

# **Test Surface Water Drought Permit**

## **2.2\_Environmental Monitoring & Mitigation Plan**

19 July 2022

## Table of Contents

1.	Introduction	4
1.1	Access for monitoring and mitigation deployment	5
1.2	Summary of completed Lower Test monitoring.	6
1.3	Water Quality monitoring	7
1.4	Mitigation and Restoration of SSSIs	7
2	Scope of Monitoring During and Post-Permit	8
3	Drought Onset and During Drought Monitoring	9
3.1	Water Quality and Water Level	9
3.1.1	Automatic Water Quality Monitoring data	9
3.1.2	Supplementary Spot Water Quality Sampling	10
3.1.3	Review of Data Collected	11
3.1.4	WQ triggers	12
3.1.5	Rainfall, Groundwater Level, River Flow , Weather and wider Operations monitoring	15
3.2	Fish Distress Monitoring	15
3.2.1	When and where to monitor	15
3.2.2	Monitoring for and reaction to WQ deterioration	15
3.2.3	How and what to record during monitoring	16
3.3	Intake Fish Monitoring	17
3.3.1	Elver and Lamprey Impingement Sampling	17
3.4	Invasive Non-Native Species Monitoring	17
3.4.1	Monitoring	17
3.5	River Test SSSI and Lower Test Valley SSSI	17
3.5.1	Observational Monitoring	17
3.6	Monitoring of Physical Barriers Downstream of Intake	17
3.7	Additional Monitoring	19
3.7.1	River Test SSSI and Lower Test Valley SSSI	19
3.7.2	Water Vole Presence	19
3.7.3	Macrophytes and Invertebrates	19
3.8	Other Users of the Test	19
4	Drought Permit Period Mitigation	20
4.1	Fish	20
4.1.1	Aeration	20
4.1.2	Fish Rescue	20
4.1.3	Increased Surveillance	21
4.1.4	Research into Cryopreservation of Atlantic Salmon	21

4.1.5	Blackwater River enhancement	21
4.2	Alternative water sources	21
4.2.1	Temporary Abstraction Management	21
4.3	New Resource Development	22
4.3.1	Water Transfer to the Southampton West Water Supply Area	22
4.4	Invasive Non-Native Species	22
4.5	Cattle Poaching	22
4.6	Tree felling and Scrub Clearance	23
5	Summary of Monitoring and Mitigation	23
	Appendix 1: APEM – Fish monitoring and mitigation handbook.	24
	Appendix 2: Water Quality data from installed loggers and intake	24
	Appendix 3: Proposed and alternative access arrangements	25
	Appendix 4: Summary of Monitoring and Mitigation	29
	Appendix 5: River Blackwater Report	30
	Table 1 Monitoring access and activities	6
	Table 2 Parameter thresholds for alarms at installed monitoring sites	12
	Table 3 Location and type of priority sensitive habitats	18
	Figure 1 Location of Water Flow and Water Quality Monitoring	7
	Figure 2 WQ monitoring locations from upstream to downstream	10
	Figure 3 Supplementary Water Quality Monitoring Locations	14

# 1. Introduction

This Environmental Monitoring and Mitigation Plan has been prepared to support Southern Water Services' (SWS) application for a River Test surface water abstraction drought permit under Section 79(A) of the Water Resources Act 1991:- The Test Surface Water Drought Permit.

This Drought Permit Environmental Monitoring and Mitigation Plan (DP MMP) has been prepared in line with Government guidance and an agreement signed in April 2018 between the Environment Agency (EA) and SWS under Section 20 of the Water Resources Act 1991 (S.20 Agreement). The S.20 Agreement governs the heightened dependency that SWS has on drought permits and drought orders for maintenance of public water supplies, resulting from the alterations to SWS abstraction licence issued by the EA on March 15th 2019. Some heightened dependency on drought permits and drought orders will persist pending complete implementation of new permanent supply resources to replace those lost under the revised abstraction licences. The S.20 Agreement is provided, as an appendix document ref: **1.1\_App\_2\_Section 20 agreement**, to the Drought Permit Application.

UK Government guidance<sup>1</sup> in relation to drought permits and drought orders states monitoring is required to:

- Fill gaps in our understanding of the baseline environment;
- Assess the effects of the reduction in minimum residual flow during a drought; and
- Monitor the recovery of the environment after drought.

Monitoring is required if the drought permit actions present a significant (moderate to major) risk to protected habitats, species or designated sites or there isn't enough monitoring in place to assess the risk.

Adverse impacts linked to reduced river flows and associated water level, velocity and water quality changes cannot be ruled out as a result of the operation of the Test Surface Water Drought Permit.

Baseline data and monitoring during drought are integral requirements to determine when mitigation measures are needed and the level of response required.

Permanent monitoring and permanent mitigation measures were developed into plans accompanying the S.20 Agreement. These permanent monitoring and permanent mitigation plans have subsequently been finalised and approved by SWS, the EA and Natural England (NE). These signed documents, as for this drought permit, are provided as appendices to document 1,1 Description of the Permit, document references: **1.1 App 4 S20 Monitoring Plan** and **1.1 App 5 S20 Mitigation Plan**. SWS is committed to full implementation of the permanent Test Surface Water Drought Permit and Drought Order Monitoring and Mitigation Plans' measures as agreed with the S.20 Agreement, subject to access arrangements being agreed.

The overall environmental monitoring, mitigation and compensation programme committed to in the s20 Agreement commenced in 2018. An overall progress summary is provided in document 2.3 of this Drought Permit application.

The permanent monitoring arrangements for the River Test are agreed to be satisfactory by the EA and NE, to provide the baseline data against which to assess the impact of drought and the operation of the Test Surface Water Drought Permit (abstraction from the River Test below the hands-off flow ("HoF") of 355,000 cubic meters per day pursuant to a drought permit) or Test Surface Water Drought Order (abstraction below 265,000 cubic meters per day pursuant to a drought order) should these be implemented. This permanent monitoring will continue during and after drought. It provides the basis of monitoring during this proposed Test Surface Water Drought Permit.

The intended permanent mitigation arrangements for the River Test are agreed so as to improve the resilience of the river's habitat and ecology to drought. SWS has committed to ensure the agreed measures are implemented by April 2024. The EA and NE accepted that these measures would take several years to implement.

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<sup>1</sup> <https://www.gov.uk/guidance/drought-plans-environmental-assessment-and-monitoring#write-your-environmental-monitoring-plans>

A summary of the overall progress of implementation of the environmental monitoring and permanent mitigation and compensation commitments of the S.20 Agreement is provided as document ref: 2.3 Section 20 Monitoring and Mitigation Progress of this Drought Permit application.

This DP MMP provides the supplementary in-permit commitment of SWS to monitoring, mitigation and reporting pertinent to the implementation of the Test Surface Water Drought Permit.

In respect of mitigation, this DP MMP sets out the planned mitigations SWS will deploy if ecological stress is found when the river flow falls below 355,000 cubic metres per day, with the permit in place.

This document sets out how core data from within the agreed permanent monitoring scope and the supplementary monitoring committed within this DP MMP will be used to guide in-permit mitigations.

The overall approach is in line with the S.20 Agreement. It will:

- Monitor the pertinent environmental parameters before, during and after the drought permit to assess impact of the abstraction taken within the permit.
- Mitigate or reduce adverse effects during the drought permit implementation; and
- Provide restoration as required by NE for any residual adverse effects that remain after mitigation has been implemented (though Southern Water will expect such restoration to be evidentially due to the abstraction under the drought permit).

## 1.1 Access for monitoring and mitigation deployment

The abstraction of the Test Surface Water Drought Permit is a relaxation of the conditions of Southern Water's permanent abstraction licence (11/42/18.16/546), permitting abstraction from the Great Test channel in the Lower River Test area, downstream of Nursling Mill which itself is downstream of the M27 road bridge crossing of the River Test.

Therefore, much of the monitoring most directly relevant to SWS's abstraction under this drought permit falls on the Lower Test (below the M27) within the Land owned by Barker Mill Estate (BME), where the fishing rights are leased to Little River Management (LRM). Permanent or temporary mitigation measures may also fall in this area. Since the Public Inquiry of March 2018, SWS, BME and LRM have negotiated terms under which annual baseline monitoring and implementation of mitigation measures, if agreed, may be able to proceed routinely (to an agreed protocol). This negotiation was ongoing through 2019 and 2020. Southern Water provided a proposed final Agreement to BME and LRM in October 2020. This was not accepted by BME and LRM and, subsequent clarity as to how Agreement might be resolved was not achieved until late in 2021. Negotiation recommenced during Spring 2022 and there is recognition in all Parties that the Agreement might be finalised within 2022, subject to further iteration of the Agreement document.

During 2019 and to June 2020, progress towards a permanent agreement had been such that one-off agreements were made to allow monitoring work to proceed on a series of days from 3rd April 2019 to 7th October 2019 and, on 11th March and June 16th 2020. The EA, NE, Hants and Isle of Wight Wildlife Trust (HIWWT) and SWS made use of access on these days to undertake invertebrate, macrophyte, fish and water vole monitoring, habitat walkovers, flow control structure surveys and, reconnaissance to plan water quality monitor installations. No access has been allowed by LRM for this monitoring since June 2020, as the negotiation had then and has still not been concluded acceptably.

SWS do not expect access to be agreed with the landowner and Fishery for monitoring or mitigation during the period leading into or during this 2022 drought permit.

SWS understands that any Test Surface Water Drought Permit granted will not confer rights of access, and will also need assent from NE, as required.

SWS also notes the S.20 Agreement recognises that refusal of access by a landowner, preventing the company undertaking monitoring, should not be used by the EA as reason to refuse to grant the Test Surface Water Drought Permit, without due consideration of use of its own powers of entry to assess environmental condition and collect data. SWS has reminded the EA of this before and during the pre-application discussions about this drought permit application. Furthermore, the agreed implementation of the S.20 Agreement assigns the collection of most of the baseline ecological data pre, during and post drought permit with the EA and, other baseline data to be collected by the HIWWT and only some (especially water quality data) by SWS.

Despite best efforts, no agreement has yet been reached establishing ongoing access as between BME and LRM, with SWS. Therefore the monitoring and mitigation commitments for the Lower Test included in this DP MMP are caveated as 'subject to agreed access'. Public access points will be used where possible and relevant, but much of the work requires access to the BME / LRM owned and operated area.

Proposed and alternative access locations for monitoring and mitigation actions are provided in Appendix 3, below. These are limited to points of existing SWS access or public access. In previous discussion with the EA, none of the alternative water quality monitoring (permanent station) sites were considered feasible in terms of either access or location relative to original objectives.

SWS has previously respectfully asked that the EA consider adopting their statutory powers to access to undertake the desired annual monitoring and, in respect of drought permit monitoring requirements and, SWS also respectfully asks the EA to use those powers in respect of monitoring and mitigation required during the implementation of this Test Surface Water Drought Permit.

SWS also wrote to the EA on 16th September 2021 respectfully asking that the EA consider allowing installation of a Southern Water water quality monitoring sonde at its River flow gauging station (Conagar Bridge) on the Little Test River. The EA considered this but, has declined to allow it.

Given the position above, the content of this monitoring and mitigation plan that is dependent on permissions from BME / LRM should only be considered implementable should the EA successfully deploy its own powers of entry to undertake the work.

Where agreement cannot be reached for preferred access locations we will endeavour to utilise public access locations, as far in that they are appropriate for the task. For example, the identified sensitive fish habitat locations require agreed access and public access is not available.

## 1.2 Summary of completed Lower Test monitoring.

The Lower Test Fishery and Barker Mill Estate granted access for monitoring on a series of days in 2019 and 2020 as shown below:-

**Table 1 Monitoring access and activities**

Date	Work undertaken
3 <sup>rd</sup> April 2019	<ul style="list-style-type: none"> <li>• General habitat condition 'walkover' surveys;</li> <li>• In-river invertebrate kick-sampling; and</li> <li>• Reconnaissance for future work.</li> </ul>
17 <sup>th</sup> June 2019	<ul style="list-style-type: none"> <li>• Aquatic macrophyte survey; and</li> <li>• Sea lamprey spawning survey.</li> </ul>
28 <sup>th</sup> -31 <sup>st</sup> August 2019	<ul style="list-style-type: none"> <li>• Invertebrate sampling;</li> <li>• Macrophyte survey;</li> <li>• Fish survey;</li> <li>• River habitat (including INNS mapping) and surface features surveys;</li> <li>• Water vole survey;</li> <li>• Water quality sampling; and</li> <li>• Flow control structure survey.</li> </ul>
4 <sup>th</sup> & 7 <sup>th</sup> October 2019	<ul style="list-style-type: none"> <li>• Fish survey (including electro fishing); and</li> <li>• River habitat (including INNS mapping) and surface features surveys;</li> <li>• Wintering bird surveys; and</li> <li>• Salmonid Redd counting;</li> </ul>
11 <sup>th</sup> March 2020	<ul style="list-style-type: none"> <li>• River habitat survey; and</li> <li>• Tree and scrub clearance and cattle poaching mitigation reconnaissance.</li> </ul>
16 <sup>th</sup> June 2020	<ul style="list-style-type: none"> <li>• Sea lamprey spawning survey; and</li> <li>• Himalayan Balsam volunteer removal day.</li> </ul>

SWS ecologists undertook River Habitat Surveys along pre-defined survey reaches. A River Corridor Survey and 'Surfaces' monitoring was also undertaken at this time, taking account of the presence of available invertebrate habitat types along the Lower River Test and the presence and abundance of Invasive species (Himalayan balsam).

The information collected through 2019 and 2020 is provided in the accompanying Environmental Assessment Report for this Drought Permit application.

Also, APEM has produced a baseline fish habitat report which included the findings of walkovers undertaken between August and October 2019. APEM used the walkover findings along with high resolution imagery that was obtained via non-intrusive plane flyovers to develop the Fish Monitoring and Mitigation Plan included as document ref: 2.2\_MMP App. 1 Fish Monitoring Mitigation Plan to this DP MMP.

The information collected established a much-improved factual knowledge of the baseline pre-drought permit conditions across the Lower Test area.

## 1.3 Water Quality monitoring

Southern Water's S.20 programme commitment to implement permanent water quality monitoring stations is of particular focus in this DP MMP. In total eleven stations are intended in the Lower Test area, most subject to access agreement from BME / LRM. Six have been installed in the Lower Test area using public or otherwise agreed access. Ten have been installed across the main River Itchen and its Candover stream tributary. Table 1 in document ref: 2.2\_MMP App. 2b Redacted Water Quality Monitoring Locations provides an overview summary of installation, upgrades and data continuity, noting some stations have suffered from vandalism. This has been reported to the EA. The EA has on-line access to the data in real time.

For baseline assessments SWS will also collate wider water quality monitoring (i.e. data collected from other work streams and sources) where relevant and reliable as baseline information. This will include, for example, information on nitrates and pesticides.

## 1.4 Mitigation and Restoration of SSSIs

SWS is committed to protection of SSSI and, should damage to the River Test SSSI and Lower Test Valley SSSI features arise as a result of the operation of this Test Surface Water Drought Permit, SWS will provide support for the SSSI Favourable Condition, in discussion and appropriate agreement with NE, with reference to each species and habitat as set out in the River Test SSSI and Lower Test Valley SSSI Favourable Condition Tables (FCTs), latest conditions assessment (Unit 91 for the River Test SSSI 2013<sup>2</sup> and for Lower Test Valley SSSI 2020<sup>3</sup>) and baseline data acquired under the S.20 Agreement implementation to date.

In addition to mitigation measures being progressed in implementing the S.20 Agreement commitment, Southern Water supported HIWWT to undertake two permanent improvements in the Lower Test area as actions from the River Test drought permit granted by the EA in 2019:-

- Cattle bridge repair on the Wirehouse stream, Lower Test, by HIWWT (to avoid cattle poaching).
- Tree (Poplars) felling, to improve habitat for over-wintering and breeding birds.

**Figure 1** Location of Water Flow and Water Quality Monitoring  
REDACTED

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<https://designatedsites.naturalengland.org.uk/UnitDetail.aspx?UnitId=1027764&SiteCode=S2000170&SiteName=test&countyCode=&responsiblePerson=>

3

<https://designatedsites.naturalengland.org.uk/SiteDetail.aspx?SiteCode=S1001282&SiteName=test&countyCode=&responsiblePerson=&SeaArea=&IFCAAArea=>

7

## 2 Scope of Monitoring During and Post-Permit

The remainder of this DP MMP focuses most specifically on activities pertinent to the implementation of this Test Surface Water Drought Permit. It supplements rather than supersedes the commitments to permanent monitoring and permanent mitigation on the River Test set out in the monitoring and mitigation plans agreed further to the S.20 Agreement. ( document references: **1.1 App 4 S20 Monitoring Plan** and **1.1 App 5 S20 Mitigation Plan**). The permanent monitoring provides the primary monitoring for this Test Surface Water Drought Permit, though subject to access permissions being agreed. All of the monitoring related to implementation of this drought permit is also subject to access being agreed.

The scope of monitoring required for this drought permit has been discussed and developed with the EA and NE.

The broad approach to monitoring of this Test Surface Water Drought Permit is summarised below:-

- Parameters to be monitored;
  - Hydrometric - rainfall, river flow, groundwater level and abstraction
  - Water quality – by real time stations and spot sampling
  - Ecology – Fish distress
- Habitat –
  - Walkover surveys before, during and after implementation of this Drought Permit
  - River habitat surveys, pre and post implementation of this Drought Permit.
- Locations of monitoring;
  - Generally, River Test and Lower Test Valley;
  - In-river, riverbanks and riparian;
  - Identify sensitive habitat locations Appendix 1 (document ref: **2.2 MMP App1 Fish Monitoring Mitigation Plan**.)
  - At the intake and other structures.

The remainder of the document sets out the parameters and methodology in more detail, including frequency and duration, parameter trigger levels for actions to enhance monitoring and to implement mitigations.

Mitigations include aeration; fish rescue; increased surveillance; and, temporary curtailment of abstraction management.

## 3 Drought Onset and During Drought Monitoring

### 3.1 Water Quality and Water Level

#### 3.1.1 Automatic Water Quality Monitoring data

Southern Water's automatic real-time (30 minute timestep) water quality data is a primary data source for the drought permit monitoring and mitigation actions. Parameters measured by the Sondes are:-

- Water level; temperature; pH; turbidity; conductivity; dissolved oxygen (mg/l and %); and, Ammonia (as mg/l.NH<sub>3</sub> and as UIA).

Weather, including temperature forecast data, will be kept under review alongside WQ data.

The River Test station locations are as shown on Figure 1. Station location details and period of record are detailed in Table 1 in document ref: 2.2\_MMP App. 2b Redacted Water Quality Monitoring Locations to this DP MMP, where there is further information on the procedures regarding data acquisition and data assurance methodology.

Southern Water has recently installed two further Sondes downstream of the abstraction intake and upstream of the confluence with the River Blackwater. These are respectively upstream and downstream of a temporary riverbank dewatering discharge associated with ongoing infrastructure improvement works at the Low Lift pumping station (the abstraction pumping station). This work is expected to be ongoing during this drought permit period and so, the data from the two additional sondes will be available.

The relative location of the River Test water quality monitoring stations, including the two new Sondes, are shown diagrammatically on Figure 2.

The water quality data acquired to date from the River Test stations is summarised in an Excel Workbook that will be made available to the EA and updated weekly during the process of this River Test drought permit.

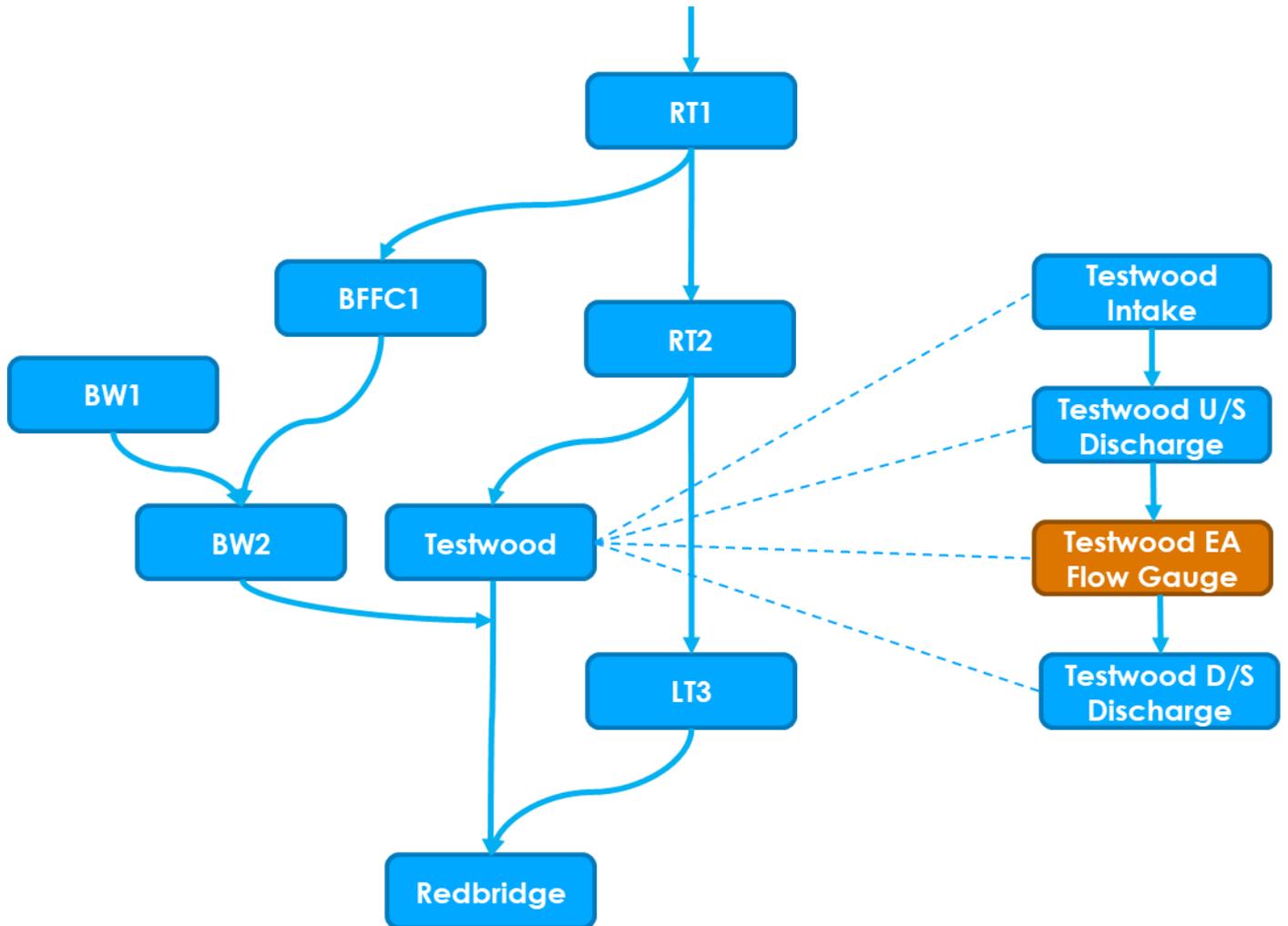
The EA has access to the data in real time, including the data for ten stations installed on the River Itchen and Candover stream except for the data from the sonde at the Testwood Intake (this is maintained by SWS and not uploaded to the Meteor Cloud. The EA will also be sent 'alarms' by email if parameter thresholds (listed below, Table 2) are breached.

Southern Water intends to use the sonde data immediately downstream of the river intake (the "Testwood U/S discharge" station as the primary data source relative to alarms and implementing actions. Other nearby station data will be used to corroborate the primary station data, to guard against it providing false alarms and action triggers. Should the primary data source fail, we intend to use the downstream of discharge sonde as the source of primary data and, if that fails, the measurement at the intake itself. (N.B. the Testwood Intake sondes does not record DO (mg/l) therefore, if the primary and secondary sondes fail, we would rely on the DO (%) data at the Intake).

The monitoring station at LT3 has been subject to vandalism on 3 separate occasions, each resulting in loss of equipment. On 14<sup>th</sup> July 2022, SWS installed a stilling well at LT3 to deter further vandalism. The sonde will not be enabled for telemetry but will have an onboard datalogger which will be downloaded during maintenance visits. It is anticipated that visits will take place once every 4 weeks.

The automated Water Quality data from 2015-2020 has been studied as part of an investigation into possible within day patterns of abstraction at Testwood, to fulfil the SWS regulatory environmental obligation under the AMP7 Water Industry National Environment Programme (WINEP). The project has been ongoing since 2019 and early outcomes suggest there is no discernible within day pattern of abstraction; the project is due to complete in October 2022.

Figure 2 WQ monitoring locations from upstream to downstream



### 3.1.2 Supplementary Spot Water Quality Sampling

Supplementary water quality sampling will be undertaken at six suitable points in the river system, as shown in Figure 3, chosen due to ease of access from public rights of way and due to their locations in the vicinity of the permanent WQ monitoring stations, which can provide validation of data. The following six sites are intended to be monitored. These sites can be revised at the direction of Environment Agency and/or Natural England if required:

- On the Blackwater adjacent to Testwood Lakes;
- Just upstream of the SWS abstraction intake;
- Downstream of the Blackwater tributary, on the River Test at Testwood Bridge;
- On the Little Test;
- On the Middle Test or southern arm of Wirehouse Stream; and
- At Redbridge.

Samples will be taken and tested on a weekly basis when the river flow is between 355 MI/d and 300 MI/d, with the permit in place. Sampling will be twice weekly if the river flow falls below 300 MI/d, with the permit in place. Samples will be taken one or two days within a week, Monday to Sunday.

Spot water quality monitoring data will be analysed and shared with the EA and NE. (Laboratory results should be available approximately one week after samples are taken). This analysed data will be compared to long term WQ trends from the site to monitor compliance and/or determine deterioration from the River Test SSSI specific water quality targets, as detailed in the River Test SSSI FCT and the last condition assessment for the site.

The spot samples process will be analysed in respect of the following parameters using an EA approved laboratory and via use of a handheld in-situ water quality probe (where specified):

- Ammoniacal nitrogen as N;
- Arsenic (dissolved);
- Biochemical Oxygen Demand (BOD);
- Cadmium (dissolved);
- Chromium (dissolved);
- Conductivity (laboratory and in-situ);
- Copper (dissolved);
- Dissolved oxygen (in-situ);
- Dissolved inorganic nitrogen (DIN);
- Iron (dissolved);
- Lead (dissolved);
- Mercury (dissolved);
- Nitrate as N;
- Nitrite as N;
- Orthophosphate as P;
- pH (laboratory and in-situ);
- Salinity (in-situ);
- Temperature (laboratory and in-situ);
- Total suspended solids;
- Turbidity (in-situ);
- Un-ionised ammonia /Total Ammonia; and
- Zinc (dissolved).

### 3.1.3 Review of Data Collected

The results of the above monitoring will be reported weekly (as and when results are available or as otherwise agreed with the EA) to, and reviewed jointly with the EA, including with respect to the tolerance threshold for fish set out in the handbook, in Appendix 1 (document ref: **2.2 MMP App1 Fish Monitoring Mitigation Plan**) and, also listed below.

This data will be analysed and sent to NE to determine/confirm whether any adverse effect to the designated sites could have occurred.

### 3.1.4 WQ triggers

The WFD UK Technical Advisory Group (UKTAG) has defined the following EQS for dissolved oxygen (DO) and DIN concentration for transitional and coastal waters.

DO (5th percentile):

- High: >7 mg/l
- Good: 5-7 mg/l
- Moderate: 3-5 mg/l
- Poor: 2-3 mg/l
- Bad: <2 mg/l

DIN (transitional waters):

- High – Good boundary: 20 µmol/l
- Good – Moderate boundary: 30 µmol/l

We have also considered guidance provided by the EA (April 2020 papers from Dom Longley, Fisheries Team Leader) concerning protection for priority fish species in relation to water quality triggers and responses.

We intend to use DO (mg/l) thresholds as listed in Table 2 below as the primary real time data triggers for actions but, real-time alarms will also be set relative to the other parameters in the Table. We intend all parameters alarms to be based on at least 2.5 hours (five 30-minute timesteps) of exceedance of the thresholds as in Table 2.

**Table 2 Parameter thresholds for alarms at installed monitoring sites**

Parameter	Upper Limit	Lower Limit	Comments
<b>Thresholds activating mitigation measures</b>			
Dissolved Oxygen (mg/l)		7.5; 6.5	Primary site is Testwood U/S, secondary site is Testwood D/S
<b>Thresholds for information only</b>			
Dissolved Oxygen (%)		75; 65	If the primary and secondary sites fail then DO (%) at Testwood Intake will be the tertiary threshold to activate mitigation to
Temperature (°C)	19		Measured at 09:00 each day in accordance with the level at which fishing activity is stopped on the River Test
pH	9	6	
Turbidity	250		
Un-ionised Ammonia (UIA, mg/l)	0.018		

7.5 mg/l dissolved oxygen is used as a level where persistence below which, fish behaviour is likely to start becoming distressed and, 6 mg/l dissolved oxygen as level where persistence below which, negative impacts on fish are more likely to occur.

The alarm levels are set as below, including durations below the thresholds so as not to trigger alarms from un-influential short duration dips in the data and, to avoid routine alarms occurring relative to normal within day patterns of variation of dissolved oxygen:-

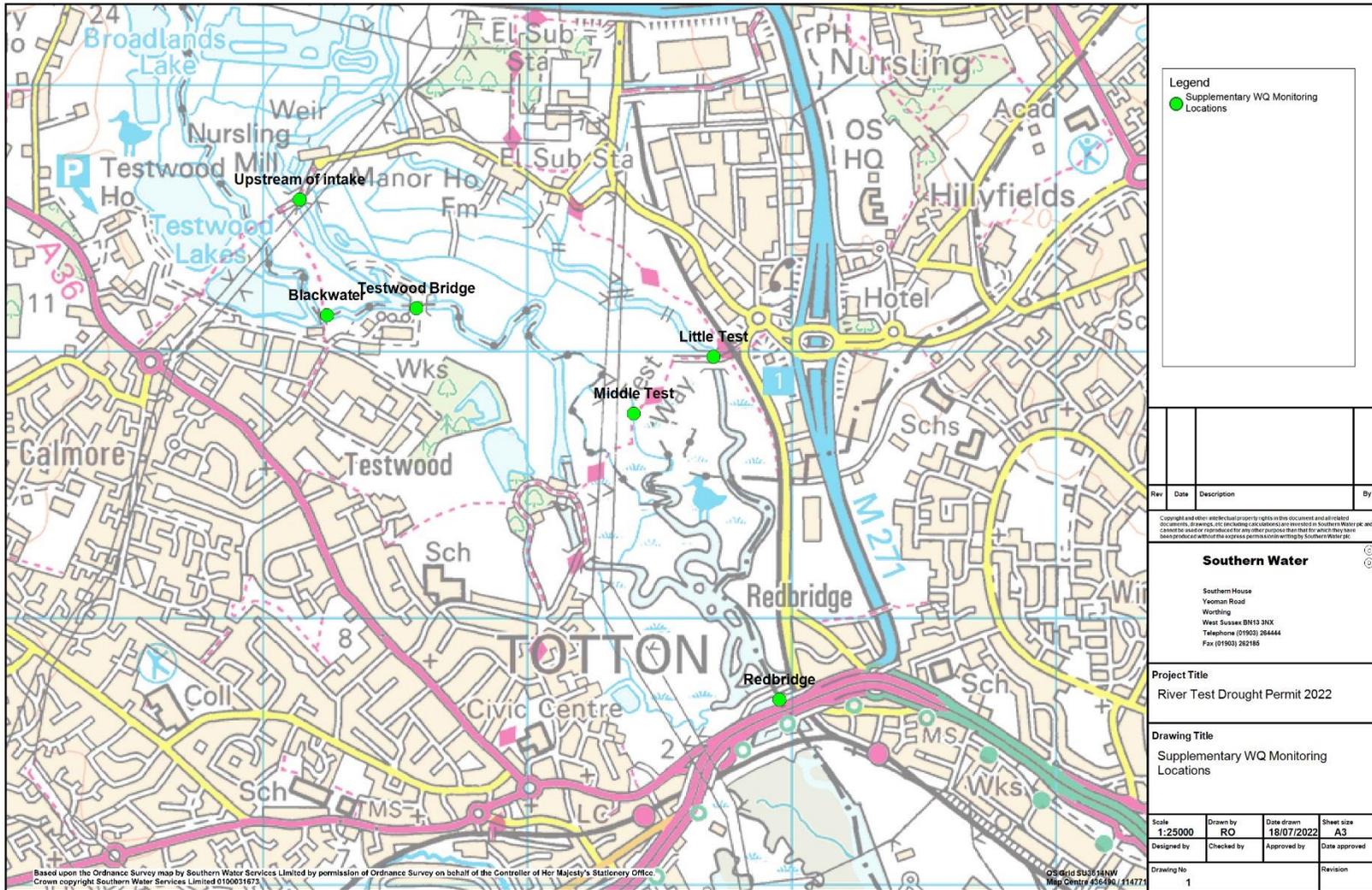
- a dissolved oxygen level of less than 7.5mg/l occurring for more than 5 consecutive 30-minute periods;
- a dissolved oxygen level of less than 6 mg/l occurring for more than 5 consecutive 30-minute periods.

The 7.5mg/l threshold is expected to be triggered for less than 20% of data, and the 6 mg/l threshold for less than 5% of data according to data available to date for analysis from the installed stations. However, during lower river flows the threshold could be reached to a greater extent. Therefore, these thresholds are considered appropriate.

Note, the River Test is designated as a salmonid fishery under the Freshwater Fish Directive (78/659/EEC). Note, failure of Nitrite guidelines occurs under baseline conditions and therefore has not been used as a trigger level.

Actions intended in response to the water quality triggers are set in section 3.2.2 below.

Figure 3 Supplementary Water Quality Monitoring Locations



### 3.1.5 Rainfall, Groundwater Level, River Flow , Weather and wider Operations monitoring

SWS uses data from the EA permanent river flow gauging stations, ground water monitoring boreholes and rainfall gauges. Weather and temperature forecasts will also be monitored with respect to abstraction impact risks, including those of low river flow in combination with high temperature, when water quality impacts may be greatest.

The Statement of Reason (document ref: 1.2 Reasons for the permit) for this drought permit application explains and discusses issues of the hydrometric network, the estimation of river flow, including the Total Test Flow estimation used to control the abstraction licence and the drought permit and, the case of 'exceptional shortage of rain' that has caused the need for this drought permit to be implemented.

SWS is able to get river flow data from the EA's national 'API' data provision system. However, there are some issues in respect of that system not always updating frequently enough. This can leave SWS dependent on provision of the Total Test Flow estimation by email from the EA. It will be vital this information is updated regularly (daily) during operation of the drought permit.

SWS recommends that the EA makes the same river flow data available to all interested parties.

SWS also recommends that a flow monitoring group is established to include key stakeholders, especially those who may have cause to alter control structures that affect river flows and water levels. Any such operations should be governed by the EA in respect of overall river management, consistent with the drought permit. The company is concerned that other operations can influence the flow that arrives at the company river intake.

## 3.2 Fish Distress Monitoring

### 3.2.1 When and where to monitor

Fish observational behaviour monitoring will be undertaken at the survey locations detailed and shown in Appendix 1 (document ref: **2.2 MMP App1 Fish Monitoring Mitigation Plan**).

When the river flow falls below 355 Ml/d with the permit in place, fish distress monitoring will take place weekly. A selection of potentially flow sensitive fish habitats in each of the reaches have been identified and mapped.

SWS intends this work will be undertaken by a specialist contractor to be agreed in advance with the EA or, by the EA themselves.

SWS will also liaise with local angling clubs, subject to their willingness to liaise, for daily updates on fish behaviour. This is expected to provide adequate surveillance of the zone of influence for identifying fish in distress.

### 3.2.2 Monitoring for and reaction to WQ deterioration

The real-time water quality station data will be monitored in case of water deterioration and, intended reactive monitoring actions are set out below in respect of quality falling through dissolved oxygen thresholds at the primary monitoring station. Data and trends towards deterioration will be assessed and monitoring actions will be escalated as listed below. (See Section 4 for Mitigation measures and actions):-

#### *Reduction of DO by 1mg/l in a 6hr period*

- Increase observations of data and assess how DO levels are recovering across all stations.

#### *Reduction in DO by 1mg/l in a 12hr period*

- Review of long-term hot weather forecast and notification of aeration contractor to be on stand-by during any specific periods where hot weather is anticipated.

#### *Reduction of DO by 1mg/l over a 24hr period*

- As above as well as supplementary spot sampling will occur with field tests to include ammonia and nitrite as well as DO.

### *7.5mg/l alarm raised*

- As above and review of ammonia and nitrite levels (any levels above agreed amount<sup>4</sup> will demonstrate a trend towards toxic conditions for fish) and, ready aeration for operation (See Section 4).

### *6mg/l alarm raised.*

- As above and implement aeration (with EA / NE / Fishery permission) until recovery of DO above 7.5mg/l.
- If there is ecological distress, reduce abstraction up to 50% for up to 6 hours (if possible, with respect to maintaining essential public water supply) to aid water quality recovery and ecological health

### *Reduction of DO further below 6mg/l*

- As above.
- Continue aeration for as long as required until recovery of DO above 7.5mg/l.
- Subject to maintaining essential public water supply, reduce abstraction as much as possible for repeated 6 hour on-off periods if DO levels reduce below 5mg/l for more than 1.5 hours.

SWS will notify the EA on 0800 80 70 60 and by email to the EA's nominated contacts in the event of WQ trends deteriorating to unfavourable conditions, as stated above. Implementation of aeration will only be actioned if the EA, NE and LRM Fishery agree to it.

### 3.2.3 How and what to record during monitoring

The weekly in-permit visual monitoring surveys (ref. section 3.2.1) will be captured by annotated walkover maps and completion of a 'River Conditions Observation Form - Low Flows'. Surveys will be completed by specialist contractor and SWS staff. All observational monitoring will occur at dawn, first light.

As stated in Appendix 1 (document ref: **2.2 MMP App1 Fish Monitoring Mitigation Plan**), signs of distress that will be monitored for will include:

- Exposure of key functional habitats;
- Concentration of fish in restricted areas/pools (try to ascertain number & species);
- Stranding of fish in marginal areas;
- Fish in distress (e.g. gasping at the surface, gathering in large shoals in deeper pools);
- Dead or dying fish (record number and species); and
- Signs of pollution.

If fish distress is observed, SWS shall notify the EA on 0800 807060 at the location of the observed distress with the following information:

- Approximate number of dead fish;
- Signs of damage or disease;
- Approximate number of fish in distress;
- Approximate number of stranded, or trapped fish;
- Approximate size of fish;
- Species affected;
- Visual signs of pollution; and
- Weather conditions.

Subsequent mitigation actions will be coordinated and agreed with the EA following notification and extent of fish distress. The intended Fish Rescue, Relocation and Aeration Methodology is provided in Appendix 1 (document ref: **2.2 MMP App1 Fish Monitoring Mitigation Plan**).

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<sup>4</sup> Ammonia 0.018mg/l Nitrite 0.01mg/l (0.003mg/l nitrite as N).

## 3.3 Intake Fish Monitoring

A new eel screen has been installed at SWS' River Test abstraction intake, satisfying the Eels Regulations 2009.

### 3.3.1 Elver and Lamprey Impingement Sampling

During operation to the drought permit we will carry out daily checks, by site operations staff, of the intake to ensure screen blinding is less than the design allowance and so, eels (including elvers) will not be impinged on the screen by the abstraction velocity at the screen. It should be noted however that screen blinding is unlikely, due to self-cleaning mechanisms on the installed screens. Were these mechanisms to fail, manual clearing will be undertaken, subject to safe working practice.

We will undertake impingement sampling, twice monthly, which will include the monitoring of the debris return chute with a suitable capture net, this monitoring will be covered by the extended FR2 permit, in place between April and September, to capture fish for methods other than rod and line. All fish impinged, if any, will be identified to species level and, if alive, returned to the river.

## 3.4 Invasive Non-Native Species Monitoring

### 3.4.1 Monitoring

During surveys in 2019 the presence and distribution of INNS were recorded in the Lower section of the River Test. Only one species was recorded, Himalayan balsam. Himalayan balsam is abundant along the riverbanks of the Lower Test. Whilst there may be a small risk that a reduction in water level (during drought) may lead to additional spread of stands of Himalayan Balsam we do not propose any special actions associated with this small risk.

Appropriate biosecurity measures (following check-clean-dry protocol) for all drought permit monitoring and mitigation will be used to ensure invasive species are not spread between sites by the activities associated with the drought permit.

SWS will undertake observational monitoring 3-6 months post permit requirement to capture any apparent drought permit related change in INNS establishment, subject to land access.

## 3.5 River Test SSSI and Lower Test Valley SSSI

There is risk that site specific targets for the River Test SSSI and Lower Test Valley SSSI interest features could be negatively impacted from the on-set of drought and during drought conditions. This risk may be exacerbated for the duration of the drought permit and as such SWS will ensure additional monitoring is completed to capture any direct effects, as described the following sections.

### 3.5.1 Observational Monitoring

The SSSI FCTs highlight the specific targets for interest features that may lead to deterioration during the operation of the permit. The Lower Test Valley SSSI also forms part of the Solent and Southampton SPA/Ramsar which has specific habitat features of interest for foraging birds, plants and invertebrates.

To ensure, abstraction related impacts are effectively observed, walkover observational monitoring will take place during the permit. Monitoring will include the activities summarised in S 20 Monitoring Plan (document ref: **1.1 App 4 S20 Monitoring Plan**).

## 3.6 Monitoring of Physical Barriers Downstream of Intake

There are several physical structures, distributaries and diversions within the Lower River Test area. These are normally passible for fish, however there is a risk that they may become barriers to fish movement during drought. The structures at Testwood Mill and at the confluence of the Wirehouse stream are downstream of the Southern Water abstraction and risks may be increased under the drought permit. However, the risks at structures is also likely to be closely related to how the structures are operated. (For example, there are opportunities to alter penstock settings so as to be most advantageous to fish movement and or flow aeration).

A summary of the features / structures thought to be of most interest in safeguarding critical flows and passageway for migratory fish are shown in Table 3.

**Table 3 Location and type of priority sensitive habitats**

Habitat type	NGR
Salmonid nursery	SU 35130 15782
Salmonid nursery	SU 35130 15782
Salmonid nursery & potential spawning habitat	SU 35130 15782
Salmonid nursery & potential spawning habitat	SU 35042 15735
Salmonid nursery	SU 35098 15635
Salmonid nursery and marginal exposure	SU 35202 15422
Juvenile lamprey nursery	SU 35903 15023
Juvenile lamprey nursery and marginal isolation	SU 36008 15106
Potential marginal exposure	SU 36111 14951
Juvenile lamprey nursery	SU 36134 14794
Potential marginal exposure	SU 36107 14673
Juvenile lamprey nursery	SU 36118 14598
Salmonid nursery (Wirehouse Stream)	SU 36151 14979

Southern Water undertook topographic and structural integrity surveys of the structures (Pa1, Pa3, Pa4 and Pa6) in August 2019.

In the event that a drought permit is implemented, subject to agreed access, observations of each structure will be undertaken by SWS or a SWS contractor (or by EA, if agreed or, possibly, if agreed by SWS, the EA and the Fishery, by the Fishery staff). Note, access to the Wirehouse Stream may be agreed with HIWWT as lease of the adjacent land.

Observations will record the following:

- Photographic record;
- Visual evidence of fish passage and general fish behaviour around the structure
- Best-endeavour noting of depth, width and velocity of flow over / through each structure;

Each feature will be observed at least once each week during main salmon migratory periods (to be agreed with the EA), for the duration of the drought permit when implemented.

Where desirable, feasible and access permits in the timescale of the drought permit implementation, temporary fish passage solutions will be developed for up to four structures downstream of the River Test abstraction in partnership with the EA, for implementation during the drought permit, if structures are deemed to be impassable and if local stakeholders agree to implementation of the measure, including agreeing access. Southern Water will ensure the 2019 survey information is available to aid the development of these solutions.

Southern Water has also committed to support development of a Lower Test river restoration strategy, to be led by the EA, in agreement with Little River Management Fishery. As at summer 2022, the EA is progressing procurement of consultants to undertake this strategy documentation. It is envisaged that, if the Lower Test River Restoration Strategy initiative progresses, these fish passage improvement opportunities would be best progressed outside drought, by agreement within the proposed development of a Lower Test River Restoration Strategy.

During drought, before physical fish passage enhancement development is initiated existing control arrangements at these structures should first be set in the most optimum arrangement with respect to

management of fish passage and with respect to any influence they have on management of flows and water levels influencing the water available for abstraction under the drought permit.

SWS will expect the EA to take an overall governance role to resolve any conflicts in respect of objectives of managing flow and water level by the controls at existing structures and, to ensure that these opportunities are maximised before any possible temporary additional fish easements are implemented. Review of operation of controls at structures could also be an important first course of action in respect of optimising flows and water quality for fish in the respective reaches of the river.

## 3.7 Additional Monitoring

### 3.7.1 River Test SSSI and Lower Test Valley SSSI

During drought there is potential for non-favourable (including outright invasive) species, that aren't associated with particular habitats, to encroach on sensitive SSSI interest features. To monitor the potential impact from abstraction the following SSSI units will be observed:

- Monitor River Habitat within unit 91, downstream of abstraction point; and
- Monitor habitat changes (Lower Test Valley SSSI Units 001, 004, 006 and 007)

Survey methods will follow best practise and will be completed in-line with favourable conditions assessment monitoring. Information will be shared with NE.

These units will be observed post-permit when non-favourable species will be visible. Only one observational survey will be undertaken to inform NE. This work will be dependent on access to these locations being agreed with landowners and NE prior to commencement.

Priority habitat mapping will also be undertaken post-permit to understand the possible usage of habitats for wintering birds. Wintering bird surveys will be undertaken for the duration of the permit.

### 3.7.2 Water Vole Presence

Additional to the permanent baseline monitoring for water voles detailed in the S 20 Monitoring Plan (document ref: **1.1 App 4 S20 Monitoring Plan**), any walkover surveys during the drought permit will include surveys for water vole activity; signs of movement, foraging and burrows will be recorded and the information shared with NE.

### 3.7.3 Macrophytes and Invertebrates

Macrophyte and freshwater invertebrate sampling will continue as per the baseline monitoring detailed in the S 20 Monitoring Plan (document ref: **1.1 App 4 S20 Monitoring Plan**) of the overall drought permit application, subject to access permission.

## 3.8 Other Users of the Test

SWS will consult with key stakeholders regarding navigation, recreation, amenity and heritage throughout the Test Surface Water Drought Permit process, and where required hold face to face meetings. If necessary SWS will erect signage informing users of the River Test of the situation, including any specific safety warnings for navigation and recreation. This will be undertaken in liaison with the EA and other relevant organisations.

## 4 Drought Permit Period Mitigation

The following section sets out mitigation required during the Test Surface Water Drought Permit. Actions are targeted at mitigating adverse impacts to sensitive receptors that display a response that are able to be detected (for example changes to water quality or fish in distress) and where there are effective means to action mitigation (for example deployment of aerators). Some receptors will not show an easily detectable response, and therefore post drought monitoring will be required to detect any change to these populations. Post drought monitoring is included in Section 6. For these receptors, adverse impacts may require restoration.

### 4.1 Fish

Mitigation of any impacts on fish will depend on the scale of the impact and on the species of fish affected. Aeration and fish rescue services will be on standby, provided or supported by specialist contractor (APEM) during the drought permit period and will be deployed upon detection of fish in distress when the river flow is less than 355 MI/d, with the drought permit in place. The following section summarise our proposals for fish mitigation, with further details presented in Appendix 1 (document ref: **2.2 MMP App1 Fish Monitoring Mitigation Plan**).

#### 4.1.1 Aeration

SWS has two aerators, normally on stand-by for water pollution incidents, these may be available however there is a risk that these are deployed or have to be reserved for pollution incident purposes during the drought permit period. The specialist contractor will support provision, deployment and management of any aeration required.

SWS will follow the action set relative to WQ trends as described in Section 3.2.2 to determine when aeration will be actioned. We will also pay particular attention to visual signs, including fish in distress at the surface of the water to determine when to deploy the aerators. The length of time that aeration will be deployed will be entirely dependent on the reaction of WQ downstream of deployment. WQ will be monitored downstream to understand how the environment recovers from aeration. Aeration will be deployed continuously until recovery, including night-time operation.

Inevitably any aerator deployment will depend on access to the river, which we will undertake best endeavours to secure with the relevant landowners.

Any actual deployment will first be discussed with the EA for agreement and should also be agreed with the Fishery. Alternative aeration methods are summarised in Appendix 1 (document ref: **2.2 MMP App1 Fish Monitoring Mitigation Plan**). It may be that less intrusive methods will be used instead in the first instance of need.

Appendix 1 also provides proposed aeration deployment locations, based on sensitive fish habitat. SWS will consider other locations if suggested by the EA, NE or by other third parties but, access, security and public safety must be primary considerations.

An aeration trial is proposed, to be deployed from Testwood WSW and monitored over a 48hr period, access to the River Test will be from Southern Water owned land, downstream of Testwood intake. Habitat Regulation Assessment screening, SSSI assent and a Flood Risk Activity Permit application is currently under development. This trial will add confidence to support the use of aeration in line with the proposed dissolved oxygen trigger thresholds provided in Section 3.2.2. Implementation of the trial will only be undertaken with agreement of the EA, NE and the Fishery.

#### 4.1.2 Fish Rescue

Fish rescue will be coordinated in partnership with a specialised contractor and SWS, to ensure access and landowner agreements are in place. SWS will ensure that the EA are notified about any fish rescue events on detection of fish in distress. Trained SWS staff will be available to coordinate immediate response to a fish in distress incident.

In the unlikely event that fish removal is necessary, SWS will ensure that the correct permissions are in place (i.e. a Fish Removal 2 Form), and that a suitable location where they will be moved to has been identified and agreed in advance of the flow falling below 355 MI/d. These locations will need to be continuously revisited to

ensure landowners are always 'on board' if such emergency measures are required. Fish removal will be coordinated and undertaken by the specialist fisheries contractor, see Appendix 1 (document ref: **2.2 MMP App1 Fish Monitoring Mitigation Plan**) for further details.

It may be necessary to introduce in-stream structures at sites to create functional refuges to support displaced fish stocks. The River Test is considered to be a main river and as such, installations will require a Flood Risk Activity Permit.

### 4.1.3 Increased Surveillance

There is a risk that the poachers may especially take advantage of fish in distress in low river flow conditions. In order to mitigate for this risk, SWS will supplement or otherwise support existing surveillance (by the EA or other parties) of the river when flows are below 355 Ml/d to have a sufficient occasional presence along particularly sensitive locations to deter poaching, this includes overnight periods. However, Southern Water consider this work and actions should be led by the relevant specialist Officers of the EA.

### 4.1.4 Research into Cryopreservation of Atlantic Salmon

SWS will investigate providing a financial contribution into research involving the cryopreservation of genetic material to preserve the Atlantic salmon species in the Test.

### 4.1.5 Blackwater River enhancement

Apem Ltd undertook a walkover of the River Blackwater and associated tributaries in January 2020. The walkover surveys recorded fish habitat as well as identifying sources of sediment ingress into the waterbodies.

A copy of the report is provided in Appendix 5 (document ref: **2.2 MMP App5 River Blackwater Surveys**). The Key recommendations include further sediment source mapping, fencing and alternative water sources provided to deter livestock access to the riverbanks. Southern Water are committed to progressing these recommendations, including them in business planning and working with partners, through the Test and Itchen Catchment Partnership, to develop projects to improve the Blackwater River.

## 4.2 Alternative water sources

### 4.2.1 Temporary Abstraction Management

If particular water quality deterioration or ecological stress is found downstream of the abstraction, SWS can in theory temporarily reduce its abstraction from the river by covering its supply requirement by abstraction from the Little Lake. However the performance the Treatment Works is variable relative to the use of the Lake water and there is risk of interruption to treatment such that a supply outage could occur with risk to supplies to customers. The ongoing capital maintenance improvement programme at the Treatment Works also means that the Works is under constrained flexibility. Therefore, any desirable reduction of abstraction will require very careful management and must work within these constraints.

Generally, water supply raw water quality performance criteria requires the Little Lake water level to be kept above 3.8 m – 4.0 m. Siltation and wet well levels will be monitored by SWS and deterioration may require return to continuous operation of the river intake

Any reduction of the river abstraction should be limited to 6 hours and subsequent reinstated abstraction will need to be great enough to maintain supply and sufficiently replenish the Little Lake storage, if that has been drawn down to cover reduced river abstraction.

Subject to the above criteria, should the river flow fall below 355Ml/d while the drought permit is under operation, and if monitoring identifies a specific environmental concern, the EA could ask SWS to implement temporary curtailment of the river abstraction. This would be implemented if discussions between the EA and SWS establishes an acceptable arrangement.

However, for much of 2022 to date, the Little Lake has been entirely out of service in terms of being able to source water to the Water Treatment Works. Therefore this opportunity to support stopping abstraction from the river may not be possible at all.

## 4.3 New Resource Development

SWS is committed to developing new water supply resources as soon as possible. The intended schemes and alternatives are set out in the Water Resource Management Plan (WRMP19) but, implementation is now subject to RAPID Gateway process of further assessment of the options and justification for funding to implement the confirmed best option. The new supply resource solution is being progressed as the company's 'Water for Life Hampshire' (WfLH) programme.

### 4.3.1 Water Transfer to the Southampton West Water Supply Area

The SWS case for this drought permit is made with the assumption that as far as practicable with respect to maintaining public water supply, all water transfers from Southampton West zone will be minimised. No transfer is currently possible into the Southampton West supply area. (The infrastructure that currently facilitates transfer out of the Southampton West supply area is uni-directional only).

The intended WfLH solution includes proposed development of an improved Hampshire supply network, termed the "Hampshire grid". This intended scheme includes increased inter-zonal supply transfer capacities and bi-directional functionality.

Once the improved transfer functionality is in place, the company will have greater flexibility to manage abstractions across the Test and Itchen catchments, which in itself may help mitigate some of the abstraction needed under drought permits and orders. However, these improvements are still some years away from commissioning.

## 4.4 Invasive Non-Native Species

INNS will be monitored post permit requirement, as stated in section 4.4. The presence of INNS irrespective of the permit will also be recorded to inform landowners appropriately.

HIWWT, supported by SWS and others, are currently developing a catchment-wide strategy to reduce and control INNS. The SWS supported Drought Resilience Fund will also accommodate projects that are aimed at catchment scale INNS eradication.

SWS undertook some physical removal of Himalayan Balsam at sites in the Lower Test on 16th June 2020. The removal was focused on the upstream section from Testwood Mill, due to ease of access. Approximately 500m of riverbank was worked on amounting to 50m<sup>2</sup> of Himalayan balsam removed by a team of eight people. SWS will monitor how successful this has been during future access, if granted. However, SWS suggest, due to the presence of Himalayan balsam upstream of the Lower River Test, it is not worthwhile pursuing this local approach further unless it is part of a wider strategy of removal of INNS within the catchment.

## 4.5 Cattle Poaching

There is a perceived risk of river habitat and species damage due to cattle poaching where cattle graze adjacent to the River Test and its tributaries. Two locations were / are perceived to be at a particular risk of increased cattle poaching:- the Wirehouse Stream and downstream of Testwood WSW Bridge, on the River Test.

It was considered that fencing might be the most appropriate measure to avoid cattle poaching of the River Test and its tributaries, during the operation of the River Test Drought Permit. A number of sections were viewed with HIWWT and NE during a site walkover in 2019 and options for the management of cattle discussed. The outcome of the discussions during this walkover agreed that fencing was not the most appropriate measure to avoid cattle poaching.

The Wirehouse Stream was at particular risk of poaching during 2019 and SWS supported the HIWWT , to install a new bridge in 2020 allowing cattle to cross the stream without entering the channel.

For the duration of the Drought Permit riverbank will be observed where possible to assess the impact of cattle poaching. If required further plans to address poaching will be discussed with the EA and NE.

## 4.6 Tree felling and Scrub Clearance

As part of the Test Surface Water Drought Permit in 2019, SWS were conditioned (section 5.10, Test Drought Permit 2019) to submit a plan (including timings) to the Environment Agency to undertake scrub and tree clearance work within the Lower Test Valley SSSI, to provide better, more joined up habitat for bird species and to maintain the 'favourable condition' status of the SSSI during the validity of the Drought Permit.

The objective of the management plan was to enhance clear visibility and sight lines for wintering birds, prior to or after peak visiting periods. This will encourage further habitat utilisation across the Lower Test Valley SSSI, including opening new habitat areas to the north of the site.

In 2020, HIWWT were funded by SWS to complete this work. Poplars were removed to improve sight lines for wintering birds. Scrub clearance was not progressed, due to landowner concerns, however this is proposed to be revisited by HIWWT and programmed for action in autumn 2022.

## 5 Summary of Monitoring and Mitigation

Please see the summary table included in Appendix 4 (below, in this document).

## Appendix 1: APEM – Fish monitoring and mitigation handbook.

-see document ref: *2.2 MMP App1 Fish Monitoring Mitigation Plan*

## Appendix 2: Water Quality data from installed loggers and intake

-see document ref: *2.2 MMP App2a Water Quality Monitoring*

## Appendix 3: Proposed and alternative access arrangements

Type (and ref in MMP)	ID	Locations	Access options to location	Preferred method of access to complete monitoring	Alternative methods	Alternative access location
<b>MONITORING</b>						
Water Quality - Permanent loggers (MMP section 3.1)	RT1	SU 3492 2067	Via public highway (footpath)	By foot	Boat	n/a
	BW1	SU 3464 1632	SWS land	By foot	Boat	n/a
	BFFC1	SU 3476 1631	Downstream of M27	By foot	Boat	n/a
	BW2	SU 3531 1514	Via public highway (footpath)	By foot	Boat	n/a
	LT3	SU 3694 1441	Via public highway (footpath)	By foot	Boat	n/a
	Redbridge	SU 3699 1372	Via public highway (footpath)	By foot	Boat	n/a
Supplementary WQ monitoring (Section 3.1.2)	Blackwater adjacent to Testwood Lakes	As shown in Figure 3	Via SWS land	By foot	Boat	Public access footpath
	Upstream of SWS abstraction intake	As shown in Figure 3	Via SWS land	By foot	Boat	Public access footpath
	At Testwood Bridge	As shown in Figure 3	Via SWS land	By foot	Boat	Public access footpath
	At Redbridge	As shown in Figure 3	Public access	By foot	Boat	Public access footpath
	Middle Test	As shown in Figure 3	Public access	By foot	Boat	Public access footpath
	Little Test	As shown in Figure 3	Public access	By foot	Boat	Public access footpath
Fish distress monitoring (Appendix 1)	VM1	Nursling Mill	BME / LRM	By foot	Drone / boat	n/a
	VM2	River Blackwater	SWS Land at Testwood Lakes	By foot	Drone / boat	n/a
	VM3	D/S of abstraction	SWS land and LRM	By foot	Drone / boat	n/a

Type (and ref in MMP)	ID	Locations	Access options to location	Preferred method of access to complete monitoring	Alternative methods	Alternative access location
	VM4	U/S reach from Testwood Mill	BME / LRM, for full visibility	By foot	Drone / boat	Partial visibility - Lower Test Nature reserve
	VM5	Wirehouse Stream	Lower Test Nature Reserve	By foot	Drone / boat	n/a
	VM6	D/S of Testwood Mill	BME / LRM, for full visibility	By foot	Drone / boat	Lower Test Nature reserve
	VM7	Little Test	BME / LRM, for full visibility	By foot	Drone / boat	Lower Test Nature Reserve
Intake fish monitoring (Location redacted)	Testwood WwTW		SWS land	Vehicle access to survey location		n/a
INNS (Appendix 1)	As proposed in Fish Distress monitoring					
Structures	Pa1	SU 35199 15775	BME / LRM	By foot	Drone	n/a
	Pa2	SU 35497 15174	Access from Testwood Lakes (Blackwater River RHB)	By foot	Drone	n/a
	Pa3	SU 35912 15100	BME / LRM	By foot	Drone	n/a
	Pa4	SU 36151 14979	HIWWT	By foot	Drone	n/a
	Pa5	SU 36210 14994	HIWWT	By foot	Drone	n/a
	Pa6	SU 36154 14458	BME / LRM	By foot	Drone	n/a
SSSI walkovers (Section 3.5)	River Test	Unit 91	BME / LRM or SWS land / Public Access	By foot	Drone	n/a
	Lower Test Valley	Units 1, 4, 6 and 7	Lower Test Nature Reserve	By foot		n/a

Type (and ref in MMP)	ID	Locations	Access options to location	Preferred method of access to complete monitoring	Alternative methods	Alternative access location
<b>MITIGATION</b>						
Aeration (Appendix 1 and Section 4.1.1)		Testwood Bridge	From Testwood Bridge, either side of bridge abutments	Access for 4x4 with trailer		n/a
		River Blackwater (upstream of confluence)	From Testwood lakes SWS land	Access for 4x4 with trailer		n/a
		Wirehouse Stream	HIWWT – Lower Test Nature Reserve	Access for 4x4 with trailer		n/a
Fish capture (Appendix 1)	Locations where fish are in distress	Unknown	Unknown	Ideally where 4x4 and trailer can access river bank	Via boat upstream or downstream of fish in distress	n/a
Fish relocation (Appendix 1)	Fish captured in reaches 1 and 2	Downstream of Nursling Mill (SU 36157 14456)	LRM	Access for 4x4 with trailer	Via boat upstream or downstream of fish in distress	n/a
	Fish rescued from Wirehouse Stream	Downstream of Little Test Confluence (SU 36356 15163)	LRM	Access for 4x4 with trailer		n/a
Fencing (MMP 4.5)	Wirehouse Stream		HIWWT – Lower Test Nature Reserve	Access for 4x4 with trailer		n/a
	Downstream of Testwood Bridge		SWS land	Access for 4x4 with trailer		n/a

Footnotes to Monitoring and Mitigation Plan access review summary table: -

- This access review focusses only on the planned reactive monitoring and mitigation associated with the implementation of the drought permit.
- It does not reflect on the baseline monitoring and mitigation intentions (set out in Appendix 2 and 3 to the drought permit application).

- The access options described in the review (summary table above) do not anticipate access to riverbank or in-river where sites are within Barker mill Estate (BME) / Little River management (LRM) fishery lease areas, unless prior agreement has been reached with BME / LRM.
- That is, public / other access (independent of BME / LRM agreement) is only expected to provide a 'partial' achievement of the objective of the item.
- Where any of the scheduled permanent baseline monitoring falls within the time period of implementation of the permit, access to undertake that monitoring is expected to be subject to BME / LRM agreement.
- Suggestion of using Drone(s) is also expected to require agreement from BME / LRM, on the assumption these could disturb fishing activities. Or, agreement of any the owner of any other land to be flown over.
- This review and summary table does not supersede the comments raised in the Monitoring and mitigation Plan concerning the opportunity for the Environment Agency to invoke its powers of entry to undertake environmental monitoring work if Southern Water cannot agree access arrangements (e.g. with BME / LRM)

## Appendix 4: Summary of Monitoring and Mitigation

Monitoring type	Potential Impacts	Baseline Information	During Drought Permit Implementation Period			Post Permit	Responsibility for monitoring and mitigation
			Monitoring and trigger setting	Trigger and monitoring to inform mitigation action	Mitigation actions triggered by monitoring if adverse effect detected.	Monitoring and post-drought mitigation/ restoration if adverse effect detected.	
Water Quality and Water Level	Reduction in water quality that could lead to environmental stress	Installed sondes	As detailed in section 3.1.4	Specific mitigation required to protect fish populations, detailed in section 3.2.2	Aeration to improve dissolved oxygen levels Additional spot sampling Observational monitoring in line with sections above	Continuous monitoring from installed sondes. Environment Agency to be informed of data	SWS with support from EA
Fish distress monitoring	Injury or mortality of fish	Sensitive fish habitat mapping Appendix 1.	Observational surveys as detailed in Appendix 1 - When the river flow falls below 355 Ml/d on a weekly basis	Water quality monitored, in particular dissolved oxygen levels, river temperature, nitrite and ammonia levels	Deploy aeration Fish rescue	Water quality data to be shared with EA Ongoing communication with local fishing clubs to share information	SWS with support from EA
Intake fish monitoring	Lower flows and velocity change functioning of installed screens at Testwood and result in fish impingement	Impingement data from 2018-present	Impingement monitoring occurring between April-September each year (this will cover the period the drought permit)	Number of fish impinged Injury or mortality of fish returning to river	Ongoing monitoring	Ongoing monitoring beyond April to September	SWS
River Test INNS monitoring	Spread of INNS through colonisation of exposed riverbanks at lower flows	Walkovers completed in 2019	Presence of INNS recorded throughout drought permit, as part of other survey activities	Comparison of INNS distribution from 2019 baseline	As part of catchment INNS strategy	Ongoing monitoring post event	SWS
Monitoring of physical barriers downstream of intake	Barriers become impassable to migratory fish due to lower flow conditions	Detailed information for structures was captured in 2019	The following details will be observed during the permit: Photographic record; Visual evidence of fish passage and general fish behaviour around the structure Best-endeavour noting of depth, width and velocity of flow over / through each structure;	Information to be shared with EA and undertaken by specialist contractors If a structure becomes impassable then further action may be required.	Temporary fish pass and refuge Alteration of sluices	No requirement post permit	SWS with support from EA
River Test SSSI / Lower Test Valley SSSI	Competition of interest features by non-favourable species as a result of reduced river flow.	NE site specific condition assessment. FCTs	Post permit	Walkovers to be completed post drought permit. NE to be informed of non-favourable species presence	Notify NE	Appropriate management plan to achieve FCT targets, for features impacted as a result of river flow reduction	SWS and NE
River Test SSSI	Sediment deposition changing in-channel habitat for interest features Barriers to fish movement Reduced habitat for interest features Water quality impacts for interest features namely brook lamprey and bullhead Increased INNS activity impacting riverbanks, competing with native species, and increasing predation Predation exposure to interest features from reduced water levels	Existing EA and NE data SWS and EA fish monitoring data HIWWT data	RHS surveys to determine sedimentation and exposed low flow channel sediment Spot water quality sampling, Walkover surveys to determine changes in bank profiles, fish in distress and INNS	Changes in river form and function may lead to interest feature deterioration Increased sediment may lead to deterioration of interest feature Deterioration of water quality Increased presence of INNS, predation of interest features (fish) Fish in distress	Consider deployment of aeration equipment in key reaches/water bodies with critically low oxygen levels. Fish rescue Solutions for barriers to fish movement INNS monitoring	Notify NE Continued fish monitoring Fish rescue if required In-channel features for barriers to fish movement INNS management plans – support to TICP Fulfilment of management to achieve FCT targets	SWS, EA, HIWWT, NE
Lower Test Valley SSSI	Behaviour change and habitat use of wintering birds	WeBS data, previous SWS reports	Permit and post-permit	Changes in habitat use	Notify NE	Fulfilment of management to achieve FCT targets, for features influenced from abstraction during the drought permit.	SWS

Monitoring type	Potential Impacts	Baseline Information	During Drought Permit Implementation Period			Post Permit	Responsibility for monitoring and mitigation
			Monitoring and trigger setting	Trigger and monitoring to inform mitigation action	Mitigation actions triggered by monitoring if adverse effect detected.	Monitoring and post-drought mitigation/ restoration if adverse effect detected.	
Water vole	Exposed burrows Increased predation	HIWWT data	Review existing water vole survey data	Two 500m stretches including 300m upstream of abstraction point.	Presence of activity recorded and NE informed	Monitoring as agreed in the public inquiry outcome – results to inform Lower Test River Restoration Strategy	SWS NE and HIWWT
Macrophytes	Reduction in habitat Deposition of sediment on macrophytes Increased competition from INNS	Existing EA Macrophyte records. Existing EA WQ data	N/A in Winter		N/A in Winter	Monitoring to continue as per S20 agreement	SWS, EA,
Freshwater invertebrates	Reduction of suitable habitat Increased sedimentation Increased predation	Existing EA macroinvertebrate surveys and WQ data	N/A in Winter	N/A in Winter	N/A in Winter	Monitoring to continue as per S20 agreement	SWS, EA,

## Appendix 5: River Blackwater Report

See separate document: **2.2 MMP App5 River Blackwater Surveys**