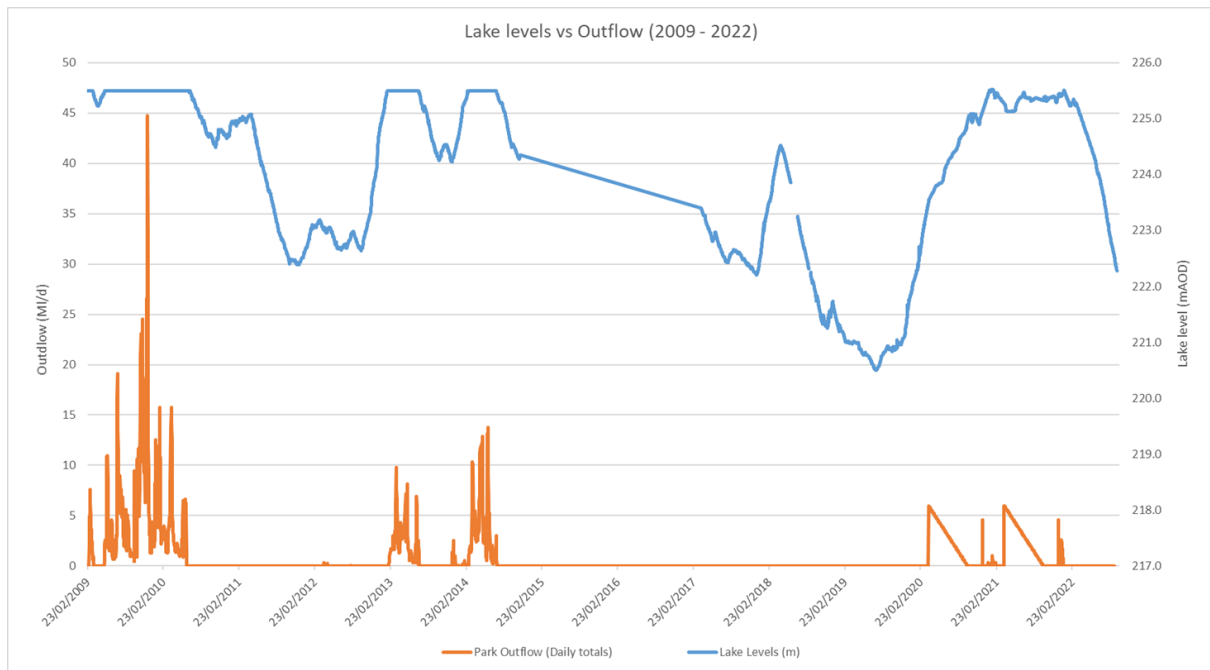
Figure 5 – Photograph of outfall screen at Park Lake



The current abstraction license (EA, 2018) at Park Lake does not require a compensation flow. This means that under a non-drought permit operating regime the lake does not *typically* spill into the Trenant Stream, even though this has occasionally occurred. i.e., no spill recorded for an extended period from July 2014 to March 2020. See Figure 6 below.

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Figure 6 - Abstraction rate and overflow spill at Park Lake, 2009 – 2022 (SWW internal monitoring data)



Park Lake is currently below top water level, and the above data confirms that there have been long periods where these conditions have persisted. In the current situation, as stream flow will be maintained to the Tennant Stream from the leat system circumventing Park Lake, drought permit implementation is unlikely to worsen existing dry conditions in the wider catchment.

It has been considered that the present fish populations need to move upstream into headwater or tributary areas to spawn and require sufficient flow to overcome migratory obstacles (i.e., weirs, natural cascades) to do so. However, as the flow in Tennant Stream is not hydraulically dependent on Park Lake, as outlined above, the only impact pathway possible is in high flow conditions when the lake overflows. Therefore, although receptor sensitivity for Atlantic Salmon, Brown Trout and European Eel is **high** under drought conditions, the permit itself and the drawdown that will occur is highly unlikely to impact these species as there is no pathway.

As a result, the *magnitude of impact* of the permit on fish in the downstream catchment is thought to be **negligible** resulting in an overall impact assessment of **minor** for Brown Trout and European Eel which may be present in the Tennant Stream immediately downstream of Park Lake.

9.0 Birds

Breeding and winter bird surveys were undertaken in 2013, 2014 and 2015 to obtain a current snapshot of the value of the site for birds. The most recent survey divided the Park site into 9 compartments, based on predominant habitat type.

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Thirty-eight species of breeding birds were recorded at Park Lake (2017, pg.45) which included:

- Seven Red Listed species: Cuckoo, Grasshopper Warbler, Linnet, Lapwing, Sand Martin, Skylark, and Song Thrush.
- Nine Amber Listed species: Curlew, Dunnock, Grey Wagtail, Willow Warbler, Mallard, Meadow Pipit, Mistle Thrush, Reed Bunting, Wheatear and Willow Warbler.
- Of note were breeding Lapwing, Curlew and Wheatear and a breeding colony of Sand Martin, and observations of Barn Owl, Peregrine and Hobby.

Wintering birds at Park include:

- Small numbers of waterfowl and roosting gulls and occasional use of a sand tip for foraging by Golden Plover.

Park Lake site appears to have benefited from its advanced state of restoration as it now has a rich and diverse population of breeding birds. The lake now provides a locally important winter wildfowl and gull roost and refuge. SWW will continue to manage the site for the benefit of wildlife.

10.0 Protected Species

Surveys of bats, dormice and reptiles were carried out as part of 2013 and early 2014 field surveys. The aim was to identify the range of species present at the Park Lake site to help inform future site management planning.

The surveys revealed the presence of:

- Three species of reptiles – Adder, Slow-worm and Common Lizard
- Eight species of bat using the site for feeding or commuting, including Greater Horseshoe, Lesser Horseshoe, Noctule, Common Pipistrelle, Soprano Pipistrelle, Daubenton's bat, Natterer's bat and other Myotis species.

There was no evidence of the presence of dormice. Though the habitat is suitable, it is poorly connected to known sites elsewhere. The key recommendations from the surveys which are being taken into account in planned site enhancements include:

- Maintaining the belt of sheltered land and stream in the west of the site
- Ensuring a mix of open glades and scrubby willow trees, and
- Maintaining sheltered open water, such as the ponds in the south of the site that give bats ready access to water.

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- Possible provision of bat boxes for roosting.

No specific actions were recommended to support the reptiles that were present (2017, pg.47). It was suggested that the current low density probably reflects a recovering population that survived on the relict heathland areas during the operational phase of the China clay mining operations. Future surveys should establish whether the density improves over time.

11.0 Invasive Species

The most recent NNIS report undertaken was 2015 and summarises the findings and mitigations. An additional NNIS survey is underway as part of the EAR commissioned.

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SWW NNIS Survey 2015 – CORNWALL

Park Lake Site Summary

Site Assessed	Park Lake
Area (ha)	174ha
Grid Reference	SX195706
Survey methods	Walk-over survey
Surveyor's name	John Sproull (CEC)
Date of assessment	25 th & 29 th June 2015
Weather on date of assessment	Dry and sunny with temperatures in line with or above seasonal norms.
Site designation	Browngelly Downs County Wildlife Site (CWS) (NC/CN7/S6.1)

Results Summary

Invasive species present	New Zealand pygmyweed (Sch 9) Montbretia (Sch 9) Rhododendron (Sch 9) Spiraea sp Bamboo sp Ragwort
Important habitats on site	Upland heath (BAP habitat) Marshy grassland - Purple moor grass and rush pasture (BAP habitat) Wet woodland (BAP habitat) Oligotrophic lake (BAP habitat)

Important species on site	Marsh clubmoss (<i>Lycopodiella inundata</i>) UK BAP species Stag's-horn clubmoss (<i>Lycopodiella clavatum</i>) Greater butterfly orchid (<i>Platanthera chlorantha</i>) Ivy-leaved bellflower (<i>Wahlenbergia hederacea</i>)
Potential for protected species	Otter, birds, reptiles, invertebrates.

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Other Environmental Considerations

12.0 Landscape and Visual Amenity

Park Lake and Colliford Lake are both located within the Bodmin Moor section of the Cornwall AONB and neither are natural features as they are remnant of mining activity in the landscape. Park Lake is not publicly accessible and has mostly restricted views from the surrounding landscape. The most significant visual impact expected is lowered water levels due to further abstraction. This would affect a relatively small number of people who use the local footpath networks and possibly recreational visitors to Colliford Lake nearby.

The special qualities of the AONB landscape may determine the impact receptor as **high** sensitivity, however the magnitude of impact is expected to be **low** because the permit would not exceed the maximum drop in level currently permitted of 7.5m below the outfall. Therefore, the overall significance of impact of a DO on landscape is **minor**, to be considered in the context that Park Lake is already experiencing drought conditions which are negatively affecting visual amenity.

13.0 Recreation

Park Lake is not accessible to the public and there is a small section of Countryside and Rights of Way approximately 300m to the South of the lake, therefore the potential route of impact is negligible. Therefore, along with nearby access to recreation facilities at Colliford Reservoir, sensitivity of the tourism and recreation at Park Lake is determined to be **low** and overall significance of impact on recreation value is expected to be **negligible**.

14.0 Archaeology and Cultural Heritage

There are no listed buildings in proximity to the site. Two scheduled monuments are present in the surrounding area, comprising a medieval homestead and fields on Redhill Downs and a hut circle village 330yds (300m) West Northwood Farm.

Abstraction from Park Lake for the DO and the resulting drawdown of water levels is not anticipated to impact these features as there will be no intrusive groundworks. Therefore, overall significance of impact on archaeology and cultural heritage value is expected to be **negligible**.

15.0 Environmental Monitoring Plan

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Following the desktop assessment, we shall undertake the following monitoring steps:

- i. Maintain existing monitoring requirements in accordance with our current Licence as below:
 - a. Daily abstraction rates via installed meters
 - b. Continuous level readings at Park Lake to preserve hands-off flow requirement
 - c. Continuous flow readings in Trenant Stream using existing gauging structures
 - d. Continuous outflow volumes from Park Lake

Under our licence conditions we are required to supply this data within 28 days of the 31 March each year, or within 28 days of a request by the agency. We currently supply the abstraction data monthly and other required data annually to the Environment agency. For the duration of the drought permit we will provide this data weekly.

In addition to the above monitoring, we will undertake pre-implementation surveys for the monitoring activities set out below and then continue at the frequencies specified:

- ii. Collect fortnightly groundwater piezometer readings at existing installations.
- iii. Implement weekly walkover surveys of Park Lake and Trenant Stream for signs of fish distress until January 2023.
- iv. Implement weekly visual inspection of Park Lake bankside stability during draw-down.

In order to mitigate the impacts of this drought permit we shall:

- i. Publish an Environmental Assessment Report and revised Environmental Monitoring Plan by 31st December 2022
- ii. Implement 2mm screening on the pumps to protect against unknown invasive species transference risk.
- iii. In the unlikely event of fish distress being identified within a walkover as per 2.6.iii we shall undertake water quality monitoring at that location and consider whether fish rescue is appropriate.
- iv. In the unlikely event that walkover surveys identify bankside instability we shall seek immediate review from an internal South West Water accredited Supervising Civil Engineer. Whilst this review is undertaken abstraction shall return to Licence conditions, abstraction will not return to application level until the Supervising Civil Engineer indicates it is safe to resume higher flow

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abstraction.