Test Surface Water Stage 0.1 Drought Order 2025 Appendix D

Environmental Features Assessment

July 2025
Version 7.0

Southern Water

Version No.	Date of Issue	Changes
Final Draft for EA/NE Review	Jan-18 & Mar-18	Issued for Public Inquiry (Jan 18) and for consultation (Mar-18)
V2.0	Jun-18	To NE/EA for comment
V3.2	Oct-18	To NE/EA for comment
V5.0	Mar-21	Update for draft Drought Plan 2022
V6.0	Jan-22	Updated with NE/EA comments
V7.0	Jul-25	Updated for application for Stage 0.1 Drought Order

Contents

D1. Introduction

As part of its Drought Plan 2022, Southern Water is required to undertake environmental assessments of each of the drought permits and drought orders set out in the plan. This appendix forms the environmental features assessment for the proposed **Test Surface Water Stage 0.1 Drought Order 2025**, and informs the Environmental Assessment Report (EAR) for the application for the **Test Surface Water Stage 0.1 Drought Order 2025** . Throughout this document the Test Surface Water Stage 0.1 Drought Order is referred to as 'the Drought Order' unless the full name is necessary for understanding.

This report incorporates relevant evidence prepared for the Hampshire Abstraction Licences public inquiry held in March-April 2018 and the agreements reached as part of the inquiry process, as formalised in the Section 20 Agreement made under the Water Resources Act 1991. It also reflects the revised abstraction licence issued for the Testwood abstraction following the signing of the Section 20 Agreement.

Note that this document is based on, and is largely the same as, the report prepared to support the Southern Water 2022 draft Drought Permit application. Since this was produced Southern Water, the Environment Agency and Hampshire and Isle of Wight Wildlife Trust have all undertaken extensive monitoring programmes on the Rivers Test and Itchen as agreed under the Section 20 Agreement. However at this time the vast majority of these data are still being analysed, and the findings are yet to be reported to the Environment Agency and Natural England independently of this document. Therefore it has not been possible to update the EAR with the results of these data in respect of the assessment presented. However the report has been updated to reflect the specific application in 2025 and changes in respect of the understanding of potential impacts on Internationally designated sites as reflected in the Habitats Regulations Assessment (WSP, 2025[1]) accompanying the application in 2025.

D.1.1. Test Surface Water Stage 0.1 Drought Order

Southern Water's existing operations

Southern Water abstracts from the River Test at Testwood, approximately 1.7 km upstream of the normal tidal limit ("NTL") near Testwood Mill / Testwood Pool.

The current abstraction licence allows abstraction of up to 80 Ml/d and 29,200 Ml/year. This is subject to a Hands-off Flow (HOF) of 355 Ml/d calculated as a sum of flow at Testwood Bridge, Test Back Carrier and Conagar Bridge. This licence was revised following the agreement reached from the 2018 Public Inquiry and the new licence conditions are detailed in 1.

As part of the revision, the location of the HoF has been moved to capture the total flows to the Test estuary. However, there is no gauging station at this location, and due to the braided nature of the river, the flow at the HoF location is estimated combining measurements from multiple flow gauges.

Table 1 Test Surface Water abstraction licence details

Licence number	Daily (Ml/d)	Annual (Ml/d)	HoF (Ml/d)	HoF location / calculation
11/42/18.16/546	80	29200	355	Total Test Flow - "sum of flow at Testwood Bridge, Test Back Carrier and Conagar Bridge"

[1] WSP (2025). Test Surface Water Licence 11/42/18.16/54 Stage 0.1 Drought Order 2025. *Information to support an assessment under Regulations 63 and 64 of the Conservation of Habitats and Species Regulations 2017.*

Southern Water's Test Surface Water Stage 0.1 Drought Order

Water resources modelling using Southern Water's Western Area 'Aquator' water resources model indicates that, under the current River Test abstraction licence conditions (see above) there would be a significant supply deficit in the Western Area under a range of low flow conditions. Therefore, there is a need for Southern Water to apply to relax the HoF from 355Ml/d to 265Ml/d, to help maintain public water supplies to the Western Area during these low flow conditions.

Under conditions where the available mitigation measures are deemed to fully off-set the potential effects of the relaxation of the HoF, Southern Water would be applying to the EA for a Drought Permit as detailed under the Section 20 Agreement. However, the HRA Stage 2 assessment for the application concludes that it is not possible to conclude there will be no adverse effect on site integrity for the River Itchen SAC and River Meon Compensatory SAC Habitat even with mitigation in place (WSP, 2025[2]). Therefore, compensation is required and this level of abstraction can only be approved as a Drought Order and through an application to the Secretary of State for Environment, Food and Rural Affairs.

The Drought Order seeks to reduce the licence HoF (355 Ml/d) to 265 Ml/d (Table 2). The Test Surface Water Stage 0.1 Drought Order would always be applied for before the Test Surface Water Stage 1 Drought Order, as referred to in the Section 20 Agreement.

Table 2 Test Surface Water Stage 0.1 Drought Order summary

	Stage 0.1 Drought Order details
Receiving watercourse	River Test
Abstraction sources	Testwood
Normal HoF / licence details	355 Ml/d (licence condition)
HoF control	Flow at the Total Test Flow (TTF)
Proposed drought action	Relax HoF to 265 Ml/d Assumes Coleridge Award split is enforced – this may require specific provisions to be included in the Stage 0.1 Drought Order, along with potential additional legal provisions about the operation of other control structures. TTF is not affected by the Coleridge split, but the operation of this and other control structures do control flows between the Great and Little Test.
Permit Or Order	Order
Yield (Ml/d)	Up to 80 Ml/d for extreme drought conditions

D.1.2. Approach

The impact of Southern Water's Testwood abstraction licence on the River Test has been the focus of several investigations by the Environment Agency and Southern Water since concerns were raised in the Catchment Abstraction Management Strategy (CAMS) process in 2006. The key outputs from these investigations, which are referenced at the relevant points in this report include:

- Environment Agency (2010) Lower Test Project Baseline Report;
- Atkins (2013) Lower River Test NEP – Volume 1 Report, Volume 2 Figures, and Volume 3 Appendices (for Southern Water Services);

[2] WSP (2025). Test Surface Water Licence 11/42/18.16/54 Stage 0.1 Drought Order 2025. *Report to inform an assessment under Regulations 63 and 64 of the Conservation of Habitats and Species Regulations 2017.*

- Fenn C. (2015) Summary report on the work, findings and recommendations (to date) of the Salmon Working Group of the Hampshire and Isle of Wight Water Resources Steering Group;
- Atkins (2016) River Test – Restoring Sustainable Abstraction (RSA) Summary Report (for Southern Water Services);
- Environment Agency (2017) Licence Change Proposal Report – Testwood – River Test SSSI, and Appendices A-S;
- Atkins (2018) Testwood AMP6 Investigations – Phase 1 and Phase 2;
- APEM Ltd. (2025). Technical note on the effects of the Test drought permit on salmon in the River Itchen. Author: Nigel Milner.
- WSP (2025). Testwood Licence 11/42/18.16/54 Stage 0.1 Drought Order 2025. *Information to support an assessment under Regulations 63 and 64 of the Conservation of Habitats and Species Regulations 2017.*

Environment Agency Environmental Outcomes for the River Test

As a result of the NEP investigations and subsequent technical work, the Environment Agency has specified environmental outcomes that are required for the sustainable operation of the Testwood abstraction. These were originally developed in 2009 but have subsequently been reviewed and updated. The updated position specified by the Environment Agency (Environment Agency 2017 - LCPR) identifies five environmental outcomes/objectives[3]; these are:

- Objective 1: A flow regime in the lower River Test that attracts, maintains or improves passage for migrating salmon.
- Objective 2: A flow regime that maintains a water temperature profile in the lower River Test to support salmon spawning and is as resilient as possible to climate change.
- Objective 3: The required effective screening of all abstraction intakes to prevent fish being drawn in and trapped at any stage of their life cycle.
- Objective 4: A flow regime that maintains or improves water quality in the River Test for salmonid populations.
- Objective 5: A flow regime that ensures no deterioration in Good Ecological Status and maintains the habitats and species of the River Test SSSI, Lower Test Valley SSSI and Solent & Southampton Water SPA and Ramsar habitats and species.

Steps are already in place to comply with Objective 3 and, with regard to Objective 4, the Environment Agency identified that the principal water quality risks to the River Test salmonid populations arise from high sediment loads and siltation of spawning gravels higher upstream and outside the hydrological zone of influence of the Testwood abstraction. The Environment Agency indicated that the Testwood abstraction is not considered to be a major contributor to this problem (Environment Agency 2010)[4].

This assessment takes into consideration the aims of these environmental outcomes while focussing primarily on potential impacts on the key features designated under the River Test SSSI, and in particular the flow-sensitive interest features which include various fish species (including Atlantic salmon), macrophytes and macroinvertebrates.

Available WFD data are also discussed in relation to the extent to which discrete water body effects may occur at the ecological community scale. WFD analysis is explicitly linked back to the impact pathways discussed in relation to the SSSI qualifying features.

[3] Referred to in the LCPR as 'outcomes'

[4] Environment Agency (2010) Lower Test Project Baseline Report.

Desk-based ecological evaluation has been completed for each of the sensitive receptors identified by environmental screening and scoping and using the accumulated knowledge from investigations on the Lower Test as detailed above. The evaluation aims to determine the likely additional impacts from the operation of the Testwood abstraction during natural drought conditions under the application of the Drought Order. The potential effect on each sensitive receptor is assessed using the best available science. A summary of each assessment is presented along with a statement of the assessed impact in terms of the statutory test for the designated features.

The relevant statutory tests applied are as follows:

- Habitats Directive Council Directive 92/43/EEC, Birds Directive Council Directive 2009/147/EC Ramsar convention Sites – screening assesses "likely significant effect" of the drought order on the relevant site or feature of the SPA,SAC or Ramsar in order to determine whether an appropriate assessment is required. If an appropriate assessment is undertaken, this will consider whether adverse effects on the integrity of the European site can be ruled out.
- Wildlife and Countryside Act 1981 (as amended) – whether the Drought Order is "likely to damage" SSSI features.
- Water Framework Directive Council Directive 2000/60/EC – assessing whether the Drought Order will lead to a deterioration in WFD status.
- Natural Environment and Rural Communities Act 2006 (NERC Act) – assessing impacts on those species and habitats designated under Section 41 of the Act as being of "principal importance" for the purposes of conserving biodiversity.

The definition for impacts (adverse / beneficial) uses standardised significance criteria; these are quantitative and / or qualitative measures used to grade the severity of impacts of the drought order for the impact criteria major, moderate, minor or uncertain; following the requirements of the Drought Plan Guidance. Additionally, a confidence level is allocated alongside each impact category.

This report sets out Southern Water's understanding of potential environmental impacts from operation of the drought order, based on the evidence that is currently available. Southern Water, and other parties, accept that uncertainties will remain regarding the effects on the environment from severe drought events, both with and without the drought actions proposed by the company.

Proposed monitoring and mitigation to be implemented in respect of the Test Surface Water Stage 0.1 Drought Order in 2025 are presented in the Environmental Monitoring, Mitigation and Compensation Plan (SWS, 20255) and summarised in the sections below

D 1.3.1 Monitoring Plan

The Environmental Monitoring, Mitigation and Compensation Plan (SWS, 20256) that accompanies the Drought Order application details proposed pre-drought monitoring and also monitoring during the Stage 0.1 Drought Order and so this report to inform an HRA only lists the monitoring types.

Pre-drought monitoring has comprised a suite of:

- Baseline water quality monitoring including automatic continuous monitoring and spot monitoring in the Test, pollution monitoring in the River Blackwater, a key nursery habitat for salmonids, and water quality in Southampton Water.
- Baseline fish habitat monitoring in the lower River Test;

[5] SWS (2025). Test Surface Water Licence 11/42/18.16/54 Stage 0.1 Drought Order 2025. 2.2_Environmental Monitoring, Mitigation and Compensation Plan. July 2025.
[6] SWS (2025). Test Surface Water Licence 11/42/18.16/54 Stage 0.1 Drought Order 2025. 2.2_Environmental Monitoring, Mitigation and Compensation Plan. July 2025.

- Aerial survey and interpretation of the habitats in the intertidal and lower reaches of the River Test;
- Baseline hydrometric monitoring (water levels);
- Lower Test barrier monitoring (to be undertaken in August 2025); and
- Testing of the effects of river aeration, a temporary emergency mitigation measure to be implemented should adverse water quality conditions be identified during a drought.

Monitoring during a drought will comprise a suite of:

- Continuation of the on-going baseline water quality monitoring indicated above which will be used to identify failures against river water quality thresholds and trigger action.
- Monitoring of rainfall, groundwater level, river flow, and weather which can be used to trigger mitigation actions where appropriate.
- Fish distress monitoring;
- Abstraction intake fish monitoring
- Monitoring for non-native species; and
- Monitoring of physical barriers downstream.

Post-drought, recovery, monitoring will be the same scope as the pre-drought monitoring.

D.1.3.2 Mitigation package

The Environmental Monitoring, Mitigation and Compensation Plan (SWS, 2025[7]) that accompanies the Drought Order application details the routine and also emergency mitigation measures to be implemented during the Stage 0.1 Drought Order in 2025. The measures are listed below but for detail please refer to the Environmental Monitoring, Mitigation and Compensation Plan. General mitigation measures comprise:

- In channel Habitat enhancement – River Test (Testwood downstream) including habitat improvement Lower Wirehouse Stream, fencing along the Little River Test, repair of bank erosion at Testwood WSW and repair of two further areas of bank erosion;
- In channel Habitat enhancement – Blackwater including reduction in diffuse pollution sources;
- Reduce pollution (Nursling Industrial Estate outfall); and
- River shading.

There are also two emergency measures proposed:

- Aeration; and
- Fish rescue.

D.1.4. Zone of Hydrological Influence

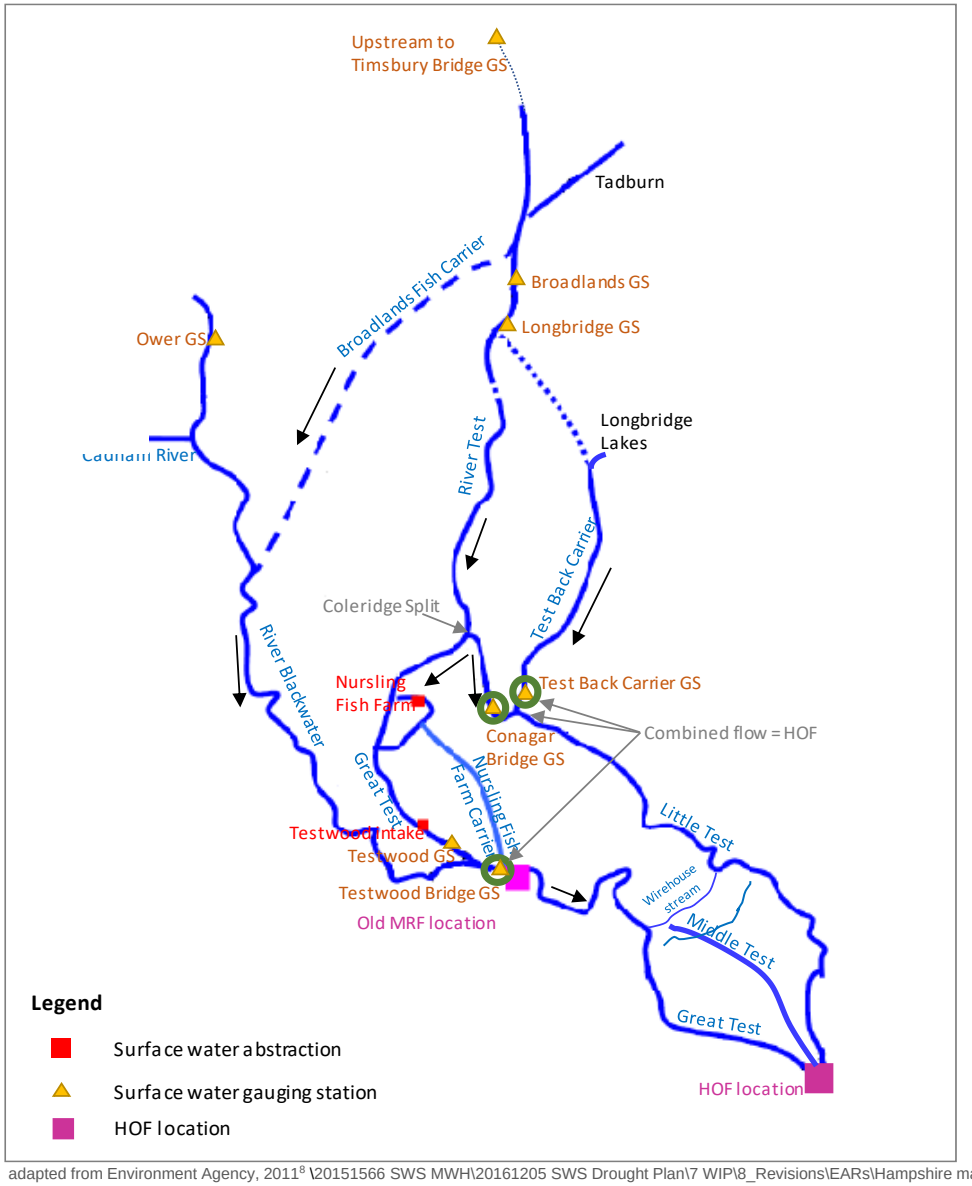
D.1.4.1 Impacted reaches

The Drought Order has the potential to impact upon flows in the freshwater reach of the Great Test, between the Testwood abstraction intake and the normal tidal limit (NTL) at Testwood Mill / Pond, as well as the transitional water of the Test estuary downstream of Testwood Mill / Pond. The drought order may also affect the flow to the two Wirehouse streams and the section of the Little River Test between their outflow and the NTL. The hydrology of the River Test is complicated by the number of channels and diversions as indicated is shown in 1. Further details about the hydrology

[7] SWS (2025). Test Surface Water Licence 11/42/18.16/54 Stage 0.1 Drought Order 2025. 2.2_Environmental Monitoring, Mitigation and Compensation Plan. July 2025.

of the River Test are provided in Appendix B to the EAR (Hydrology and Physical Environment Assessment).

Figure 1 Hydrology schematic of the Test downstream of Romsey



adapted from Environment Agency, 2011[8] \20151566 SWS MWH\20161205 SWS Drought Plan\7 WIP\8_Revisions\EARs\Hampshire maps.pptx

D.1.4.2. Impact on river flows – frequency, magnitude and duration of impacts

No modelling is available for the specific situation in 2025. However due to the exceptionally dry spring experienced across southern England in 2025, flows in the River Test are currently falling towards the HoF and therefore Southern Water has prepared the application for the Drought Order in the expectation that, without significant rainfall in the near term, the application will need to be submitted.

However, a detailed analysis is presented of the flow impacts of the Stage 0.1 Drought Order – the focus of this report) and Stage 1 Drought Order under a range of climate scenarios. Specifically, the model results compare flows with and without the Stage 0.1 Drought Order (in combination with other drought actions also set out in the Hydrology and Physical Environment Assessment). The analysis in the Hydrology and Physical Environment Assessment indicates that on average, the need to abstract below a TTF of 265 Ml/d is anticipated to occur with a frequency of approximately 1:150-

[8] Environment Agency, 2011. Lower Test Project

180 years, based on the 'MOSES' time series for potential evapotranspiration. Model results are presented for a range of historical and stochastic droughts as summarised below (the stochastic years refer to a sequence of 2000 stochastic years numbered from 2800 to 4799).

- Historical droughts: 1921 and 1976
- 1:200 year stochastic droughts: 3594 and 4315
- 1:500 year stochastic droughts: 2995 and 3290

When considering the flow predictions from the Aquator model it is important to be aware that the return periods for the stochastic droughts are based primarily on rainfall analysis – and not river flows. The predicted river flows for a particular drought severity may vary in character significantly in terms of duration below thresholds and minimum flows. It is for this reason that a range of example droughts are assessed.

In addition to the variability between different stochastic droughts, as noted in the Statement of Common Ground on Modelling for the 2018 Inquiry[9] "the modelled river flows are subject to considerable uncertainty". These uncertainties include but are not limited to:

1. **Gauged records** that have been used to calibrate the Test and Itchen groundwater model. This is pertinent to the River Test which is affected by flow splits some of which are ungauged.

2. Following calibration of the model, which leaves remaining uncertainties relative to the gauged records, a process of **naturalisation** is required with respect to the abstraction and discharges occurring at the time – a process which associated with uncertainties.

3. Assumptions in **the weather generator** that is used to generate stochastic rainfall inputs for longer term (2000-year) sampled inputs to the Test and Itchen groundwater.

4. **Potential evapotranspiration** inputs to the Test and Itchen groundwater model that are used to generate naturalised flow time series for input to the Aquator model. The differences between flows predicted by the PENSE and MOSES potential evapotranspiration assumptions (as discussed in the Statement of Common Ground) are an illustration of this.

5. **Aquator is not an operational model** – it responds to pre-defined rules that govern the conditions under which abstraction and other actions are permitted. The rules are necessarily simplifications of the operating procedures that may be followed in practice.

6. **Aquator model flows have not been calibrated** against gauged records because the operation of sources in the historical record will differ from the Aquator scenario assumptions. These differences include licence constraints, demand profiles (based on 2015/16 demands in the current model) drought savings, abstractions, and day-to-day operational decisions.

7. Southern Water's Water Resources Management Plan considers a range of different stochastic years as examples of 1 in 200 and 1 in 500 year drought events. These **example events are selected primarily based on rainfall characteristics not annual minimum low flows**. So, if a 2000 year sequence is ranked, i.e. ordered, based on minimum flows, the minimum flow rank (which can be translated into a frequency), would not be expected to match the ordering/frequency based on rainfall analysis.

8. Related to this, **the predictions for any selected event is just one scenario of how flows might respond** in an extreme event and assumes that all planned operational measures are deployed in a certain way. It is equally possible that flows may follow a different pattern or

[9] Hampshire Abstraction Licences public inquiry. Statement of Common Ground – Modelling. Southern Water and the Environment Agency, 2018.

that operation measures may be deployed differently or be more or less effective than anticipated[10].

9. Finally, small changes in flow predictions of a few Ml/d can result in a specific year just triggering – or not triggering - a Drought Order. At the infrequent end of low flows, these **small changes in flow predictions can result in significant changes in apparent frequencies**.

Summary statistics on the minimum flows and duration of flow impact are presented in Table 3 alongside the public water supply deficits that are predicted to arise without the Drought Order. The minimum flow data shown in brackets are the flows that would occur without the Drought Order thereby indicating the maximum impact on minimum river flows. The implications of these flow predictions need to be considered bearing in mind the uncertainties above.

Notwithstanding the uncertainties, it can be said with confidence that droughts within the historical record are likely to have required implementation of the Drought Order and that for more severe droughts, the Drought Order is likely to be required for relatively long periods.

Table 3 Balance of low flows at HoF location and public water supply deficits

	River Test low flows with (without) Stage 0.1 drought order			Public Water Supply deficits without the Test Surface Water Stage 0.1 Drought Order * in place	
	Minimum flow (Ml/d)	Duration below 265 HoF (days)	Months below 265 HoF	Maximum deficit (Ml/d)	Duration of deficit (days)
Historical flow sequence					
1921/22	295 (355)	81 (9)	Oct – Jan	56	72
1976	343 (355)	24 (1)	Aug - Sept	12	23
Stochastic flow sequence					
~1:200 (yr 3594)	301 (355)	62 (1)	Sept - Oct	46	54
~1:200 (yr 4315)	265 (345) *256 (335)*	103 (32)	June - Oct	89	99
~1:500 (yr 2995)	265 (346) *213 (294)*	252 (168)	Apr – Dec	119	250
~1:500 (yr 3290)	265 (265) *225 (305)*	254 (87)	April – December	128	245

*Deficits without the Drought Order and all the preceding/ subsequent drought actions

Grey text indicates example droughts where the Stage 1 Test Surface Water Drought Order is required

Statistics from model runs DP1008_h and DP1009_h (without drought orders and with Test and Itchen drought orders, respectively)

20151566 SWS MWH\20161205 SWS Drought Plan\7 WIP\8_Revisions\Model output\DP1008vsDP1009 analysis.xlsx

Figure 2 and Figure 3 present the River Test (TTF) flow time series for selected drought episodes which are predicted to have flows below 355 Ml/d. Based on these example model outputs, the main points to note are:

For the historical droughts:

[10] Hampshire abstraction licences public inquiry. Rebuttal proof of evidence of Alison Matthews.

- Flows fall below the HoF of 355 Ml/d for varying severities and durations. No assessment of calibration is possible due to the lack of gauged records, but comparison with information from the River Itchen suggests that the Aquator model may under represent the intensity of the 1976 drought.

For the stochastic droughts:

- Flows fall significantly below the HoF of 355 Ml/d and for long periods despite, in some cases, some flow recovery during rainfall events.

Figure 2 River Test (TTF) flow time series for selected drought episodes (1)

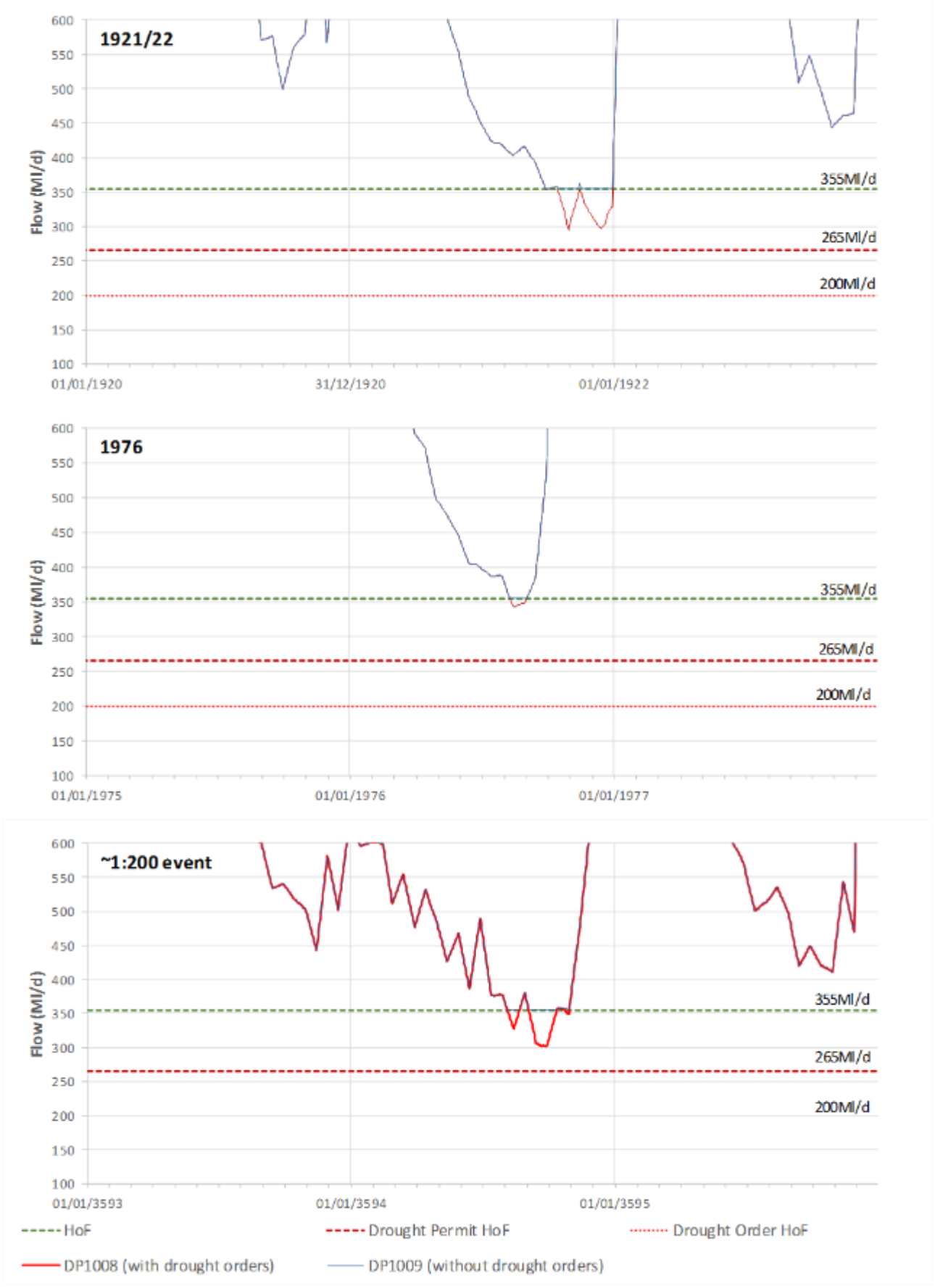
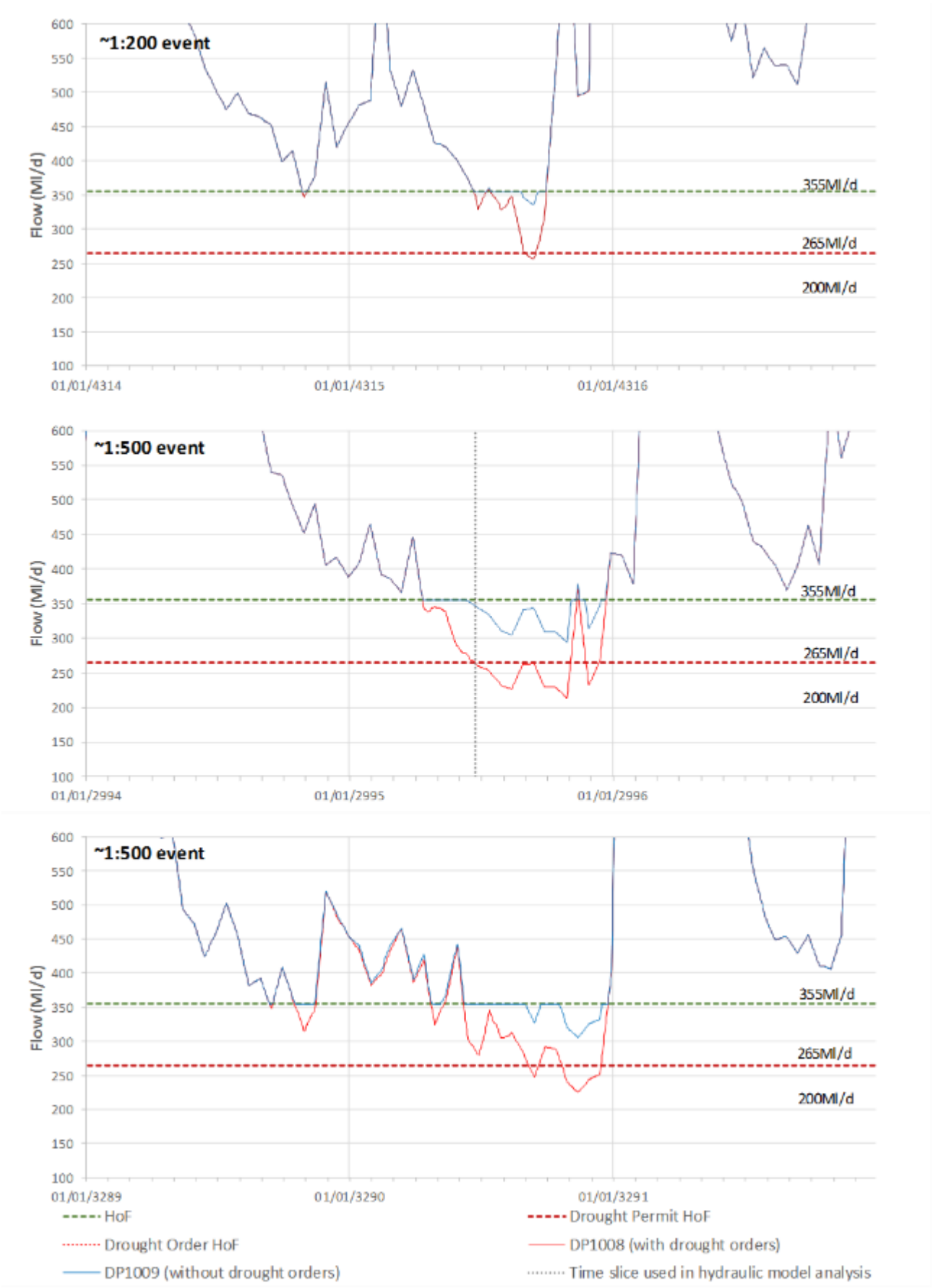


Figure 3 River Test (TTF) flow time series for selected drought episodes (2)



Grey dotted line indicates time slice considered in the hydraulic assessment of D.1.4.3

D.1.4.3 Impact on river hydraulics and physical habitat

The most effective means of evaluating the relationship between river flow and how it translates into water depth and velocity is to develop a hydraulic model.

As detailed in the Hydrology and Physical Environment Assessment, a hydraulic model was developed as part of the NEP investigations, and which was further extended as part of the AMP6 investigations in 2017. This model covers the reach of the Great Test between the Testwood abstraction to Redbridge and includes the lower reaches of the Little Test, the Middle Test and the lower floodplain. The Hydrology and Physical Environment Assessment provides more details and Full details of the modelling are reported as part of the Testwood AMP6 Investigations[11].

The updated hydraulic model was used to assess the potential effects on hydraulic character of the Lower Test with and without the Stage 0.1 Drought Order. The simulation covers the stochastic drought year 2995 and the lead-in year 2994. Example outputs for the key variables of velocity and depth were extracted for the period shown on Figure 2 (June 2995), when the Stage 0.1 Drought Order was in use, but not the Test Surface Water Stage 1 Drought Order. Simulated velocities and depths (with and without the Stage 0.1 Drought Order) are shown in the Hydrology and Physical Environment Assessment but are not repeated here. **It is important to acknowledge that there are concerns as to the quality of the cross-section survey data used in the model due to survey difficulties in fully surveying the channel due to extensive weed growth (see Hydrology and Physical Environment Assessment). Consequently, there is uncertainty in the model depth and velocity output values provided.**

In the Hydrology and Physical Environment Assessment, further analysis is presented which compares the average and maximum velocity and depth over the spring/neap cycle plotted against flow for the scenarios with and without the Stage 0.1 Drought Order.

The main observations from this analysis are that the drought order abstraction does not significantly alter the prevailing velocity and depth regime at any of the locations and, in addition, it demonstrates the importance of in stream-structures in controlling the hydraulic regime. However, due to the issues with the cross-section survey data, changes to flow velocity and depth at the channel margins in particular cannot be reliably inferred from the model outputs, and there is uncertainty as to the precision of the average depth and velocity values.

[11] Atkins (2018) Testwood AMP6 Investigations, Hydraulic Modelling of the Lower River Test (under review)

D2. Designated Sites

D.2.1. Habitats Sites

A report to inform an assessment under Regulations 63 and 64 of the Conservation of Habitats and Species Regulations 2017 of the effects of the Stage 0.1 Drought Order at Testwood on Habitats Sites[12] (report to inform a HRA) has been produced (reported in WSP, 2025[13]). It has been produced for the purpose of providing the competent authority, in this case the Secretary of State for Environment, Food and Rural Affairs, with the information necessary to enable compliance with its duties under the Conservation of Habitats and Species Regulations 2017 (as amended) (the 'Habitats Regulations')[14].

The report to inform a HRA details a four stage process:

- Stage 1 – Screening or 'Test of significance';
- Stage 2 – Appropriate Assessment (including the 'integrity test');
- Stage 3 – Assessment of Alternative Solutions; and
- Stage 4 – Assessment Where No Alternative Solutions Exist and Where Adverse Impacts Remain.

The report to inform an HRA concluded that, of the sites considered, the following site was screened out due to there being no mechanism of effect and hence no likely significant effect was possible:

- River Test Compensatory SAC Habitat.

However Likely Significant Effects were identified for the following Habitats Sites (see Figures 4 and 5):

- River Itchen SAC;
- River Meon Compensatory SAC Habitat;
- Solent and Southampton Water SPA;
- Solent and Southampton Water Ramsar site;
- Solent Maritime SAC; and
- Solent and Dorset Coast SPA.

The report to inform a HRA determined that, for those mechanisms of effect where a likely significant effect was identified, operation of the proposed Drought Order will not cause or contribute to a failure

[12] Habitat Sites (also known as European sites) include, Special Areas of Conservation (SACs) candidate Special Areas of Conservation (cSACs) and Special Protection Areas (SPAs). As a matter of policy, the UK Government also considers possible SACs (pSACs), potential SPAs (pSPAs), Ramsar sites and, in England, proposed Ramsar sites as European sites

[13] WSP (2025). Test Surface Water Licence 11/42/18.16/54 Stage 0.1 Drought Order 2025. *Report to inform an assessment under Regulations 63 and 64 of the Conservation of Habitats and Species Regulations 2017.*

[14] The 2017 Regulations have been amended by the *Conservation of Habitats and Species (Amendment) (EU Exit) Regulations* 2019 to reflect the UK's exit from the EU, although these largely carried forward the provisions and terminology of the 2017 Regulations and do not fundamentally alter their interpretation. This report therefore primarily refers to the 2017 Regulations and (where appropriate for clarity) the relevant provisions of the Habitats Directive.

to meet the attributes of the SAC, SPA or Ramsar sites list below either alone or in combination with other plans or projects:

- Solent and Southampton Water SPA.
- Solent and Southampton Water Ramsar site.
- Solent Maritime SAC.
- Solent and Dorset Coast SPA.

However, no adverse effect on integrity cannot be concluded for the River Itchen SAC or the River Meon Compensatory SAC Habitat, even with mitigation in place, in respect of operation of the Drought Order alone.

Additionally, the proposed renewal of Southampton Port's Maintenance Dredge and Disposal Licence and hence continuation of maintenance dredging activity is considered to act in-combination with the Stage 0.1 Drought Order on the salmon population of the River Itchen SAC and River Meon Compensatory SAC Habitat, albeit this assessment is considered precautionary and uncertain in nature.

Therefore the report to inform the HRA was required to consider the three legal tests required to be satisfied in order for the proposed Drought Order to qualify for a derogation in respect of the potential for effects on the River Itchen SAC and the River Meon Compensatory SAC Habitat alone and in combination with the proposed renewal of Southampton Port's Maintenance Dredge and Disposal Licence, and hence continuation of the routine maintenance dredge activities. It demonstrates there are no feasible alternative to the drought order, the application for a drought order it is of overriding public interest and therefore it outlined proposed compensatory measures that would take place at the Woodmill Activity Centre, specifically on the Woodmill Salmon Pool.

Figure 4 European Designations in relation to the Drought Order

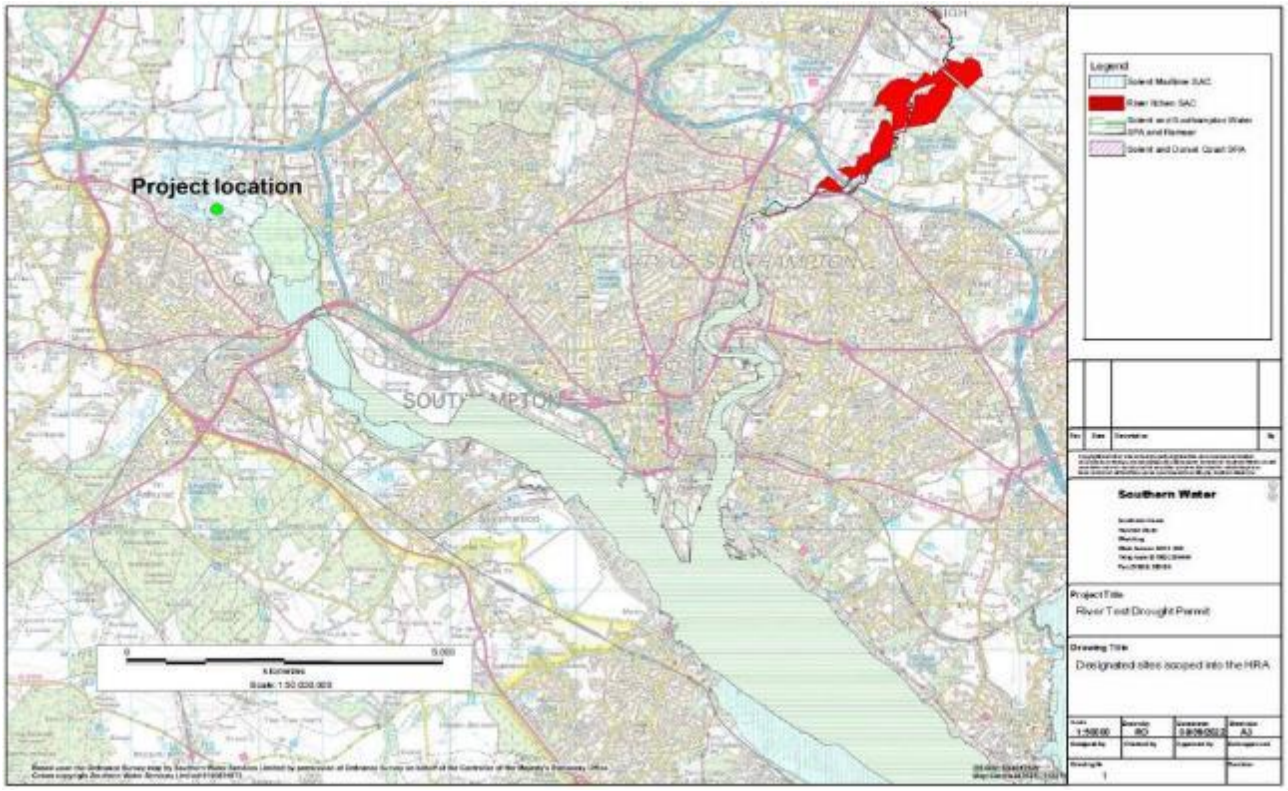


Figure 5 River Meon Compensatory SAC Habitat (© Natural England) Scoped into the assessment

D.2.2. National Designated Sites

This section considers potential for effects on nationally designated sites (i.e. SSSIs). Whilst the HRA takes account of the River Test Compensatory SAC Habitat and River Meon Compensatory SAC Habitat sites, these sites are not formally designated at an SSSI level and so are not considered in this section.

D.2.2.1. Sites of Special Scientific Interest

The River Test SSSI

Baseline

The River Test is designated along much of its length as The River Test SSSI which is broken down into 91 operational units, which cover around 50 km of the river and riparian areas.

The Testwood abstraction intake lies towards the downstream end of the SSSI in operational unit 91; approximately 96% of the SSSI (by river length) lies upstream of the abstraction, outside of its zone of influence.

Unit 91 includes the River Test from the A3090 at Romsey to the normal tidal limit (NTL as marked on OS maps) at Testwood Mill – including both the Great and Little Test after they split (Figure 6). The length of Unit 91 on the Great Test is approximately 7.5 km. The abstraction at Testwood occurs around 1.7 km above the NTL at Testwood Mill on the Great Test, which is the lower extent of the River Test SSSI designation. The confluence of the River Blackwater with the Great Test is located around 300 m downstream of the abstraction intake.

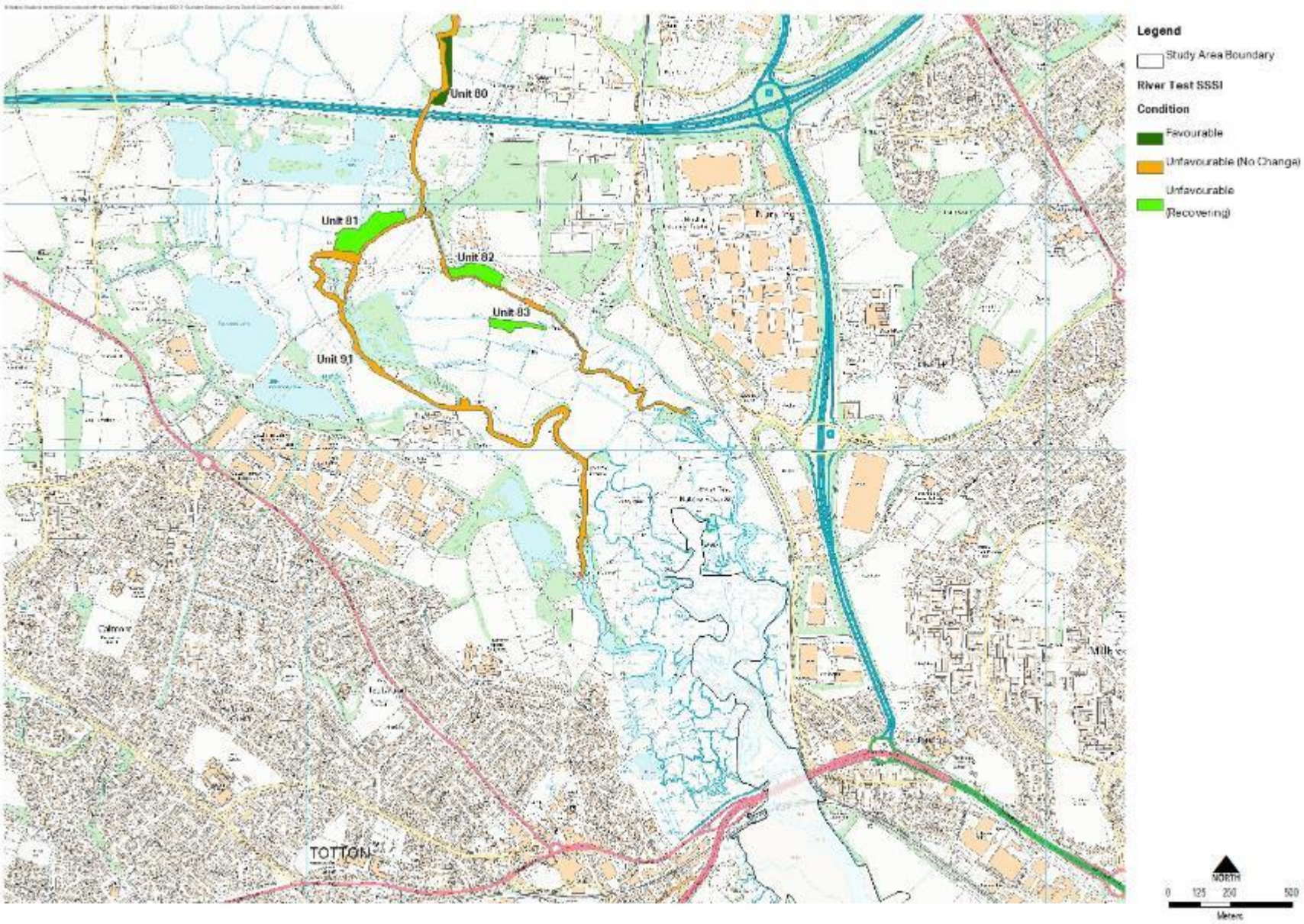


Figure 6 River Test SSSI

21 Appendix D Environmental Features Assessment

Notified Features

Natural England's Favourable Condition Table (FCT)[15] (see Annex 1) provides a list of the broad habitat types and associated designated interest features for the SSSI, as reproduced below:

- Rivers & Streams
  - Type III chalk river: base-rich, low-energy lowland rivers and streams, generally with a stable flow regime
  - Brook Lamprey, *Lampetra planeri*
  - Bullhead, *Cottus gobio*
- Neutral grassland
  - MG8 - *Cynosurus cristatus* - *Caltha palustris* grassland
- Fen, marsh and swamp:
  - M22 - *Juncus subnodulosus* - *Cirsium palustre* fen meadow
  - S25 - *Phragmites australis* - *Eupatorium cannabinum* tall-herb fen
  - S26 - *Phragmites australis* - *Urtica dioica* tall-herb fen
  - S28 - *Phalaris arundinacea* tall-herb fen
  - S3 - *Carex paniculata* swamp
  - S4 - *Phragmites australis* swamp and reed-beds
  - S5 - *Glyceria maxima* swamp
  - S7 - *Carex acutiformis* swamp
- Broadleaved, mixed and yew woodland:
  - W5 - *Alnus glutinosa* - *Carex paniculata* woodland
  - W6 - *Alnus glutinosa* - *Urtica dioica* woodland
- Rivers and streams, broadleaved woodland, fen marsh and swamp, and grassland:
  - Breeding Bird Assemblage: Lowland open waters and their margins
  - Invertebrate assemblage (W125 slow flowing river, W114 stream and river margin, W314 reed-fen and pools, W221 undisturbed fluctuating marsh)

In addition to the above designated features, the River Test SSSI citation presents the 'Description and Reasons for Notification' in several paragraphs which provide a detailed description of the 'Key Features and General Character' of the river. A summary of the key features is presented below.

The flora in the River Test and its margins is more species-rich than most lowland rivers. The lower river is particularly diverse as its upstream chalk nature is influenced increasingly by clay substrates. The macrophyte assemblages largely dictate the river's habitat notifications in the river as Type III: base rich, low energy lowland river as per its notified feature, as well as the grasslands, meadows, fen, marsh, swamp and woodlands detailed above.

The citation notes that over 100 species of flowering plant, moss and liverwort have been recorded along its channel and banks and over 232 invertebrate taxa have been recorded in the river. Species of note include the southern damselfly *Coenagrion mercuriale* (RDB3) and Desmoulins whorl snail *Vertigo moulinsiana* (RDB3); both species are considered of European Interest and listed in Annex II of the Habitats Directive.

The River Test and its adjoining vegetation provide valuable habitat for wetland birds. The characteristic riverine species include kingfisher, coot, moorhen, grey wagtail and little grebe. There are also many species making use of the dense marginal vegetation and associated woodland, grass

[15] Natural England (2018) Definitions of Favourable Condition: River Test - Consultation Draft February 2018

and fen. One species of note which uses the river margins and reed beds on passage and in winter is the bittern.

Several fish species are included in the River Test citation including the bullhead (*Cottius gobio*), brook lamprey (*Lampetra planeri*), brown trout (*Salmo trutta*) and Atlantic salmon (*Salmo salar*).

The full SSSI citation is available at:

https://designatedsites.naturalengland.org.uk/PDFsForWeb/Citation/2000170.pdf

Favourable Condition Targets for the River Test SSSI

Natural England uses definitions of favourable condition for the special interest features at a site. Standards for favourable condition are defined with particular reference to the specific designated features for a site and are based on a selected set of attributes for features which most effectively define favourable condition.

A draft consultation document of Definitions of Favourable Condition for the River Test was issued in February 2018[10]. This document sets out the features found in each unit of the SSSI and the favourable condition targets for each of the features. The site-specific habitat condition objectives that are relevant to Unit 91 are contained in FCT 3a of the Natural England document which is included as Annex 2 of this report. This includes flow targets (CSMG) and water quality targets that have been set in accordance with Common Standards Monitoring Guidance (CSMG). The Hydrology and Physical Environment Assessment provides further details about the flow and water quality standards, noting that further work is planned as part of an agreed WINEP investigation programme to assess the CSMG standards against the impacts of existing abstractions from the River Test (and treated effluent discharges).

As set out in the assessment in Hydrology and Physical Environment Assessment, the drought order is likely to increase the magnitude of departure of actual flows from the CSMG/FCT targets but not the duration, although this requires further investigation to confirm this. The reduced flow and flow velocity may impact on SSSI ecological features within the impacted SSSI reach downstream of the abstraction intake, including migratory SSSI fish species passing through the reach (upstream or downstream, depending on the species, lifecycle stage and time of year).

The Hydrology and Physical Environment Assessment also identifies the risk of a local failure of some CSMG water quality targets in the SSSI reach downstream of the abstraction intake: soluble reactive phosphorus (SRP) is likely to be failing before implementing the Drought Order and may further deteriorate temporarily, whilst dissolved oxygen (and possibly BOD) may temporarily fail the target locally due to lower flows and flow velocity in the impacted reach to the NTL. This could have adverse implications for several SSSI ecological features in the impacted reach, including migratory SSSI fish species passing through the reach (upstream or downstream, depending on the species, lifecycle stage and time of year).

Southern Water, the Environment Agency and Hampshire and Isle of Wight Wildlife Trust have all undertaken extensive monitoring programmes on the Rivers Test and Itchen as agreed under the Section 20 Agreement and Southern Water has also been working on an enhanced list of mitigation and compensation measures that will be implemented to offset the potential effects of drought permits/orders that may be needed on both the Itchen and the Test. The mitigation available to offset the effects of the Drought Order in 2025 are summarised in the EAR and detailed in the Environmental Monitoring, Mitigation and Compensation Plan (SWS, 2025[16]). . Should there be evidence of damage to the SSSI due to implementing the Drought Order, Southern Water will work with Natural England and Environment Agency to restore impacted features to pre-implementation condition.

[16] SWS (2025). Test Surface Water Licence 11/42/18.16/54 Stage 0.1 Drought Order 2025. 2.2_Environmental Monitoring, Mitigation and Compensation Plan. July 2025.

The additional monitoring began in August 2020 and will inform future updates to the CSMG river flow targets and water quality impact assessments (Hydrology and Physical Environment Assessment), and these risks to SSSI features (as well as non-designated environmental features). The impact assessments will also be further updated on completion of the WINEP investigations programme on the river flow and water quality CSMG targets.

Natural England Condition Assessment

Natural England carries out and publishes Condition Assessments for all units of SSSIs in the UK. The Condition Assessment for Unit 91 forms the basis for identifying those species and habitats included in the citation which may be of concern within Unit 91.

The latest Condition Assessment available for Unit 91 of the River Test SSSI was carried out on 11th February 2013 (downloaded from the Natural England website on 22/02/2021), as summarised in Table 4.

Table 4 Natural England Condition Assessment: 11th February 2013

SSSI unit	Main habitat	Condition assessment	Comments	Reasons for adverse condition
91	Rivers and Streams	Unfavourable - No change	The unit did not comply with the flow targets. The unit met the water quality targets[17] covering the biological and chemical GQA classes, ammonia and phosphate limits and suspended solids. The unit did not comply with the river profile or river planform targets. The unit complied with the riparian zone target but failed the river bank vegetation target. The unit complied with the species composition target for chalk rivers. The unit failed the target for presence of both non-native plant and fish species. The unit had the following species of interest present: otters, water voles, brook lamprey, bullhead and salmon.	Agriculture - inappropriate cutting/mowing, freshwater - invasive freshwater species, freshwater - water abstraction,

Source: https://designatedsites.naturalengland.org.uk/ReportUnitCondition.aspx?SiteCode=S2000170&ReportTitle=River Test SSSI

Flow sensitive habitats and species of concern

For the purposes of this Drought Order environmental assessment, the key habitats and species at risk from the Drought Order abstraction have been developed in discussion with Natural England, and taking into consideration Natural England's Unit 91 Condition Assessment. The combined set of habitats and key species of concern in the SSSI to be considered in more detail are:

- flowing waters - Type III: base-rich, low-energy lowland rivers and streams, generally with a stable flow regime
- salmon

[17] This does not represent current situation with the new CSMG water quality standards for the River Test.

- sea trout
- brown trout
- bullhead
- brook lamprey
- otter
- water vole.

Assessment Summary

As indicated in the Condition Assessment summary above, the SSSI baseline condition is already impacted by anthropogenic activity, in both water quality and hydrologically. Drought conditions will have already exacerbated these effects, so the Drought Order will further increase the risk to the condition of the SSSI features.

The CSMG and WFD water quality assessment provided in the Hydrology and Physical Environment Assessment indicate that water quality concerns within the hydrological zone of influence of the Testwood abstraction during application of the Drought Order are largely focused on temperature, dissolved oxygen, BOD and SRP; other water quality parameters are well within levels of concern for the ecology.

An assessment summary for each of the sensitive features follows:

Type iii river

- The designated river habitat feature includes in-channel, marginal and riparian habitats, the aim of designation is to conserve and promote restoration of the natural functioning of all the habitat for the characteristic communities of the river.
- Natural England considers hydrological, chemical, physical and biological aspects of the habitat in their condition assessment. The physical habitat assessment is primarily based on River Habitat Survey with observations of bankside, riparian and channel management, including the presence of in-channel structures and woody debris. Macrophyte and macroinvertebrate survey data collected by the Environment Agency for WFD assessment form the key elements of the biological assessment and hydrological and chemical aspects are also based on data from the Environment Agency.
- Very limited ecological and physical habitat data exist for reaches downstream of the abstraction in any flow conditions due to limited access and no direct measurements of hydrological, chemical, physical or ecological data exist in the Lower Test for periods of extreme low flows.
- Environment Agency WFD macrophyte and macroinvertebrate survey data from surveys immediately upstream and downstream of the abstraction indicate a classic type iii chalk river community, with very high conservation value. There is no evidence of abstraction impacts in historical flow conditions[18].
- Several investigations, assessments and data sources have been used in this assessment of potential impacts, including:
  - Hydrological modelling of historical and stochastic climate series reported in EAR Appendix B (Hydrology and Physical Environment Assessment).
  - Hydraulic modelling of the Lower Great Test and tidal reaches Appendix B (Hydrology and Physical Environment Assessment) and Testwood AMP6 Investigation[19] and

[18] Environment Agency (2017) Licence Change Proposal Report – Testwood – River Test SSSI
[19] Atkins (2018) Testwood AMP6 Investigations – Hydraulic Modelling Report. Report to SWS

summarised in Appendix B (noting the uncertainties surrounding the model outputs as highlighted earlier)

- Geomorphological survey (a brief walkover survey only, not a detailed RHS or fluvial audit survey) of the Great Test downstream of the abstraction – NEP Investigations 2011[20]
- Macrophyte species lists and indices –
    - Environment Agency survey data, upstream of the abstraction 2010-2016.
    - NEP survey of the Great Test upstream and downstream of the abstraction 2011.
- Macroinvertebrate species lists and indices
    - Environment Agency survey data, upstream and 100 m downstream of the abstraction 2000-2016.

- Based on the available information, it is considered that the likely impact on the type iii chalk river habitat downstream of the abstraction pursuant to a Drought Order will likely be **minor (medium confidence)** and that the Drought Order abstraction is not likely to damage the integrity of the feature in the long-term. However, the Environment Agency and Natural England consider the data and modelling are inconclusive due to the lack of ecological survey data and concerns as to the quality of the data used in the hydraulic modelling. Applying the precautionary principle, there is not sufficient certainty to conclude that the abstraction is not likely to damage the integrity of the feature.
- Southern Water, the Environment Agency and Hampshire and Isle of Wight Wildlife Trust have all undertaken extensive monitoring programmes on the Rivers Test and Itchen as agreed under the Section 20 Agreement. However, as detailed earlier, at this time the vast majority of these data are still being analysed. Therefore it has not been possible to update the EAR, and supporting appendices, with the results of these data in respect of the assessment presented.
- In addition, Southern Water has been working on an enhanced list of mitigation and compensation measures that will be implemented to offset the potential effects of drought permits/orders that may be needed on both the Itchen and the Test. The mitigation available to offset the effects of the Drought Order in 2025 are summarised in the EAR and detailed in the Environmental Monitoring, Mitigation and Compensation Plan (SWS, 2025[21]).
- Furthermore, the Testwood Intake WINEP scheme is looking at the impact of the baseline abstraction on fish (Salmon in particular). Once the collected data has been reviewed and interpreted by the WINEP the EAR will be updated if available in time for application.

Salmon

- Atlantic salmon populations in the River Test reached very low numbers in the late 1980s and early 1990s but the trend of fish numbers is showed a steady increase for a period since 1990 and, while historically the fish numbers were well below the conservation limit, the estimated numbers have actually exceeded the conservation limit in both 2015 and 2016[22]. A further review of fisheries data obtained from the Environment Agency Data Ecology and Fish Data Explorer[23] for subsequent surveys on the River Test and tributaries indicate the continued presence of Atlantic salmon populations. However the most recent published assessment (for 2023) classified the Test salmon stock as 'At Risk' (of failing to meet their Management Objectives) in 2023 and projected them to be 'At Risk' in the Test, in 2028. In 2023, stocks were at 43% of the Conservation Limit in the Test (Cefas / EA / NRW, 2024a).

[20] Atkins (2011) Lower River Test NEP Investigation. River Test Geomorphology Assessment Technical note
[21] SWS (2025). Test Surface Water Licence 11/42/18.16/54 Stage 0.1 Drought Order 2025. 2.2_Environmental Monitoring, Mitigation and Compensation Plan. July 2025.
[22] Environment Agency (2017) LCPR Appendix J
23 https://environment.data.gov.uk/ecology/explorer/

Unpublished provisional statistics for 2024 give the Test at 48% of CL and the stock remains At Risk (APEM Ltd., 2025).

- Spawning and juvenile salmon habitat is mainly located in the main river Test. Salmon will often spawn in first available gravels in the lower Test reaches as evidenced by salmon parr survey data and recent 2018-19 winter redd surveys carried out by the Environment Agency (unpublished data). Juvenile salmon are resident in the reach downstream of the abstraction intake.
- Most adult salmon (upstream migration from the estuary) and salmon smolts (downstream migration to the estuary) will pass through the impacted reach.
- There are three main mechanisms by which flows may impact on salmon populations:
  - Reductions in flow, velocity and depth downstream of the abstraction causing a physical barrier to migration, loss of holding habitat or reduced habitat suitability for spawning and juvenile salmon.
  - Reduced flows inhibiting or failing to trigger fish movements from the estuary (upstream migration) and/or hindering movements of downstream smolt migration.
  - Reduced flows increasing water temperatures to dangerous levels for the salmon, or leading to poorer river water quality in the freshwater reach to the NTL.
- Southern Water has carried out work in collaboration with several independent fisheries experts to develop an understanding of the role that flow changes may have on upstream migration of salmon into the River Test and upstream past the abstraction intake. The investigations and data used in this assessment in respect of upstream migration of adult salmon only include:
  - Fewings Qmig model - Environment Agency Licence Change Proposal Report[24]
  - Lower River Test NEP Investigation[25]
  - Restoring Sustainable Abstraction Salmon Working Group key findings[26]
  - Testwood AMP6 Investigations – further statistical analysis by APEM[27] [28] [29] and Hydro-Logic[30]
  - Dr David Solomon's Report on fish passage at Testwood for the Environment Agency[31]
  - Hydraulic modelling of the Lower Great Test and tidal reaches as set out in Appendix B (Hydrology and Physical Environment Assessment) and Testwood AMP6 Investigations[32] (but noting the uncertainties identified above)
  - Hydrological modelling of historical and stochastic climate series reported in the EAR Hydrology and Physical Environment Assessment.
- The above referenced salmon studies are limited to consideration of adult upstream migration. Consideration of effects on other salmon life-cycle stages (spawning, juveniles, smolts, etc.) has taken account of the flow modelling, the hydraulic modelling (noting its uncertainties) and the wider assessment of the environmental impact of the Drought Order

[24] Environment Agency (2017) LCPR Appendix M
[25] Atkins (2013) Lower River Test NEP Investigation
[26] Fenn C.(2015) Key Findings of the Restoring Sustainable Abstraction Salmon Working Group
[27] APEM (2018a) Statistical Modelling of the Response of Salmon Counts to Flow and Related Variables in the Lower Great Test. Report to SWS
[28] APEM (2018c) Modelling of Salmon Migration Response to River Flows in The Little Test. Seprot to SWS
[29] APEM (2018b) Preliminary Assessment of River Flow Impacts on Salmon Migration and Population Response Resulting from Alternative HoFs in Simulated Extreme Drought Scenarios. Report to SWS
[30] Hydro-Logic Services (2017) Time series analysis of daily salmon count data from the Great Test at Nursling Mill, 1996-2007, for Southern Water Services
[31] Solomon D. (2005) Fish Passage at Testwood and Conagar on the Little Test. Report for the EA
[32] Atkins (2018) Testwood AMP6 Investigations – Hydraulic Modelling Report. Report to SWS

as set out in this Appendix (e.g. effects on river habitat) and Appendix B (Hydrology and Physical Environment Assessment, e.g. water quality risks).

- The Drought Order will increase the stress caused by drought conditions in respect of upstream migration of adult salmon, through further impacts on migration trigger flows/velocities, increasing temperature and risks of local changes to water quality. These extra impacts over and above the drought could lead to returning salmon being further delayed from entering the river system, with adverse effects and stresses on the adult salmon from "holding up" in the estuary. Despite the adult upstream migration investigations, it is acknowledged that there remain uncertainties in respect of the hydraulic modelling and temperature modelling due to concerns as to the robustness of the input data (see the Hydrology and Physical Environment Assessment), and the need for additional salmon and habitat monitoring in the Lower Test.
- There is a risk that the Drought Order will adversely affect smolt migration through the bottom of the freshwater system and out to the Test estuary, due to lower flow velocity, higher temperature and potential changes to water quality. The impact is uncertain and will depend on the time of year when the Drought Order is to be implemented (i.e. relative to the key smolt migration run).
- Juvenile salmon resident in the impacted reaches will already be vulnerable to drought conditions (e.g. elevated river temperatures and lower dissolved oxygen) prior to implementation of the Drought Order. Consequently, any further reduction in flow will exacerbate the drought stress on juveniles, particularly in summer months when temperatures will be expected to be highest. The impact is uncertain and will depend on the time of year of implementation of the Drought Order (lower risk in winter when dissolved oxygen and temperature effects will be reduced).
- Salmon spawning and egg incubation in salmon redds in the reach below the abstraction intake could be affected by changes to river habitat conditions, including lower velocities leading to siltation of spawning habitat (discouraging use of the river reach for spawning) and/or siltation of salmon redds once spawning has occurred leading to reduced reproductive success in a spawning reach of the Test (albeit a relatively small length of the total spawning habitat available in the Test, but noting that in drought, spawning may be more likely to occur in the lower reaches due to the challenges of further upstream migration in drought conditions). The likely impact is **moderate (low confidence)** and will depend on the time of year of implementation of the Drought Order (lower risk outside of spawning and egg incubation periods).
- Taking account of the above uncertainties, and applying the precautionary principle, there is not sufficient certainty to conclude that the Drought Orderabstraction is not likely to adversely affect salmon in the lower River Test/River Test SSSI. The impact assessment (Table 5) is therefore considered precautionary, with any future assessments updated with the results of monitoring data collected since 2020.
- In addition, Southern Water has been working on an enhanced list of mitigation and compensation measures that will be implemented to offset the potential effects of drought permits/orders that may be needed on both the Itchen and the Test. The mitigation available to offset the effects of the Drought Order in 2025 are summarised in the EAR and detailed in the Environmental Monitoring, Mitigation and Compensation Plan (SWS, 2025[33]). .

Sea trout

- Sea trout are the anadromous form (i.e. sea running) of the brown trout species (*Salmo trutta*) and a species of concern in the lower Test. Sea trout are important in the contribution they

[33] SWS (2025). Test Surface Water Licence 11/42/18.16/54 Stage 0.1 Drought Order 2025. 2.2_Environmental Monitoring, Mitigation and Compensation Plan. July 2025.

make to the overall *Salmo trutta* population in chalkstreams reaches accessible from the marine environment, such as the lower Test.

- Information on sea trout in the River Test is available from the Test counter data and abundance of sea trout in the river system is informed by electrofishing surveys. The ability to assess the status of sea trout is however complicated by the fact that it is not possible to know how many juvenile trout parr are parented by river trout as opposed to sea trout. Additionally, land access has constrained the ability to survey the impacted reach for sea trout. This introduces some uncertainty to the impact assessment and additional monitoring and evidence is needed to more accurately assess the impact on sea trout.
- Sea trout are generally present in the lower Test (both adults and juveniles) and are confirmed as present in the Wirehouse Streams. There is available habitat for sea trout parr in the lower reaches of the main channel (less available habitats in the Wirehouse streams); surveys were completed in 2019 to map sea trout habitat for different life-cycle stages in the impacted reach.
- Potential impacts on the sea trout life-cycle stages will be similar in nature to those identified above for Atlantic salmon, with all life-cycle stages potentially at risk due to the presence of spawning, juvenile and adult habitat in the impacted reach, as well as the need for sea trout to migrate upstream and downstream. As identified for salmon, the risks to different life-cycle stages will depend on the precise timing of the Drought Orderimplementation. Changes to river temperature, flows and flow velocity, and water quality (dissolved oxygen principally) due to the Drought Orderall contribute to the potential effects. The likely impact is **moderate (low confidence)** (as set out above for salmon), and further survey evidence is required to more accurately assess the potential impact.
- Taking account of this uncertainty, and applying the precautionary principle, there is not sufficient certainty to conclude that the Drought Orderis not likely to adversely affect sea trout. The impact assessment (Table 5) is therefore considered precautionary, with any future assessments updated with the results of monitoring data collected since 2020.
- In addition, Southern Water has been working on an enhanced list of mitigation and compensation measures that will be implemented to offset the potential effects of the drought /order. The mitigation available to offset the effects of the Drought Order in 2025 are summarised in the EAR and detailed in the Environmental Monitoring, Mitigation and Compensation Plan (SWS, 2025[34]).

Bullhead

- There are limited fish survey data available for the main Lower Test in the vicinity of the abstraction (only data from 2018 and 2019 are available from a limited number of sites within this stretch). These surveys recorded relatively high abundances (13 – 65) of bullhead on both of the Wirehouse Stream channels, indicating their presence in this potentially affected reach. No records of bullhead were recorded on main River Test channels (Great, Middle and Little Test), but due to the limited data sets (single surveys in two years only), this is not conclusive. Environment Agency fish surveys carried out in the Lower Test but upstream of the M27 (Nursling) indicate that bullhead are distributed throughout the catchment where they would be expected and it is assumed they will be present in the main river reach downstream of the abstraction intake. Bullhead are also confirmed (autumn 2018 and 2019) as being present in the Ghillies Run, Testwood.
- Bullhead in other catchments have been shown to suffer under low-flow conditions due to silt deposition and reduced water quality during drought conditions, but invariably do recover

[34] SWS (2025). Test Surface Water Licence 11/42/18.16/54 Stage 0.1 Drought Order 2025. 2.2_Environmental Monitoring, Mitigation and Compensation Plan. July 2025.

once flow conditions return to normal[35] (for example, as observed on the River Misbourne (Environment Agency unpublished data)).

- Bullhead populations in the Test are relatively resilient (compared to salmon and sea trout), but the Drought Ordermay nevertheless lead to some loss of marginal habitat and potential degradation of spawning substrate. Reduced flows into the Wirehouse Streams could impact bullhead and associated habitat availability in these watercourses (hydrological impacts are uncertain as to how flows to the Wirehouse Streams will be managed in a severe drought in respect of flow apportionment).
- There are uncertainties surrounding the hydraulic modelling outputs in respect of marginal habitats important for bullhead. As explained in the Hydrology and Physical Environment Assessment, the cross-section survey data used in the model did not fully cover the channel margins and there is therefore an absence of robust data on the potential bullhead habitat within these cross-sections.
- Taking account of the above uncertainties, and applying the precautionary principle, there is not sufficient certainty to conclude that the Drought Order is not likely to adversely affect bullhead and therefore the likely impact is assessed as **minor (low confidence)**. The impact assessment (Table 5) is considered precautionary, with any future assessments updated with the results of monitoring data collected since 2020.
- In addition, Southern Water has been working on an enhanced list of mitigation and compensation measures that will be implemented to offset the potential effects of the drought order. The mitigation available to offset the effects of the Drought Order in 2025 are summarised in the EAR and detailed in the Environmental Monitoring, Mitigation and Compensation Plan (SWS, 2025[36]).

Brook Lamprey

- There are no historic fish survey data available for the Lower Test in the vicinity of the abstraction, although the Environment Agency fisheries team have observed an abundance of Brook Lamprey in the Lower Test. Recent work (2018) has also confirmed the abundance of Brook Lamprey in the Wirehouse Streams and at one location at least downstream of the abstraction intake. The density of brook lamprey recorded in the “Northern” Wirehouse Stream in 2018 is the highest ever recorded in a River Test fish survey, although no specimens were recorded in the subsequent survey, undertaken in 2019.
- Due to their preference for river channel margins and areas of shallow, soft silt, Brook Lamprey are considered to be at risk from lower flows arising from the Drought Order which may lead to a reduction in wetted width with impacts on channel margins and local water depth over shallow silts. Brook lamprey are very selective of the type and location of silt beds they inhabit as they have a high oxygen demand and specific diets, and therefore there is less opportunity for brook lamprey to move to other silt habitat within the impacted reach. The Drought Order may also lead to a reduction in dissolved oxygen in the impacted reach, primarily in summer months, which may disproportionally affect brook lamprey due to their high oxygen demand.
- There are uncertainties surrounding the hydraulic modelling outputs in respect of marginal silt habitats important for brook lamprey. As explained in the Hydrology and Physical Environment Assessment, the cross-section survey data used in the model did not fully cover the channel margins and there is therefore an absence of robust data on the potential brook lamprey habitat within these cross-sections.
- Taking account of the above uncertainties, and applying the precautionary principle, there is not sufficient certainty to conclude that the Drought Order is not likely to adversely affect

[35] Tomlinson, M. and Perrow,M. (2003), Ecology of Bullhead (Life in UK Rivers series)
[36] SWS (2025). Test Surface Water Licence 11/42/18.16/54 Stage 0.1 Drought Order 2025. 2.2_Environmental Monitoring, Mitigation and Compensation Plan. July 2025.

brook lamprey and therefore the likely impact is assessed as **moderate (low confidence)**. The impact assessment (Table 5) is therefore considered precautionary, with any future assessments updated with the results of monitoring data collected since 2020

- In addition, Southern Water has been working on an enhanced list of mitigation and compensation measures that will be implemented to offset the potential effects of the drought order. The mitigation available to offset the effects of the Drought Order in 2025 are summarised in the EAR and detailed in the Environmental Monitoring, Mitigation and Compensation Plan (SWS, 2025[37]).

Otter

- There are no detailed studies of otter in the lower River Test but they are known to be present in the neighbouring River Itchen and have been observed in the River Test valley.
- The high mobility of otter over tens of kilometres means they are resilient to droughts and it is unlikely flow conditions downstream of the Testwood abstraction intake would affect the local otter population adversely. The Environment Agency have agreed that otter would not be affected by the Drought Order impacts on river flow [38]. The likely impact is therefore assessed to be **minor (medium confidence).**

Water Vole

- Water vole communities are potentially vulnerable to changes in water level, such as may occur in drought conditions and exacerbated by abstraction. Local changes in water levels in channel margins due to the Drought Order may, for example, lead to exposure of burrows resulting in increased predation.
- The Environment Agency has not carried out surveys historically as they are perceived as a species that is widely present throughout the catchment [39]; consequently the presence and distribution of water voles in the Lower Test downstream of the abstraction is largely unknown as there are no known recent surveys of water vole in these reaches.
- Although water vole are perceived to be widespread in the catchment, the species is regarded as highly threatened and nationally declining. The water vole population within the zone of influence of the Drought Order is potentially small and fragmented. This may make the population more vulnerable to local changes in water levels/depth in channel margins and wider environmental pressures exacerbated by the Drought Order.
- Natural England has requested, and Southern Water and the Environment Agency have agreed, that water vole are included in the Environmental Monitoring, Mitigation and Compensation Plan (SWS, 2025[40]) to provide greater information on their presence within the hydrological zone influence of the Drought Order. Access for surveys was not possible in 2018 and 2019, although in the 2019 survey there were no latrines located upstream of Testwood and only one latrine was located downstream. Once further data are available, a more informed assessment will be carried out, linking the water vole location data to the wider effects identified in this assessment on hydrology and relevant habitat features (as informed by additional monitoring) so as to better assess the likely impact. In the interim, the impact is assessed as "**uncertain**".

Table 5 provides a summary of potential impacts on the River Test SSSI. Southern Water is committed to delivering the packages of monitoring and mitigation measures to improve monitoring

[37] SWS (2025). Test Surface Water Licence 11/42/18.16/54 Stage 0.1 Drought Order 2025. 2.2_Environmental Monitoring, Mitigation and Compensation Plan. July 2025.
[38] pers. comm. Tim Sykes – meeting Environment Agency / Southern Water on Western Area Drought Orders
[39] pers. comm. Tim Sykes – meeting Environment Agency / Southern Water on Western Area Drought Orders
[40] SWS (2025). Test Surface Water Licence 11/42/18.16/54 Stage 0.1 Drought Order 2025. 2.2_Environmental Monitoring, Mitigation and Compensation Plan. July 2025.

and build the resilience of the Lower Test catchment and River Test SSSI. However, should damage to the River Test SSSI arise as a result of the operation of the Drought Order, as evidenced by pre and post-drought monitoring, Southern Water will ensure that the SSSI is restored to its pre-implementation state, linking back to each affected species and habitat as set out in the FCT.

Table 5 Summary of potential impacts on the River Test SSSI

Feature	Potential impact	Ecological value of feature	Likely impact	Confidence
River Test SSSI				
Type III flowing waters	A reduction in area or extent of habitat. Changes to the composition of the habitat (e.g. reduction in species structure, abundance or diversity that comprises the habitat over time). Interruption or degradation of the processes that support the habitat.	International	Minor	Medium
Salmon	Decrease in habitat as a result of changes in water levels. Decrease in the abundance/distribution of features of importance. Changes in community structure as a result of changes in water quality.	International	Moderate	Low
Sea trout	Decrease in habitat as a result of changes in water levels. Decrease in the abundance/distribution of features of importance. Changes in community structure as a result of changes in water quality.	National	Moderate	Low
Bullhead		National	Minor	Low
Brook lamprey	Decrease in habitat as a result of changes in water levels. Decrease in the abundance/distribution of features of importance. Changes in community structure as a result of changes in water quality.	National	Moderate	Low
Otter	Decrease in foraging and breeding habitat as a result of decreased water levels. Decrease in food sources as a result of changes in water levels and water quality. Increased competition as a result of decreased habitat availability. Increased predation as a result of decrease in habitat available as refuge.	Regional	Minor	Medium

Feature	Potential impact	Ecological value of feature	Likely impact	Confidence
Water vole	Decrease in foraging and breeding habitat as a result of decreased water levels. Decrease in food sources as a result of changes in water levels and water quality. Changes in food sources as a result of changes in water quality. Increased competition as a result of decreased habitat availability Increased predation as a result of decrease in habitat available as refuge.	National	Uncertain (pending further water vole survey data)	N/A

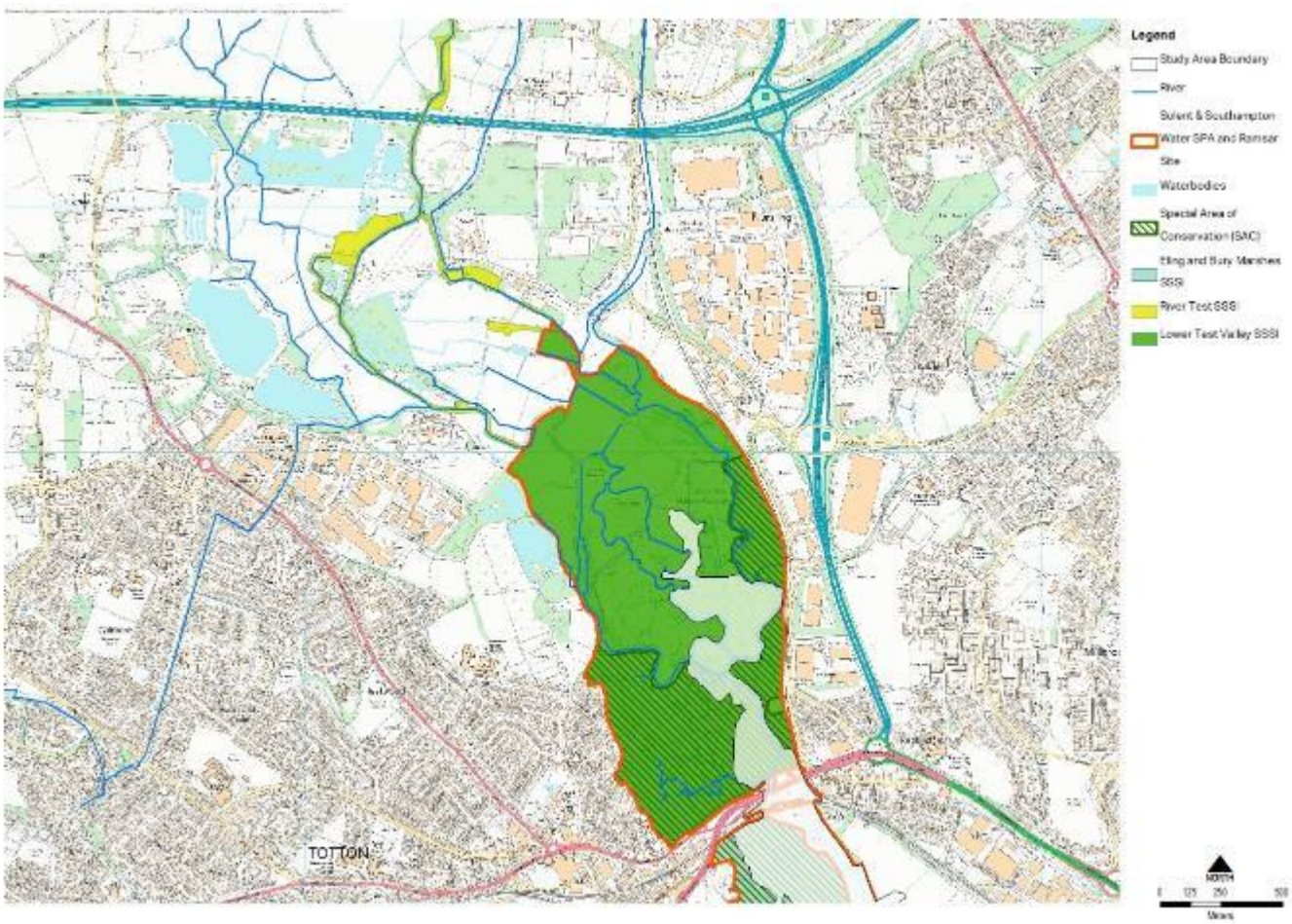
In considering the impact assessment, it is noted that a significant programme of enhancement measures either have been, or are soon to be, implemented in the Lower and Middle Test catchment, including river restoration plans, diffuse water pollution plans and other ongoing activity of partnerships and regulators that overall are seeking to meet the Favourable Condition Targets for the River Test SSSI. This will result in a changing baseline over time however the situation as it largely was reported in the report prepared to support the Southern Water 2022 draft Drought Permit application.

The Lower Test Valley SSSI

Baseline

Error! Reference source not found. Figure 7 shows the location of the Lower Test Valley SSSI, which covers an area approximately 139 ha in extent.

Figure 7 Lower Test Valley SSSI



The Lower Test Valley SSSI is broken down into eight component units, classed as littoral sediment (three units – Units 001 – 003), fen, marsh and swamp (two units, Units 004 and 005) and lowland neutral grassland (three units, Units 006 - 007).

The SSSI citation states that the site is located at the upper estuary of the River Test and exhibits a gradation from salt through brackish to freshwater conditions. The site includes one of the most extensive reed *Phragmites* beds on the south coast, with flanking unimproved meadowland intersected by numerous tidal creeks flooded on high water spring tides. Saltmarsh habitat to the south supports a varied flora with several species characteristic of salt marsh habitat. Above the limit of tidal influence are extensive unimproved neutral meadows containing several plants now rather uncommonly found owing to modern intensive agricultural methods. Over 450 species of flowering plants have been recorded for the site as a whole.

Natural England's Favourable Condition Table[41] provides a list of the broad habitat types and associated designated interest features for the SSSI, as reproduced below:

- Lowland neutral grassland
  - MG5 *Cynosurus-Centaurea* Grassland
  - MG8 *Cynosurus cristatus – Caltha palustre* Grassland

[41] Natural England (2007) Lower Test Valley conservation objectives and definitions of favourable conditions for designated features of interest – Consolation Draft

- MG11a *Festuca rubra-Agrostis stolonifera-Potentilla anserina* Grassland *Lolium perenne* sub-community
- *MG13 Agrostis-Alopecurus Pasture*

- Fen, Marsh and Swamp
  - S4 *Phragmites australis* Swamp
  - S5a *Glyceria maxima* Swamp
  - S6 *Carex riparia* Swamp
  - S7 *Carex acutiformis* Swamp
  - S14 *Sparganium erectum* Swamp
  - S21 *Bolboschoenus maritimus* Swamp
  - S20 *Schoenoplectus tabernaemontani* Swamp
  - S22 *Glyceria fluitans* Swamp
  - S23 Margin Vegetation
  - S26c *Phragmites australis-Urtica* Fen, *Oenanthe crocata* sub- community
  - S28 *Phalaris arundinacea* Tall Herb Fen
  - M22 *Juncus subnodulosus – Cirsium palustre* Fen Meadow
  - M27b *Filipendula ulmaria – Angelica sylvestris* Mire, *Urtica – Vicia* sub-community.
- Littoral Sediments (Saltmarsh)
  - Saltmarsh communities (SM6, SM8, SM9, SM13, SM14, SM16, SM20 & SM24)
- Littoral sediments, coastal grazing marsh & fen,marsh and swamp
  - Aggregations of non-breeding birds (SPA & Ramsar feature only)
  - Aggregations of non-breeding birds- the qualifying feature for international SPA over-wintering birds is criterion 3.3 – localities regularly used by non-breeding birds (1% or more GB population), >20,000 waterbirds

Assessment Summary

- The SSSI Unit Condition Assessments were last surveyed in September 2019 and showed that all the Units were in favourable condition, with the exception of two units of lowland neutral grassland referred to as Totton Meadows (Unit 006) and Test Valley Meadows (Unit 007). These two units were considered to be of unfavourable - recovering condition. None of the units had any condition threat risk identified within the SSSI Unit Condition Assessments.
- The River Valley communities of the Lower Test Valley encompass the Great, Little and Middle Test, plus the Wirehouse Streams which flow from the Great Test to Little Test just within the northern boundary of the Lower Test Valley Nature Reserve. The Testwood abstraction is located approximately 0.5 km upstream of the northern boundary of the Lower Test Valley SSSI. The Drought Order has the potential to impact upon flows in the freshwater reach of the Great Test, between the Testwood abstraction intake and the NTL at Testwood Mill, and also impact flows in both Wirehouse streams. Water levels in the meadows and saltmarsh areas bordering the river channel in the northern and eastern sections of the SSSI are the most vulnerable to impacts from the Testwood abstraction. The Little Test splits from the Great Test upstream of the abstraction intake so the Drought Order will not directly alter flows on the Little Test, apart from flows entering the Little River Test via the two Wirehouse Streams. The Middle Test is entirely tidal and any impacts from the abstraction on this water body will be negligible.
- The hydrological zone of influence of the abstraction on the Lower Test Valley SSSI is limited to the western and northern areas of the Lower Test Valley Nature Reserve. Beyond the NTL at Testwood Mill the tidal influence is the dominant factor in the habitats of concern. The

Drought Order will not affect the tidal regime or elicit significant impacts on salinity gradients that could trigger a significant impact pathway on the lower half of the SSSI.

Investigations into the wetlands and the potential impact of the abstraction were carried out as part of the NEP investigation. Although there may be some impact on the wetlands of the Drought Order during drought conditions it appears that there is relatively low connectivity between the river channels and the wetlands with the influence of tidal inundation dominating the hydrological regime for the wetland. Taking account of this, and the impacts of the Drought Order on freshwater flows in the Great Test, Wirehouse Streams and Little Test downstream of the Wirehouse Streams confluences, the potential impacts on the notified features of the upper half of the Lower Test Valley SSSI (above the NTL) are summarised in

- Table 6.

Table 6 Summary of potential impacts on the Lower Test Valley SSSI (above the NTL)

Feature	Potential impact	Ecological value of feature	Likely impact	Confidence
Lower Test Valley SSSI				
Breeding bird assemblages	Decrease in foraging and breeding habitat as a result of decreased water levels in Great Test, Wirehouse Streams and Little Test downstream of Wirehouse Streams confluences. Decrease in food sources as a result of changes in water levels and water quality. Changes in food sources as a result of changes in water quality. Increased competition as a result of decreased habitat availability Increased predation as a result of decrease in habitat available as refuge.	International	Minor	Medium
Lowland wet grassland and meadow	Decrease in habitat quality as a result of decreased water levels in Great Test, Wirehouse Streams and Little Test downstream of Wirehouse Streams confluences. Decrease in the extent of habitat as a result of changes in water levels. Changes in the abundance and/or occurrence of macrophyte species.	National	Minor	Medium
Fen, marsh and swamp	Decrease in habitat quality as a result of decreased water levels in Great Test, Wirehouse Streams and Little Test downstream of Wirehouse Streams confluences. Decrease in the extent of habitat as a result of changes in water levels. Changes in the abundance and/or occurrence of macrophyte species.	International	Minor	Medium
Saltmarsh	Decrease in habitat quality as a result of decreased water levels in tidal reach. Decrease in the extent of habitat as a result of changes in water levels.	International	Minor (habitat downstream of NTL)	Medium

Feature	Potential impact	Ecological value of feature	Likely impact	Confidence
	Changes in the abundance and/or occurrence of macrophyte species.			

The River Itchen SSSI

Baseline

The River Itchen was notified as a SSSI in 2001, the date at which the aggregation of five former SSSI into the River Itchen SSSI was completed. The SSSI extends to 748.5 ha and includes the river and adjacent semi-natural areas that, at the time of notification, were considered to be intimately linked with the river, and be dependent upon it for their continued existence.

Table 7 presents the full list of ecological features for which the site has been notified.

Table 7 Notified features for the River Itchen SSSI

River Itchen SSSI	
Rivers and streams	• Type III: Base-rich, low-energy lowland rivers and streams, generally with a stable flow regime • Otter (Lutra lutra) • Atlantic Salmon (Salmo salar) • Brook Lamprey (Lampetra planeri) • Bullhead (Cottus gobio) • White-clawed crayfish (Austropotamobius pallipes) • Water vole (Arvicola amphibius) • Breeding bird assemblage: Lowland open waters and their margins
Broadleaved, mixed and yew woodland	• W1 - Salix cinerea - Galium palustre woodland • W5 - Alnus glutinosa - Carex paniculata woodland • W6 - Alnus glutinosa - Urtica dioica woodland
Neutral grassland	• MG8 - Cynosurus cristatus - Caltha palustris grassland[42]
Fen, marsh and swamp	• S3 – Carex paniculata swamp • S4 - Phragmites australis swamp and reed-beds • S5 - Glyceria maxima swamp • S7 - Carex acutiformis swamp • S25 - Phragmites australis - Eupatorium cannabinum tall-herb fen • S26 - Phragmites australis - Urtica dioica tall-herb fen • S28 – Phalaris arundinacea • M22 - Juncus subnodulosus - Cirsium palustre fen meadow • M27 – Filipendula ulmaria-Angelica sylvestris mire
Rivers and streams, swamp and fen	• Southern damselfly (Coenagrion mercuriale)
Rivers and streams, broadleaved woodland, swamp, fen and grassland	• Invertebrate assemblage: W314 reed-fen & pools • Invertebrate assemblage: W125 slow-flowing water • White-clawed crayfish (Austropotamobius pallipes)

[42] *Rothero et al. (2016) redefined this community as *Cynosurus cristatus – Carex panicea - Caltha palustris* grassland

The River Itchen is not directly affected by changes in flows associated with the Drought Order and therefore habitats and the less mobile species will not be affected and are not therefore discussed below. The key features of interest therefore in respect of the Drought Order and the River Itchen SSSI are Atlantic salmon and Otter.

Salmon

The baseline status of the salmon population in the River Itchen is summarised in Appendix B of the '*Test Surface Water Licence 11/42/18.16/54 Stage 0.1 Drought Order 2025. Report to inform an assessment under Regulations 63 and 64 of the Conservation of Habitats and Species Regulations 2017* (WSP, 2025) and therefore is only briefly summarised here.

The most recent published assessment (for 2023) classified the Itchen salmon stock as 'At Risk' (of failing to meet their Management Objectives) in 2023 and projected them to be 'At Risk' in the Itchen, in 2028. In 2023, stocks were at 42% of the Conservation Limit in the Itchen (Cefas / EA / NRW, 2024a). Unpublished provisional statistics for 2024 give the Itchen at 37% of CL and the stock remains At Risk (APEM Ltd., 2025).

Otter

No published reports on the otter population of the SSSI have been located but they are known to be widely present. There is currently no condition assessment for otter on the River Itchen reported on the Natural England website.

Otters are however believed to move between catchments in the Southampton Water area, including between the Test and Itchen.

Assessment Summary

Salmon:

- Potential for effects arise as a result of deterioration in environmental conditions in the Test ZoI, (which insofar as these might affect salmon is taken to extend from the Testwood abstraction point to the downstream end of estuary Zone 4 (Dockhead) in Southampton Water) that might result from the Stage 0.1 Drought Order allowing abstraction to continue under river flow conditions that is not allowed within the normal licensed abstraction.
- It should be noted that low flows (often accompanied by high temperatures) resulting from the natural drought will precede or be concurrent with a Drought Permit abstraction. These are conditions that can be directly harmful to salmon and/or displace them from the system even in the absence of the Stage 0.1 Drought Order. The degree to which the Drought Permit exacerbates these conditions (magnitude and extent) and where those effects might be experienced within the ZoI remains uncertain and is subject to ongoing monitoring and modelling
- The rivers of the Test and Itchen support an unusual group of salmon populations that along with the other chalk catchments of Meon, Hants Avon, Stour, Piddle and Frome form a unique genetic group within which exchange of breeders and interdependencies of population resilience are likely to be higher than normal for salmon. Such a grouping is termed a metapopulation, that is they offer reciprocal support through some level of breeder exchange in the event of environmental depredation and population decline in any one. Therefore the contributions of these rivers to the Itchen should be considered in the HRA. The Test and Itchen by virtue of their proximity are considered the most closely reciprocally interdependent pair and the Test population being the largest by x2.2 is likely a source of breeders to the Itchen.
- Principle environmental factors likely to act on salmon within the ZoI are high temperature, low dissolved oxygen, reduced pollutant dilution and hydraulic variables including low velocities and shallower depth. These physicochemical changes can lead to processes such as:

- Reduction in habitat size (defined by area, volume, velocities, overhead shelter and water quality), that affects holding potential and vulnerability to predation and poaching and crowding that could increase pathogen transmission.
- Reduction in flow-related cues for movements in or out of the holding areas within the ZoI and the connectivity to allow such movements.
- Exposure to lethal or sub-lethal water quality conditions, including high temperature and low dissolved oxygen, that may cause in situ stress-related physiological impacts with consequences for reproductive effectiveness.
- Barriers to river entry through avoidance of poor water quality and high temperatures leading to displacement from the ZoI and Test/Itchen system that may be permanent or lead to displacement, delays and fish missing physiological windows for maturation, or limits distribution of spawners.

- In many cases these processes will act in synergy causing combined effects. Their occurrence and intensity will vary greatly through the ZoI according to topography, channel form and tidal influence, with a general presumption of reducing effects moving downstream as river flow has a progressively lower influence. Furthermore, these effects on salmon holding in the ZoI are dependent on:
  - The location of the salmon holding areas.
  - The seasonal timing and duration of their holding period.
  - The levels of impact factor where the fish are located.
  - An understanding of the relationship between the factors, as modified by the Stage 0.1 Drought Order, acting separately or in combination on fish originating from the Itchen and Test.
- The river inter-dependencies should be considered. There are various categories of straying and exchange that render fish from both rivers exposed to potential Stage 0.1 Drought Order impacts in the ZoI. Fish destined to spawn in the Itchen (probably mainly of Itchen origin but some Test fish also, see above) will stray temporarily into the ZoI. Their loss or reduced breeding capacity would affect Itchen breeding success in the spawning year of Drought Order implementation. Other fish destined to spawn in the Test (mainly of Test origin with a smaller component of straying Itchen fish) if affected by the Drought Order, and if that translated to reduced smolt production, would lead to reduced Test subsidy of breeders to the Itchen after a lag of 3-4 years (generation time).
- A detailed assessment of potential effects on salmon in the Itchen is presented in the 'Technical note on the effects of the Test drought permit on salmon in the River Itchen. Author: Nigel Milner' (APEM, 2025), which is contained in the Appendix B of the Test Surface Water Licence 11/42/18.16/54 Stage 0.1 Drought Order 2025. Report to inform an assessment under Regulations 63 and 64 of the Conservation of Habitats and Species Regulations 2017 (WSP, 2025) that accompanies the application.
- The assessment indicated that given the poor state of the Itchen SAC salmon population, i.e. recent historically low numbers of returning adult salmon, even the potential for loss of a small number of salmon, as a result of implementation of the Stage 0.1 Drought Order would be considered to represent a failure against the relevant site Conservation Objectives in respect of salmon. This is translated in this EAR to represent a Moderate impact, but given a high degree of uncertainty in the assessment, is made with a low level of confidence. It is also recognised that the HRA concluded that, it is not possible to conclude beyond reasonable scientific doubt that the mitigation measures available for a 2025 Drought Order will fully mitigate the potential for effect on the salmon population and therefore it is not possible to conclude there will be no adverse effect on site integrity for the River Itchen SAC (or the River Meon Compensatory SAC Habitat), without compensatory measures. The

conclusion therefore accepts there will be a measure of damage to the population that requires compensation.

- Otter: Otters are believed to move between catchments in the Southampton Water area, including between the Test and Itchen. However, whilst there is a potential pathway for exposure to risk, the Environment Agency and Natural England advise that the Stage 0.1 Drought Order is unlikely to have a significant effect on the population. Therefore the likely impact is assessed as negligible (high confidence).

- The potential impacts on the notified features of the River Itchen SSSI are summarised in

Table 6.

Table 7 Summary of potential impacts on the River Itchen SSSI

Feature	Potential impact	Ecological value of feature	Likely impact	Confidence
River Itchen SSSI				
Type III flowing waters	None	International	None	High
Otter	Decrease in foraging and breeding habitat as a result of decreased water levels. Decrease in food sources as a result of changes in water levels and water quality. Increased competition as a result of decreased habitat availability. Increased predation as a result of decrease in habitat available as refuge	International	Negligible	High
Bullhead	None	International	None	High
Brook lamprey	None	International	None	High
White-clawed crayfish	None	International	None	High
Salmon	Reduction in habitat size Reduction in flow-related cues for movements in or out of the holding areas within the ZoI and the connectivity to allow such movements Exposure to lethal or sub-lethal water quality conditions Barriers to river entry through avoidance of poor water quality and high temperatures leading to displacement	International	Moderate	Low
Water vole	None	National	None	High
Breeding bird assemblage	None	National	None	High
Broadleaved mixed and Yew woodland communities	None	National	None	High
Neutral grassland (MG8)	None	National	None	High
Fen, marsh, swamp and fen communities	None	National	None	High
Southern damselfly	None	National	None	High
Invertebrate assemblages (W314, W410)	None	National	None	High

D3. WFD Status and Ecological Community Assessments

The WFD test of ‘no deterioration’ is applied to the WFD water body and relates to a change in status for any one of the Annex V quality elements. The timescale for assessment of deterioration is considered on a short-term and long-term basis. The short-term assessment is based on the interim classification reported by the Environment Agency from one year to another. The long-term assessment is based on the 6-yearly cycle driven by the River Basin Management Planning process and reporting requirements of the WFD (Article 4.6(e)).

WFD status and ecological community assessment in this EAR focus on locally derived ecological, hydrological and hydraulic data to assess the risk of deterioration to the WFD water bodies.

Note: As detailed in the Hydrology and Physical Environment Assessment there is no planned long-term increase in abstraction rates on a rolling 6 year cycle throughout the 2000 year stochastic climate series.

D.3.1 Water Body Status Baseline

There are two downstream WFD water bodies that may be affected by the Drought Order. The WFD surface water body - Test (Lower) (GB107042016840) runs from the confluence with Tadburn Lake, south of Romsey, to the boundary with Southampton Water transitional water body, encompassing the Testwood Abstraction intake. The downstream WFD water body is the transitional water body - Southampton Water (GB520704202800) which starts at the boundary with the Test (lower) water body, and encompasses the Test, Itchen and Hamble estuaries as well as Southampton Water out to Calshot. The location of the boundary between these two waterbodies was originally set upstream of the NTL at Testwood Mill (approximately 625m downstream of the Testwood abstraction intake) and this boundary was used for RBMP Cycles 1 and 2. For the RBMP Cycle 3, the Environment Agency is proposing to modify the boundary to align to the NTL at Testwood Mill, located 1.7 km downstream of the Testwood abstraction intake. For the purposes of the following WFD assessments, as agreed with the Environment Agency, it is assumed that the WFD water boundary is at the NTL at Testwood Mill.

D3.1.1 Test (Lower) Surface Water Body

The abstraction intake lies near the lower end of the WFD Test (Lower) water body, 1.7km from the NTL and the boundary with the Southampton Water transitional water body.

Summary RBMP data relating to the overall ecological status of the WFD surface water body - Test (Lower) (GB107042016840) for 2019 are presented in Table 9. Note that ecological status is combined with a chemical status assessment based on priority substances and other pollutants with EU environmental quality standards to determine the overall surface water body status for River Basin Management Plan (RBMP) reporting. Overall water body assessments are not reproduced here. The table presents the ecological status classifications for the water body along with the objective status classification for 2027. As shown, the overall ecological status is Good, with physico-chemical elements being High and hydromorphological elements (which includes the hydrological regime) is Supports Good.

Table 9 Summary WFD RBMP classification data for Test (lower) surface water body (2022)

Water body ID		GB107042016840
Water body Name		Test (Lower)
RBMP Cycle 3 Status/Potential	Overall ecology	Good
	Fish	Good
	Macroinvertebrates	High
	Macrophytes and phytobenthos	High
	Physico-chemical elements	High
	Hydromorphological quality elements	Supports good
	Specific pollutants	High
RBMP3 water body objective (2015)*	Overall	Good
	Fish	Good
	Macroinvertebrates	High

	Macrophytes and phytobenthos	Good

* No objectives on the catchment explorer website were published for 2027

D.3.1.2 Southampton Water transitional water body

The Southampton Water WFD transitional water body (GB520704202800) starts at the end of the Test (lower) water body and extends to the junction with the Solent at Calshot and incorporates the Test, Itchen and Hamble river estuaries to their natural tidal limits. The WFD RBMP Cycle 2 assessment data for this water body are presented in Table 108.

Southampton Water is designated under the WFD as a Heavily Modified Water Body – this indicates a body of surface water that is substantially changed in character as the result of physical alterations by human activity, as designated by the Member State in accordance with the provisions of the WFD Annex II.

The whole water body is classified as a transitional water body covering an area of 30.9 km^2. Upstream of the transitional water body, the flow in the Test has been augmented by the River Blackwater tributary and so flow impacts from the abstraction are partially mitigated by this additional flow input. As is typical for a transitional water body, the influence of the tidal cycle is clearly evident in the assessment of the velocities in the Test estuary during the high tide, and particularly at spring high tide. Apart from at high tide, water from the freshwater River Test at Testwood Mill is free flowing into the transitional water body.

Table 108 Summary RBMP data relating to the overall ecological status of the WFD transitional water body: Southampton Water (2022)

Water body ID		GB520704202800
Water body Name		Southampton Water
RBMP Cycle 3 Status/Potential	Overall ecology	Moderate
	Fish	Good
	Macroinvertebrates	Good
	Macroalgae / Angiosperms	Good / Good
	Physico-chemical elements	Moderate
	Hydromorphological quality elements – Heavily modified	Supports good
	Supporting elements (mitigation measures assessment)	Moderate (moderate or less)
	Specific pollutants	High
RBMP2 water body objective (2027)	Overall	Moderate
	Fish	Good
	Macroinvertebrates	Good
	Macroalgae	Good

D.3.2. Test (Lower) Water Body (GB107042016840)

Southern Water, the Environment Agency and Hampshire and Isle of Wight Wildlife Trust have all undertaken extensive monitoring programmes on the Rivers Test and Itchen as agreed under the Section 20 Agreement. Monitoring that is on-going, and planned for the Drought Order is detailed in

the Environmental Monitoring, Mitigation and Compensation Plan (SWS, 2025[43]).Where monitoring data are already available, this has been included in the current version of the EAR. However, as detailed earlier, at this time the vast majority of these data are still being analysed, and have yet to be reported independently from this documentation to the Environment Agency and Natural England. Therefore it has not been possible to update the EAR, and supporting appendices, with the results of these data in respect of the assessment presented.

In addition, to improve the resilience of the ecology during drought conditions in the Lower Test Southern Water has been working on an enhanced list of mitigation and compensation measures that will be implemented to offset the potential effects of the drought order.. The mitigation available to offset the effects of the Drought Order in 2025 are summarised in the EAR and detailed in the Environmental Monitoring, Mitigation and Compensation Plan (SWS, 2025[44]).

D.3.2.1. Macrophytes

Baseline

The macrophyte and phytobenthos combined status in the WFD RBMP classification for the Test (Lower) (water body ID: GB1070420116840) is 'High.

A summary assessment of the potential impact of the application of the Drought Order on the macrophyte community has been presented earlier in section D.2.6. This section deals just with the WFD status assessment and the risk of WFD status deterioration.

For WFD classification based on the macrophyte biological element, metrics on river macrophyte composition, abundance and richness are run through the LEAFPACS2 classification tool. The actual (observed) scores for these metrics are compared with a predicted score (reflecting a river in pristine condition). The comparison of the observed to expected scores is known as an Ecological Quality Ratio (EQR). EQRs are used to produce a macrophyte classification (High, Good, Moderate, Poor, Bad) of the water body for Water Framework Directive (WFD) purposes.

The Environment Agency collect WFD monitoring data at 'Upstream of Testwood Abstraction' (Site ID 155024) monitoring site. Species list and indices are available for late summer 2010, 2013 and 2016 (see Table 9). Additional monitoring sites with more recent data only (post 2018) are also available from two other nearby monitoring sites within the same WFD waterbody (Site IDs 198791 and 194492, the latter being within the area downstream of the Testwood abstraction location). Data for these sites are available on the Environment Agency data explorer[45].

Table 9 Environment Agency macrophyte monitoring sites located within the hydrological influence of the Testwood Abstraction

Site ID	Watercourse	Water body ID	Top NGR
198791	Test (Great Test)	GB107042016840	SU3506815703
155024	Test (Great Test)		SU3521215404
194492	Test (Great Test)		SU3534315291

[43] SWS (2025). Test Surface Water Licence 11/42/18.16/54 Stage 0.1 Drought Order 2025. 2.2_Environmental Monitoring, Mitigation and Compensation Plan. July 2025.
[44] SWS (2025). Test Surface Water Licence 11/42/18.16/54 Stage 0.1 Drought Order 2025. 2.2_Environmental Monitoring, Mitigation and Compensation Plan. July 2025.
[45] https://environment.data.gov.uk/ecology/explorer/

A number of standard community metrics are calculated when using macrophytes to assess river status[46]. These are provided with the Environment Agency macrophyte data and include:

- River Macrophyte Hydraulic Index - **RMHI**;
- River Macrophyte Nutrient Index - **RMNI**;
- Number of Macrophyte Taxa - **NaTAXA**;
- Number of Functional Groups - **NFG**;

With the exception of RMHI, these metrics are currently used in biological site classification under the WFD. An additional algal coverage metric (ALG, which provides percentage coverage of green filamentous algae and ranges from 0-100) is used to support biological site classifications under the WFD; no data have been retrieved for algal coverage.

Error! Reference source not found. provides a summary of the indices within the reach of the Testwood abstraction intake using the Environment Agency data.

[46] UKTAG (2014). UKTAG River Assessment Method Macrophytes and Phytobenthos (River LEAFPACS 2), July 2014. ISBN: 978-1-906934-44-6.

Table 10 Environment Agency macrophyte monitoring sites: summary of community indices in the vicinity of the Testwood abstraction intake on the River Test

Site ID	Date	RMHI	RMNI	NFG	NaTaXA
198791 (upstream of intake)	30/08/2019	7.78	7.7	7	8
155024 (upstream of intake)	06/09/2010	8.06	7.97	9	11
	10/08/2013	7.98	7.95	8	12
	28/09/2016	7.71	7.79	11	16
194492 (downstream of intake)	30/08/2018	7.94	7.94	7	11
	29/08/2019	7.86	7.87	11	16
	27/08/2020	8.03	7.99	7	10

The range of results for the section of river upstream of the Testwood abstraction intake at site 155024 are consistent over the 7 years that the data span. The NFG and NaTAXA show a slight increase while RMHI and RMNI decline somewhat. The nature of the site habitat has changed over this period with fallen trees creating a large, silty, slack area on one bank and a faster, clean gravel section on the other bank. This is likely to have affected the species present and therefore the calculated metrics[47]. Site 198791, also located upstream of the abstraction, recorded similar metrics to 155024, indicating conditions are consistent between the two sites.

The metrics associated with site 194492 (located downstream of the intake and potentially affected by the Testwood abstraction) are similar to those recorded upstream at site 155024, and relatively consistent between the surveys, which would be expected over such a limited temporal range (three years). The consistency between this site and the upstream sites indicate that there is currently no discernible impact from the abstraction, based on these metrics. However, given the limited data range from this site, this is not considered as being highly conclusive. Further data collected at this site will be included in future versions of this EAR and help clarify the baseline conditions in the Test near to the abstraction location.

Assessment Summary

- WFD compliance macrophyte monitoring sites are situated upstream of the Testwood abstraction intake and therefore there is no long-term WFD monitoring baseline on which to assess status or deterioration downstream of the abstraction intake. One new monitoring site (194492, since 2018 only) is available within the vicinity of the abstraction site, although only a limited range of data are available at this site.
- Based on an assessment of the available macrophyte data, hydrological modelling and the hydraulic nature of the river downstream of the abstraction Southern Water concludes that the risk of a deterioration in the high status of the macrophyte classification in the Test (Lower) water body caused by the operation of the abstraction pursuant to a Drought Order is low in the short term for interim classification and very low within the longer-term reporting cycle of the WFD.
- Data limitations result in uncertainties in this assessment and therefore the assessment is considered precautionary, with any future assessments updated with the results of monitoring data collected since 2020. Monitoring on-going and planned for the Drought Order is detailed in the Environmental Monitoring, Mitigation and Compensation Plan (SWS, 2025[48]).

[47] Pers. Comm. Emma McSwann – Environment Agency, summer 2021
[48] SWS (2025). Test Surface Water Licence 11/42/18.16/54 Stage 0.1 Drought Order 2025. 2.2_Environmental Monitoring, Mitigation and Compensation Plan. July 2025.

- In addition, Southern Water has been working on an enhanced list of mitigation and compensation measures that will be implemented to offset the potential effects of the drought order. The mitigation available to offset the effects of the Drought Order in 2025 are summarised in the EAR and detailed in the Environmental Monitoring, Mitigation and Compensation Plan (SWS, 2025[49]).

D.3.2.2 Macroinvertebrates

Baseline

WFD ecological status for macroinvertebrates is currently determined by an updated classification method using RICT (River Invertebrate Classification Tool (derived from RIVPACS)) under the direction of the EU WFD (2000/60/EC).

The current ecological status of the macroinvertebrate community in the Test (Lower) (water body ID: GB107042016840) is **High**. A 'High' status indicates that the water body supports a diverse and abundant macroinvertebrate community, indicative of high (unpolluted) water and habitat quality.

A full review of the potential impact of the application of a Drought Order on the SSSI macroinvertebrate community has been presented earlier in section D.2.6.1.2 This section deals just with the WFD status assessment and the risk of WFD status deterioration.

Data are available from six sites on the River Test and five sites on Nursling (Manor House Farm) Carrier Stream from the Environment Agency Data Explorer[50], within the area of interest. These data have been collected for various different purposes. The Environment Agency's monitoring for WFD classification and status assessment has been carried out at Testwood Bridge upstream of the abstraction intake since 2010. Prior to 2010, this site was used for general quality assessment (GQA), the Environment Agency's national headline indicator monitoring programme. Further Environment Agency macroinvertebrate monitoring locations are available for two sites of interest within the WFD water body, directly upstream and downstream of the abstraction intake (data for 2000-2016). These locations are monitored for the purpose of local water resources assessment. Finally, five sites on the connected Nursling Carrier Stream were monitored in 2005 only, with the purpose being described as 'National Monitoring' (no further information was available).

While the purposes of the different surveys varied, all data were collected using a standard three-minute kick-sweep sampling approach, compatible with GQA, WFD and other purposes.

A summary of monitoring site locations and records is presented in

[49] SWS (2025). Test Surface Water Licence 11/42/18.16/54 Stage 0.1 Drought Order 2025. 2.2_Environmental Monitoring, Mitigation and Compensation Plan. July 2025.
[50] https://environment.data.gov.uk/ecology/explorer/

Table 11.

Table 11 Environment Agency macroinvertebrate monitoring sites

Site name	Watercourse	Site ID	Monitoring period	NGR	Monitoring Purpose
Testwood	Test (Great Test)	43111	2000-2009	SU3517015480	GQA
Testwood Bridge		160230	2010-2016	SU3517015480	WFD
50 m u/s Testwood abstraction		90401	2002-2008	SU3525015350	CAMS investigation
50 m d/s Testwood abstraction		90402	2002-2008	SU3535015300	CAMS investigation
U/S abstraction		157258	2010-2016	SU3520415419	Water Resources
D/S abstraction		157259	2010-2016	SU3535015300	Water Resources
Ghillie's Run		196436	2019	SU3582915042	National monitoring
Cattle Drink		196437	2019	SU3611714861	National monitoring
North Arm	Wirehouse Stream	196434	2018-2019	SU3622415022	National monitoring
South Arm		196435	2018-2019	SU3632414962	National monitoring
Nursling Test Carrier	Nursling Test Carrier (also referred to as Manor House Farm / Nursling fish farm carrier)	133941	2005	SU3517015590	National monitoring
Nursling Test Carrier		134405	2005	SU3526015510	National monitoring
Nursling Test Carrier		134406	2005	SU3531815643	National monitoring
Nursling Test Carrier		134702	2005	SU3551015320	National monitoring
Nursling Test Carrier		134901	2005	SU3543715387	National monitoring

All locations are within WFD water body: GB107042016840 except for sites 196434-196437. These sites are within the Southampton Water WFD water body, however, given they represent macroinvertebrate communities within freshwater streams, they have been included in this section.

Based on data collected within these sample sites, this assessment utilises several biotic indices which provide an understanding of the sensitivity of the macroinvertebrate community to impacts associated with the implementation of this Drought Order:

- The Lotic Index for Flow Evaluation (LIFE)[51] is a biotic index used to determine the preference of the macroinvertebrate to flow velocity and can therefore determine the sensitivity of that community to reductions in flow. LIFE scores can be calculated using macroinvertebrate family (LIFE(F)) or species level (LIFE(S)) data, depending on the level of taxonomic resolution (identification) available.

[51] Extence, C.A., Balbi, D.M. and Chadd, R.P. (1999) River flow indexing using British benthic macroinvertebrates: A framework for setting hydroecological objectives. Regulated Rivers: Research and Management 15, 543-574.

- The WFD Cycle 3 macroinvertebrate scoring system Whalley Hawkes Paisley Trigg (WHPT)[52] was utilised within this assessment. Average Score Per Taxon (ASPT) and Number of Scoring Taxa (NTAXA) biotic indices which are derived from WHPT are both used to assess the risk of deterioration to WFD classification of the macroinvertebrate element within waterbodies located within the zone of influence. ASPT responds to organic pollutants and associated pressures and NTAXA also responds to organic pollutants as well as other environmental pressures including habitat degradation, acidification and toxic pollution.

Previous data used by the Environment Agency, notably Biological Monitoring Working Party (BMWP); Number of Scoring Taxa ($BMWP_{NTAXA}$); Average Score Per Taxon ($BMWP_{ASPT}$)[53,54;] have now been superseded by the WHPT scoring system, described above. WHPT is based on more taxa than BMWP and includes log abundance for family taxon, providing a more robust biotic score and increased sensitivity to represent the invertebrate community. It also offers better comparability with LIFE and other abundance-weighted indices.

The LIFE scores and WHPT related indices can be contextualised using the RICT, which generates 'expected' values using site data (including distance from source, alkalinity, substrate, flow, gradient etc.). Actual 'observed' values can then be compared to expected values, and observed/expected (O:E) ratios can be used to compare different sites and assess whether they are impacted. Where site data are available, O:E have therefore been calculated and outcomes are presented in the following section. However, at the time of writing this report, not all site data had been obtained, therefore some sites are missing from this final analysis.

In addition, while ratios for WHPT related indices were all calculated for the purpose of this latest version of the EAR using RICT and raw site data, some of the LIFE score ratios (sites 157258 and 157259) are based on the existing data set described in a previous version (V5.0) of the EAR (i.e. pre-calculated O:E ratios).

Relevant biotic indices (LIFE and WHPT related indices) for each of the sites and dates for which data are available are provided in Annex 2 of this document.

The LIFE(F) scores for sites described in

[52] WFD-UKTAG (2014), River Assessment Method. Benthic Invertebrate Fauna. Invertebrates (General Degradation): Whalley, Hawkes, Paisley & Trigg (WHPT) metric in River Invertebrate Classification Tool (RICT) UKTAG Method Statement.ISBN: 978-1-906934-62-0.
[53] Biological Monitoring Working Party (1978). Final report: assessment and presentation of the quality of rivers in Great Britain. Unpublished report, Department of the Environment, Water Data Unit.
[54] Walley W.J. and Hawkes H.A. (1997) A computer-based development of the Biological Monitoring Working Party score system incorporating abundance rating, biotope type and indicator value. Water Research 31 (2), 201-210.

Table 11 range from 6.75 to 7.83 between 2000 and 2020, based on family level data obtained. The majority of samples reflect a macroinvertebrate community which is associated with moderate/high flow velocities within the reach. However, scores between 5.62 and 6.56 were recorded on the Nursling Test Carrier, indicating taxa associated with slower flows. Scores between 6.89 and 7.48 were recorded on Wirehouse Stream, reflecting a macroinvertebrate community which is associated with moderate/high flow velocities. Based on species level data the LIFE(S) scores generated were somewhat higher than those using family level data, ranging from 7.17 to 8.42 on the main River Test (Great Test) channel, and between 7.19 and 7.85 on Wirehouse Stream, again indicative of relatively fast flowing waters. The slightly higher scores recorded using species compared with family data is typical of the LIFE index. The species-based scores were again indicative of slower waters (5.81 to 6.71) on the Nursling Test Carrier, demonstrating consistency between the different levels of taxonomic resolution applied.

In terms of LIFE O:E ratios, sufficient site and biotic data are available for calculation of these ratios from four of the monitoring sites with the area of interest, and these are presented in 8 and Figure 9, below (for family and species level, respectively). LIFE(F) and LIFE(S) O:Es achieve more than the 1 (with the exception of one datum from May 2006 at Site 43111), which suggest the community flow preference is as expected and that there was no discernible evidence flow pressure at any of the sites, including either upstream or downstream of the abstraction intake or following drought years for the period for which data are available.

Therefore, while the communities present are generally associated with fast flow velocities, they do not seem to be impacted by reduced flows, either from the abstraction or during drought years, and are therefore not considered as being highly sensitive to further reduced flow impacts of the Drought Order.

Figure 8 Macroinvertebrate community family LIFE O:E ratios from sites on the Lower Test

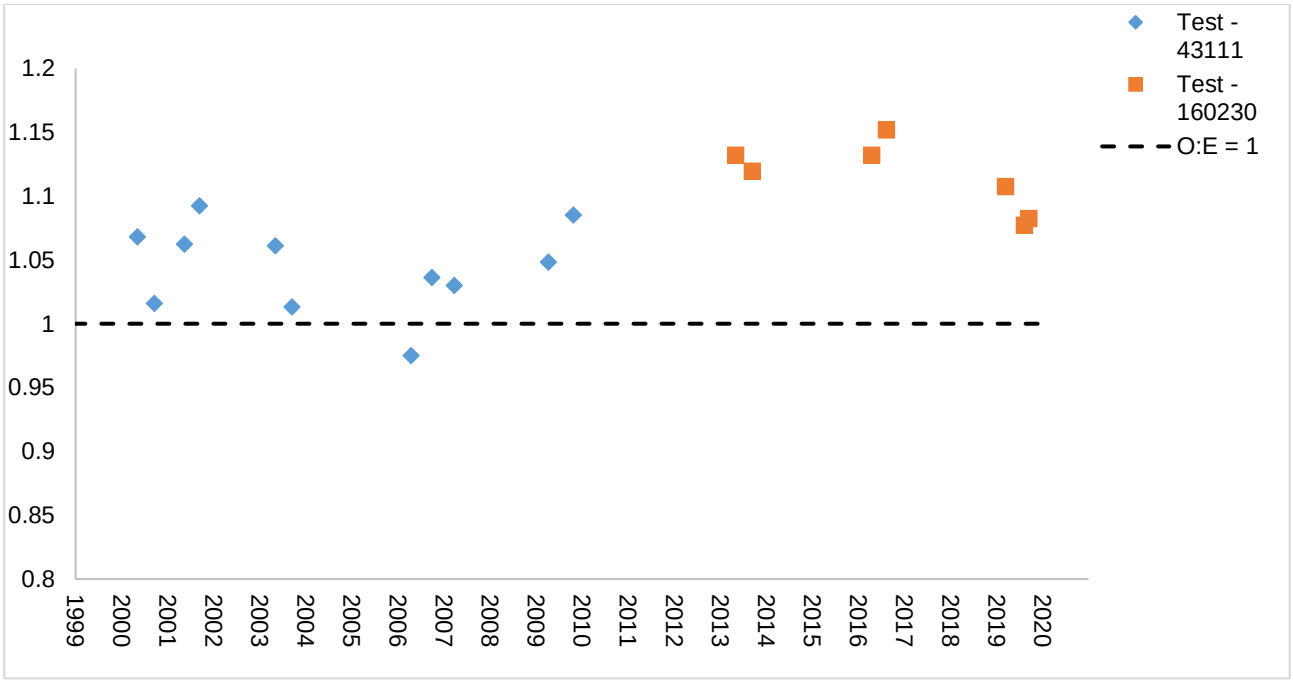
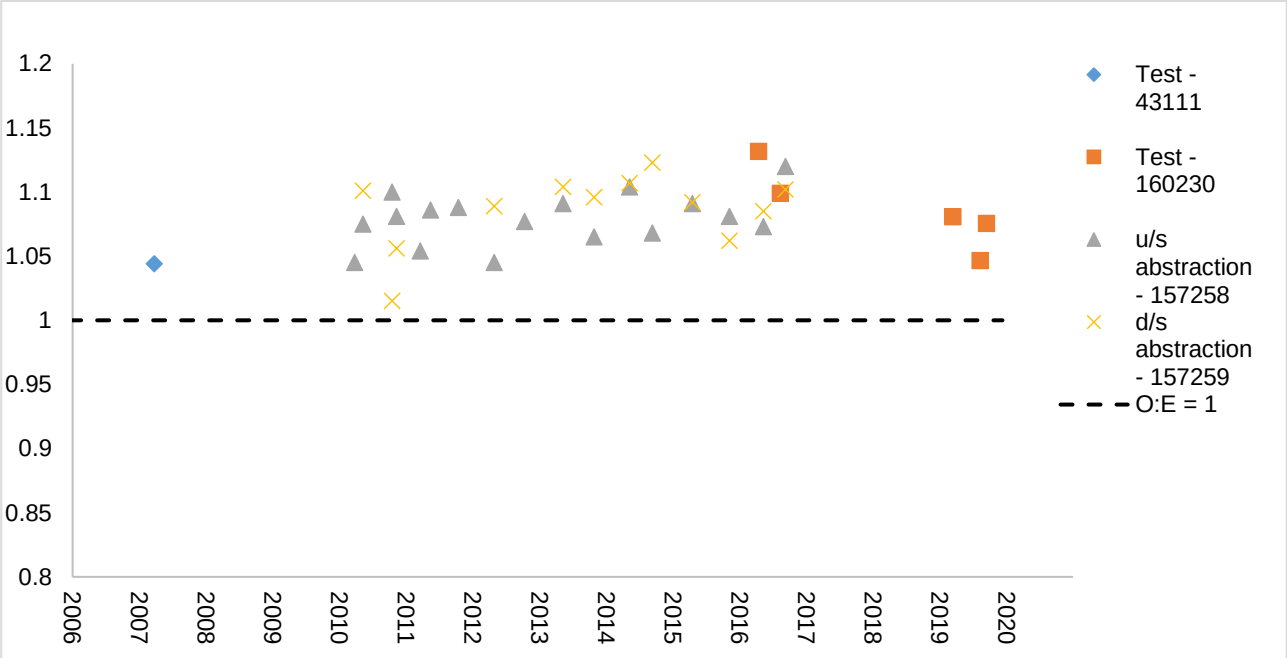


Figure 9 Macroinvertebrate community species LIFE O:E ratios from sites on the Lower Test



In addition to our assessment, the limited potential for the abstraction to impact on the macroinvertebrates of the Lower Test is highlighted by the problem the Environment Agency has identified in locating monitoring points downstream of the Testwood abstraction intake – this extract from Appendix K of the Environment Agency's LCPR[Error! Bookmark not defined.]:

Two invertebrate sites are used to assess the impact of the abstraction. One upstream and one downstream. The choice of sites in the Lower Test are very limited due to it being deep, close to the tidal limit and also other rivers joining the River Test, mitigating the impact of the abstraction.

The placement of the downstream site is restricted to one area between the abstraction intake and the confluence of the River Blackwater. There is also the Testwood flow gauging station above the River Blackwater confluence, restricting the placement of the downstream invertebrate site further.

The conclusion of the data presented above and those presented in the recent LCPR is that there is no evidence to show that the abstraction at Testwood is currently having a detrimental impact on the freshwater invertebrate ecology immediately downstream of the abstraction.[Error! Bookmark not defined.].

Other biotic indices are indicative of similar unimpacted conditions, as set out below (full data set provided in Annex 2). However, there are limited sites for which sufficient site data were available to calculate the O:E ratios for WHPT related (ASPT and NTAXA) ratios, none of which were downstream of the Testwood Abstraction. Due to the absence of discharge data on Wirehouse Stream, it was not possible to calculate any O:E ratios for the two sites. If site data become available to calculate O:E ratios for WHPT related indices at downstream sites, these will be included and updated in subsequent versions of this EAR.

ASPT scores from all sites range from 4.19 to 6.72, with the majority of samples indicative of macroinvertebrate communities consistent with good water quality, and high scores characteristic of unpolluted chalk rivers. In terms of O:E ratios, data are presented in Figure 10, below. The ASPT O:Es are consistently above 1, which suggest that this parameter is not impacted by water quality issues at the sites upstream of the abstraction intake or following drought years for the period for which data are available. Therefore, while the communities are generally associated with high water quality, they do not seem to be indirectly impacted by reduced flows during droughts.

NTAXA scores range from 27 to 45, which is very high (again, typical of unimpacted chalk streams) and indicative of good habitat and water quality. Likewise, NTAXA O:Es (Figure 4) are consistently above 1 (with the exception of one datum from May 2013), which suggest that this parameter is not impacted by water quality or other issues at any of the sites included in the data set, including following droughts.

Figure 10 Macroinvertebrate community ASPT O:E ratios from sites on the Lower Test

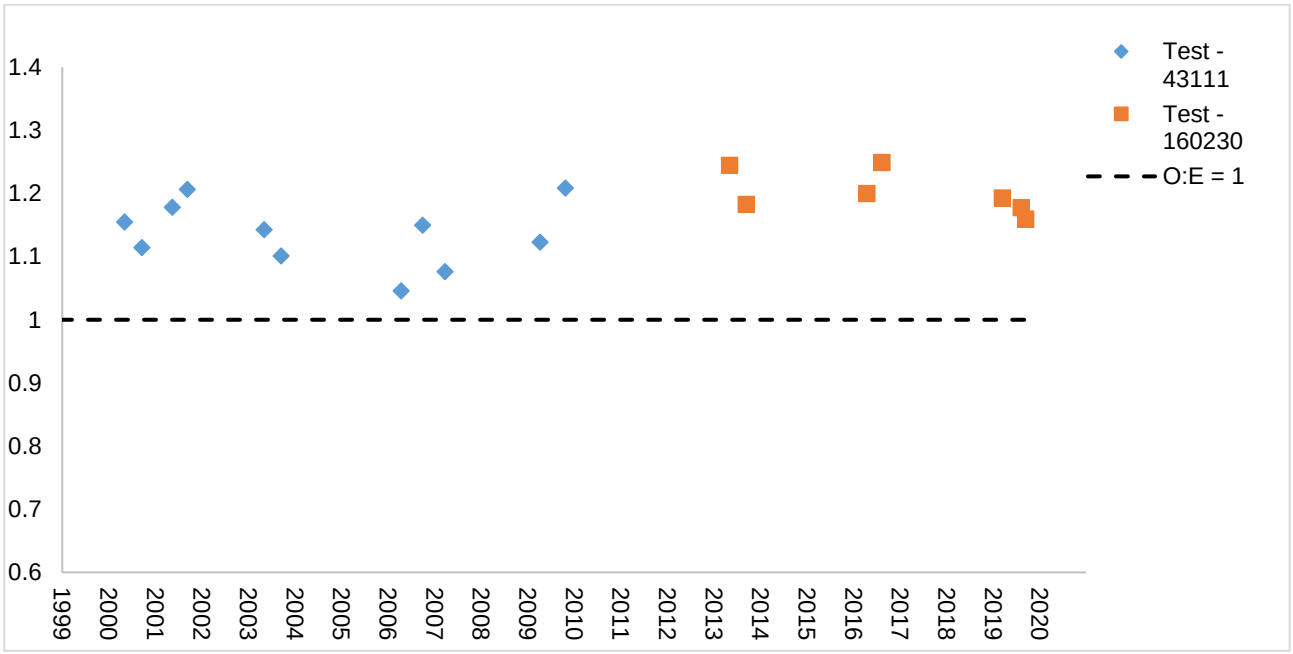
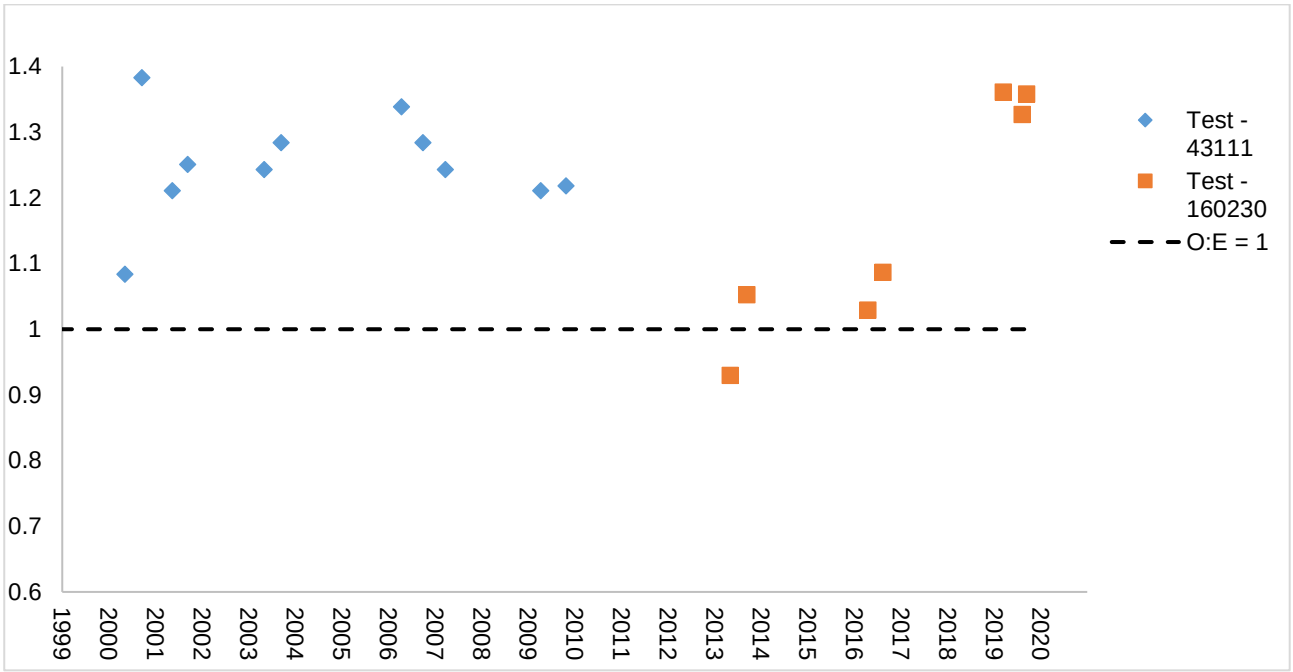


Figure 4 Macroinvertebrate community NTAXA O:E ratios from sites on the Lower Test



Aside from the lack of data available to calculate O:E rations for WHPT related indices, it is important to point out that the length of river available on which to assess the impact of flow changes due to abstraction at Testwood is very limited and less than ideal for macroinvertebrate assessments – there is a maximum length of approximately 145 m of potential impact before the concrete base of

the Environment Agency gauging weir and then the input of the River Blackwater which mitigates the impact of the abstraction and the Drought Order. Although there are no macroinvertebrate data available for extreme drought conditions in the river, hydraulic investigations indicate that the river reaches downstream of the Blackwater confluence are increasingly impounded and tidally influenced and so macroinvertebrate communities are likely to be more influenced by these impacts than any changes to river flows caused by the impact of the abstraction and the Drought Order.

Assessment Summary

- Data for the current macroinvertebrate assessment are based on monitoring points located upstream and downstream of the abstraction intake (for LIFE scores), and included data ranging up to 2020. However, sufficient data were only available to calculate WHPT related O:E ratios, which can also be affected by flow impacts, at sites upstream of the abstraction.
- There are CAMS/water resources monitoring points immediately upstream and downstream of the abstraction intake but no monitoring points further downstream of the abstraction intake on which to base an assessment of deterioration.
- Based on an assessment of the available macroinvertebrate data, hydrological modelling and hydraulic nature of the river downstream of the abstraction Southern Water conclude that the risk of a deterioration in the good status of the macroinvertebrate classification in the Test (Lower) water body caused by the operation of the abstraction pursuant to a Drought Order is low in the short term for interim classification and very low within the longer-term reporting cycle of the WFD.
- Data limitations result in uncertainties in this assessment and therefore the assessment is considered precautionary, with any future assessments updated with the results of monitoring data collected since 2020. Monitoring on-going and planned for the Drought Order is detailed in the Monitoring Plan.
- In addition, Southern Water has been working on an enhanced list of mitigation and compensation measures that will be implemented to offset the potential effects of the drought order. The mitigation available to offset the effects of the Drought Order in 2025 are summarised in the EAR and detailed in the Environmental Monitoring, Mitigation and Compensation Plan (SWS, 2025[55]).
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D.3.2.3 Fish

Baseline

Baseline information are largely derived from Environment Agency Ecology and Fish Data Explorer, as for macroinvertebrates and macrophytes.

Reaches upstream and downstream of the Testwood abstraction intake and down to the start of the transitional water body, Southampton Water (situated 625 m downstream) lie within WFD water body Test (lower) (water body ID: GB107042016840). The most recent WFD status assessment 2019 classified the water body as Good.

WFD fish population survey results are classified using FCS2 (the Fisheries Classification Scheme, Version 2). FCS2 uses a range of statistical models and geographical data to predict the fish community at any given location under natural conditions. The system then compares this with the actual survey catch at individual sites and provides a score (EQR) that reflects whether or not the two are similar. Scores determine formal classifications and may be Bad, Poor, Moderate, Good

[55] SWS (2025). Test Surface Water Licence 11/42/18.16/54 Stage 0.1 Drought Order 2025. 2.2_Environmental Monitoring, Mitigation and Compensation Plan. July 2025.

or High. The overall water body classification for fish is determined by the average EQR score of the constituent surveys[56].

The 2019 classification was based on two site level assessments: one on the Moorcourt Carrier in 2016 and one on the Broadlands trout stream (also known as Red River Carrier) survey 2016, both located some distance upstream of the abstraction intake.

The data from the WFD assessment indicate that, although brown trout abundance at Moorcourt Carrier site and brown trout and salmon abundances at the Broadlands trout stream site were less than expected, the presence of other species at expected abundances resulted in the surveys meeting the threshold score for Good status[56]. The WFD status for fish in the Test (Lower) water body annually since 2009 has consistently been assessed at Good or High.

The Environment Agency collect data on the fish species and numbers present in the River Test through a number of mechanisms including electric fishing survey data, fish counter data, fishery catch records and various other observations.

Fifty-seven fish population surveys by electric fishing were conducted by the Environment Agency on the lower River Test WFD waterbody downstream of Romsey since 2000 (Table 12). These include surveys at six sites on the River Test and two sites on connected waterbodies between Romsey and the M27. In addition, there are a limited number of more recent surveys from three sites on the Great Test (downstream of where the main River Test splits into three channels, the Great Test, Middle Test and Little Test). Survey data from the Middle Test and Little Test have not been considered, as the areas of these waterbodies within the Lower Test WFD water body are not considered as being affected.

Two different survey techniques are used:

- **Catch per unit effort** (CPUE) which involves fishing with an electric fishing unit backpack over a set distance and time while walking upstream. This technique is ideal for salmon parr abundance surveys.
- **Single catch surveys** involve fishing across the whole width of the river, usually with two electric fishing anodes connected to equipment towed by a dingy - fish are driven upstream into a stop-net across the channel which catches far more fish and gives a better measure of species abundance across the whole fish community.

Table 12 Environment Agency fish survey dates and survey method

Watercourse	Site ID	Survey site	NGR	Data range (number of surveys)	Survey method
Tadburn Lake (Tributary of River Test)	13447	House Beat	SU 35269 20706	2/09/2004 (1)	Single catch
River Test	35911	Mainstone Farm	SU 34960 20631	12/08/2010 - 16/09/2021 (10)	CPUE
	30261	Longbridge	SU 35489 17854	12/08/2010 - 16/09/2021 (10)	CPUE (6) and Single catch (4)
	13386	Moorcourt Carrier	SU 35470 17277	25/08/2004 - 16/09/2021 (10)	CPUE (4) and Single catch (6)

[56] Environment Agency LCPR Appendix J

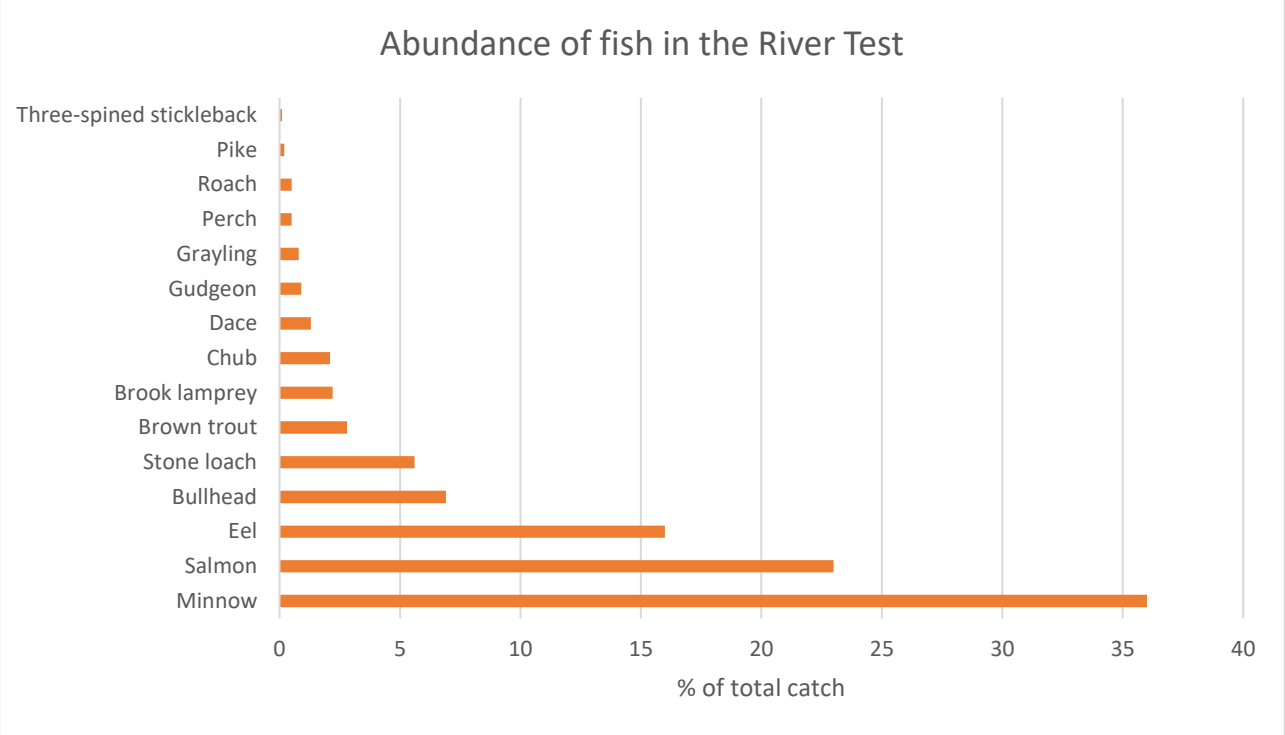
Watercourse	Site ID	Survey site	NGR	Data range (number of surveys)	Survey method
	13392	Moorcourt Main	SU 35461 17295	25/08/2004 - 23/07/2018 (3)	CPUE (1) and Single catch (2)
	75163	Meadowview	SU 35588 16793	23/09/2020 - 16/09/2021 (3)	CPUE (2) and Single catch (1)
	28383	Upstream M27	SU 35557 16648	28/08/2007 – 23/09/2021 (13)	CPUE (10) and Single catch (3)
Broadlands Fish Carrier (joined to River Test)	30864	Red River Carrier, Broadlands	SU3504617147	15/08/2008 14/06/2013	Single catch
Great Test	73483	Ghillies Run, Testwood	SU3577515056	29/08/2019 - 04/10/2019 (2)	CPUE and Single catch
	73505	Nursling Mill	SU3513615793	30/08/2019 - 04/10/2019 (2)	CPUE and Single catch
	73703	Testwood fishing hut	SU3604215138	29/08/2019 (1)	Single catch

Figure 5 shows the abundance of fish in the main River Test and connected waterbodies (Red River Carrier and Tadburn Lake tributary) within the lower Test WFD waterbody for all the fish population surveys (recorded until 2021) in order of least abundant to most abundant.

In common with most rivers, the number of fish species in the Test increases further downstream, but unusually, the River Test has relatively steep, fast-flowing sections in its lower reaches, so the species that are typically representative of the upper parts of the river, especially wild brown trout and grayling, also thrive here.

Several fish species found in the River Test are of international conservation interest, including Atlantic salmon, European eel *Anguilla anguilla*, bullhead *Cottus gobio*, brook lamprey *Lampetra planeri.*

Figure 5 Fish abundance in the River Test and connected waterbodies (2004 – 2021)

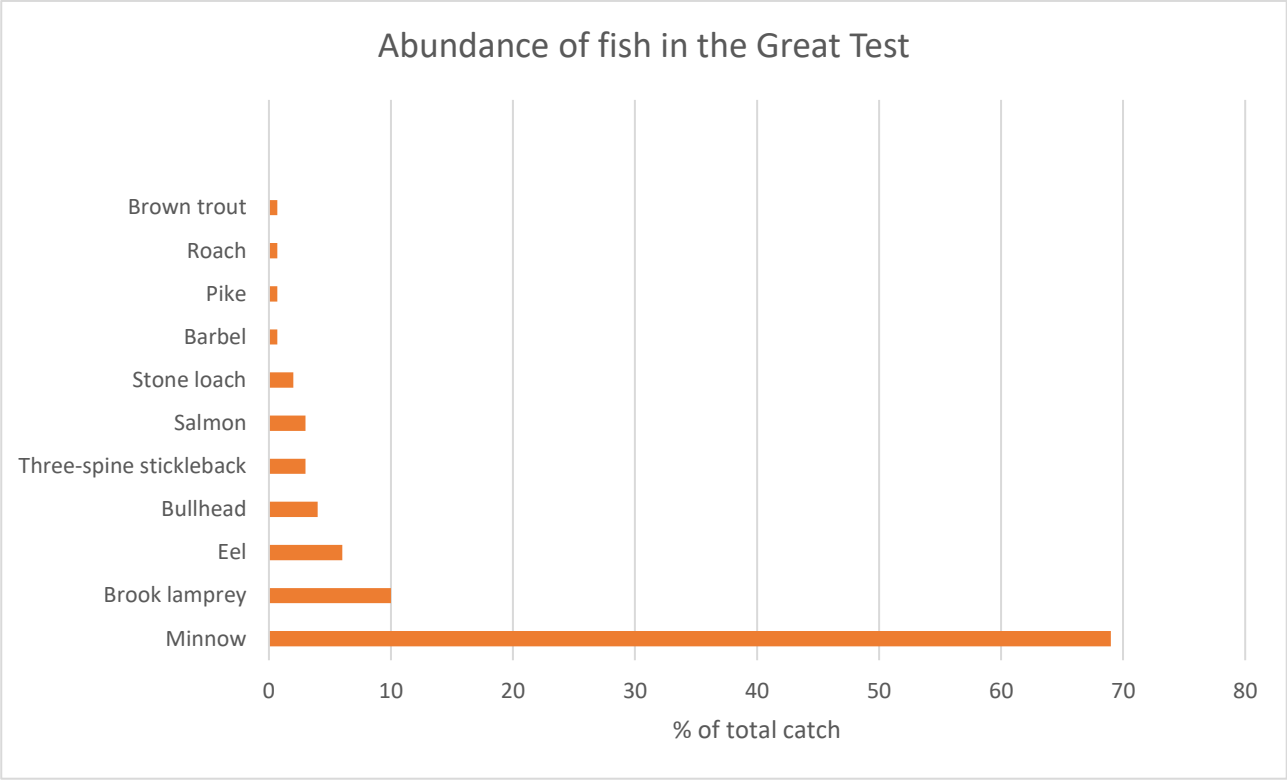


Data from the Great Test is presented separately due to the position of the sites within the system (i.e. further downstream within the Lower Test and greater proximity to the transitional waterbody) and likely presence of more estuarine species. The sites are also downstream of the Testwood abstraction.

Figure 6**Error! Reference source not found.** shows the abundance of fish in the Great Test, which were only available for 2019, in order of least abundant to most abundant. Despite the further downstream location, the fish communities are generally dominated with freshwater species, with minnow being the most abundant species recorded. Some differences compared to the upstream stretch were recorded, but it is not clear whether this reflects the limited data availability for these species. The species diversity (number of taxa species recorded) is lower than previously recorded, but this is likely to reflect the lower number of sample sites and sample dates included within this data set, rather than any other factors.

As at the other sites, several fish species recorded are of international conservation interest, including Atlantic salmon, European eel, bullhead and brook lamprey.

Figure 6 Fish abundance in the Great Test within the Lower Test WFD water body (2019)



Assessment Summary

- No routine WFD monitoring data for the water body are collected downstream of the Testwood abstraction intake but available upstream WFD monitoring data indicate that brown trout abundance in the Moorcourt Carrier and brown trout and salmon abundances in the Broadlands trout stream are less than expected, whilst the presence of other species were at expected abundances. The WFD data indicate a current WFD status of Good for the water body. The WFD status for fish in the water body has been consistently Good or High since 2009[56]. Limited data from downstream and within the vicinity of the Testwood abstraction appear to be broadly similar to upstream sites, which are dominated with freshwater fish and have low numbers of salmon and brown trout.
- Impacts of the Drought Orderon fish populations are addressed above in respect of key SSSI fish species and further below in respect of eel and sea lamprey, and are not repeated here.
- In view of the identified risks (set out earlier) to salmon and other migratory fish species, leading to effects on fish populations in both the impacted reach downstream of the Testwood abstraction intake and the upstream reaches of the WFD water body, there is a medium risk of deterioration from WFD Good status due to the Drought Order. This reflects the likelihood that any impacts on migratory species will persist over several years post-implementation of the Drought Order before recovery.
- Data limitations result in uncertainties in this assessment and therefore the assessment is considered precautionary, with any future assessments updated with the results of monitoring data collected since 2020. Monitoring on-going and planned for the Drought Order is detailed in the Monitoring Plan.
- In addition, Southern Water has been working on an enhanced list of mitigation and compensation measures that will be implemented to offset the potential effects of the drought order. The mitigation available to offset the effects of the Drought Order in 2025 are

summarised in the EAR and detailed in the Environmental Monitoring, Mitigation and Compensation Plan (SWS, 2025[57]).

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D.3.2.4Hydromorphological elements supporting the biological elements

A number of hydromorphological elements are required to support the biological assessment. These include:

- Hydrological regime
  - Quantity and dynamics of water flow
  - Connection to groundwater bodies
- River continuity
- Morphological conditions
  - River depth and width variation
  - Structure and substrate of the riverbed
  - Structure of the riparian zone

The current assessment of the hydromorphological elements supports WFD Good status.

The abstraction intake lies towards the lower end of the WFD water body and the hydrological effect of the Drought Order is partly mitigated within 300m downstream by the addition of the River Blackwater tributary flows. However, as set out in the Hydrology and Physical Environment Assessment, river flows, flow velocity and wetted width will reduce in the lowest reach of the WFD water body downstream of the abstraction intake.

The risk of deterioration in the overall hydromorphological elements of the WFD water body as a whole as a result of the implementation of the Drought Orderis assessed as negligible, taking account of the small proportion of the WFD water body affected.

D.3.2.5 Chemical and physico-chemical elements supporting the biological elements

A number of chemical and physico-chemical elements are required to support the biological assessment. These include:

- General
  - Thermal conditions
  - Oxygenation conditions
  - Salinity
  - Acidification status
  - Nutrient conditions.

The current assessment of the chemical and physico-chemical elements currently supports WFD High status. Assessment of the impacts of the Drought Order on water quality elements is presented in the Hydrology and Physical Environment Assessment, which indicates:

- Local dissolved oxygen levels may be affected by the Drought Order due to lower flows, flow velocities and the risk of macrophyte bleaching and die back occurring. There is also a low risk of deterioration in nutrient conditions due to low flows.

[57] SWS (2025). Test Surface Water Licence 11/42/18.16/54 Stage 0.1 Drought Order 2025. 2.2_Environmental Monitoring, Mitigation and Compensation Plan. July 2025.

- The impact of the Drought Order on oxygenation and nutrient conditions in the WFD water body will however be fairly rapidly reversible following cessation of the drought order.
- The Drought Order will reduce flows and flow velocity downstream of the Testwood abstraction intake, likely leading to an increase in river water temperature, particularly in summer. Temperature in the River Blackwater tributary inflow downstream of the abstraction may be cooler and, if so, this could partly mitigate the local increase in river temperature, but there is currently uncertainty as to the relative differences in temperature in the main river and the River Blackwater; at very low flows in a severe drought, it is possible that the temperature in the River Blackwater could be higher than the main river. Temperature monitoring is required to further assess the relative differences at times of very low flow.
- The Drought Order will not impact on acidification status or salinity conditions in the WFD water body.
- The proposed use of automatic telemetered water quality monitoring loggers for the impacted reach should help to proactively identify water quality problems if they develop during Drought Order implementation and allow mitigation/remedial action to be taken to help minimise the effects. Monitoring began in August 2020.
- The abstraction intake lies near the lower end of the WFD water body and so the Drought Order only effects chemical and physico-chemical elements in a small proportion of the whole WFD water body.

The risk of deterioration in the chemical and physico-chemical elements of the WFD water body as a whole as a result of the implementation of the Drought Order is assessed as negligible, taking account of the small proportion of the WFD water body affected.

D.3.2.6 Specific pollutants

The status of specific pollutants are assessed as supporting elements to the ecological status and are assessed on the following basis:

- Pollution by all priority substances identified as being discharged into the water body
- Pollution by other substances identified as being discharged in significant quantities into the water body

The status of specific pollutants is currently assessed as being of High status.

During drought conditions, specific pollutants will not be materially affected by the additional Drought Order abstraction. There is no risk of WFD status deterioration in the specific pollutant element as a result of the implementation of the Drought Order on the Test (Lower) water body.

D 3.3 Southampton Water Transitional Water Body (GB520704202800)

The Environment Agency[58] states: 'it is our judgement that recent historic abstraction rates at Testwood are unlikely to be having a significant negative ecological effect on the Test estuary or Solent & Southampton Water Ramsar site.'

Further sensitivity testing submitted by the Environment Agency[58] presented the following:

'The in-river EFI based MRF licence condition seeks to protect in-stream, freshwater, ecology (including salmon) from abstraction-related low flows. It is not based upon marine ecology, but there is an EFI for transitional waters i.e. coastal environments. This is primarily aimed at estuarine habitats and is set at a level to support good ecological status, based upon an assessment of the sensitivity of the ecology (considering plants and fish) to changes in flow: but is not explicitly designed

[58] Environment Agency LCPR Appendix C-4

for the full range of wetland habitats found in the lower Test Valley. However, it does serve as useful sensitivity test for the purposes of this assessment of risks to the SSSI.

The in-river MRF is more protective of the flows into the estuary than that which would be required if we were to consider the estuary alone, and not the in-river ecology. In effect, to protect the River Test ecology our licence conditions will ensure that more freshwater flows enter the lower Test wetlands and estuary than the minimum required for the estuarine ecology, identified using the same tool.'

The in-river ecology is therefore considered to be more sensitive to flow changes than that of the Southampton Water transitional water body. Therefore, if the flow regime is generally acceptable for the in-river ecology, it is likely to be acceptable for the ecology of the transitional water body.

D.3.3.1 Macroinvertebrates

Southampton Water is designated as a Heavily Modified Water Body and the macroinvertebrate potential status in the WFD RBMP classification for Southampton Water is assessed as 'Good'.

Baseline

Benthic macroinvertebrate communities can be used to indicate the ecological status of an estuary or coastal water body.

The Infaunal Quality Index (IQI) is used to assess the ecological health of the benthic invertebrate fauna incorporating metrics of abundance, diversity and the presence and/or absence of pollution tolerant and disturbance-sensitive taxa. The individual metrics have been weighted and combined within the IQI in order to best describe the changes in the benthic invertebrate community in response to anthropogenic pressures. Each individual metric is assessed in relation to a reference value, which is the expected value for that metric in the habitat type that is being assessed when there is minimal or no disturbance due to human activities.

Benthic invertebrates are small animals (for example, worms, sand hoppers and clams) that live in the mud and sand at the bottom of the estuary or sea. They can be used to indicate the ecological status of a water body. Metrics on species composition and disturbance sensitivity are calculated with the IQI classification tool. The actual (observed) scores for these metrics are compared with a predicted score (reflecting a habitat in pristine condition). The comparison of the observed to expected scores EQRs are used to produce a benthic invertebrate IQI classification (High, Good, Moderate, Poor, Bad) of the water body for WFD purposes.

The four class boundaries are:

- High/Good = 0.75
- Good/Moderate = 0.64
- Moderate/Poor = 0.44
- Poor/Bad = 0.24.

Each sample occasion takes 25 grab samples across the water body which are later analysed and indices calculated and averaged for the whole water body to give an overall status.

Assessment

Individual sample results range from poor to high giving an overall classification of Good for the Southampton Water WFD water body (Table 13). No monitoring is carried out in the Test Estuary above Redbridge on which to assess the risk of deterioration from the implementation of the Drought Order.

Table 13 Southampton Water Benthic Invertebrate EQR

Sample date	Average Species richness	Average Sample IQI EQR	Status
May 2011	42	0.65	Good
June 2013	44	0.68	Good

No subsequent data were available post 2013.

Benthic macroinvertebrate species throughout the wider water body are largely unaffected by freshwater inflows from the rivers. Depth profile data collection within the upper reaches of Southampton Water carried out by Southampton University suggest that there is stratification of the water body and that freshwater entering the estuary remains in the top 20 cm of the water column during the ebb tide and mixing occurs rapidly on the rising tide. The benthic invertebrates are buffered from this by the water column and experience only full salinity water conditions at the seabed through the tidal cycle.

There is no mechanism by which the benthic macroinvertebrates would be impacted by the abstraction during implementation of the Drought Order under drought conditions and no risk of WFD deterioration for this quality element within the Southampton Water WFD transitional water body.

D 3.3.2 Macroalgae

Southampton Water is designated as a Heavily Modified Water Body and the macroalgae potential status in the WFD RBMP classification for Southampton Water is assessed as being of 'Good' status.

Baseline

Macroalgae communities (seaweeds) can be used to indicate the ecological status of an estuary or coastal water body. A number of tools are used to measure metrics of composition and abundance for different types of macroalgae communities. Up to two tools are used for assessing transitional water bodies: the Opportunistic Macroalgae and Fucoid Extent. The tools compare actual (observed) metric scores against reference conditions (reflecting a water body in pristine condition). The comparison of the observed to expected scores EQRs are used to produce the macroalgae WFD status classification (High, Good, Moderate, Poor, Bad) of the water body for WFD purposes.

The Environment Agency sample various locations throughout Southampton Water to develop the EQR scores for macroalgae in the water body. Macroalgal EQR data presented in Table 14 suggest a consistently Good WFD status over the period of data collection for the Southampton Water transitional water body as a whole.

Table 14 Southampton Water macroalgal EQR

Sample date	EQR	Status
2008	0.69	Good
2010	0.62	Good
2013	0.60	Good

No WFD monitoring is carried out above Redbridge on the Test Estuary that could be used to enable an assessment of WFD deterioration and no subsequent WFD monitoring data were available post 2013.

Assessment

Macroalgal status in Southampton Water would not be impacted by the Drought Order abstraction and there would be no risk of WFD status deterioration for this quality element within Southampton Water transitional water body.

D.3.3.3 Fish

Baseline

To assess the ecological status of a water body under the WFD a statistically robust assessment of the observed health is compared against reference conditions for a minimally disturbed habitat – this is reported as an EQR. An EQR with a value of one represents reference conditions and a value of zero represents a severe impact.

WFD fish population survey results are classified using Transitional Fish Classification Index (TFCI) specifically designed for transitional waters.

The TFCI is a multi-metric index composed of ten individual components known as metrics, these are:

- Species composition;
- Presence of indicator species;
- Species relative abundance;
- Number of taxa that make up 90% of the abundance;
- Number of estuarine resident taxa;
- Number of estuarine-dependent marine taxa;
- Functional guild composition;
- Number of benthic invertebrate feeding taxa;
- Number of piscivorous taxa; and
- Feeding guild composition.

The TFCI is calculated as the sum of all metric scores and converted into an EQR with a range from zero (a severe impact) to one (reference/minimally disturbed). The four class boundaries are:

- High/Good = 0.8
- Good/Moderate = 0.6
- Moderate/Poor = 0.4
- Poor/Bad = 0.2

Fish are caught using a variety of techniques throughout the WFD water body and the data are pooled over the most recent six-year period. The pooled datasets can be used to indicate the ecological status of a transitional water body. The actual (observed) scores for the ten metrics are compared with a reference score derived from data collected in a similar way between 2006 and 2011. The comparison of the observed to expected scores are used to produce a status classification (High, Good, Moderate, Poor, Bad) of the water body for WFD purposes.

Table 15 indicates that the fish EQR values for Southampton Water show considerable year on year variation – between 2009 and 2019, the WFD classification has ranged from Poor to High. A wide range of fish species are present in Southampton Water as presented in Figure 9.

Table 15 Southampton Water WFD Water Body: Fish EQR

Sample date	EQR	status
2009	0.675	Good
2011	0.8	High
2012	0.8	High
2013	0.387	Poor
2014	0.536	Moderate
2015	0.639	Good
2016	0.674	Good
2019		Good

Limited fish monitoring data is available from the Southampton Water WFD transitional water body above Redbridge in the uppermost part of the Test Estuary, near to the Testwood site. The sites and details within the area are presented in Table 16 Environment Agency fish survey dates and survey method below.

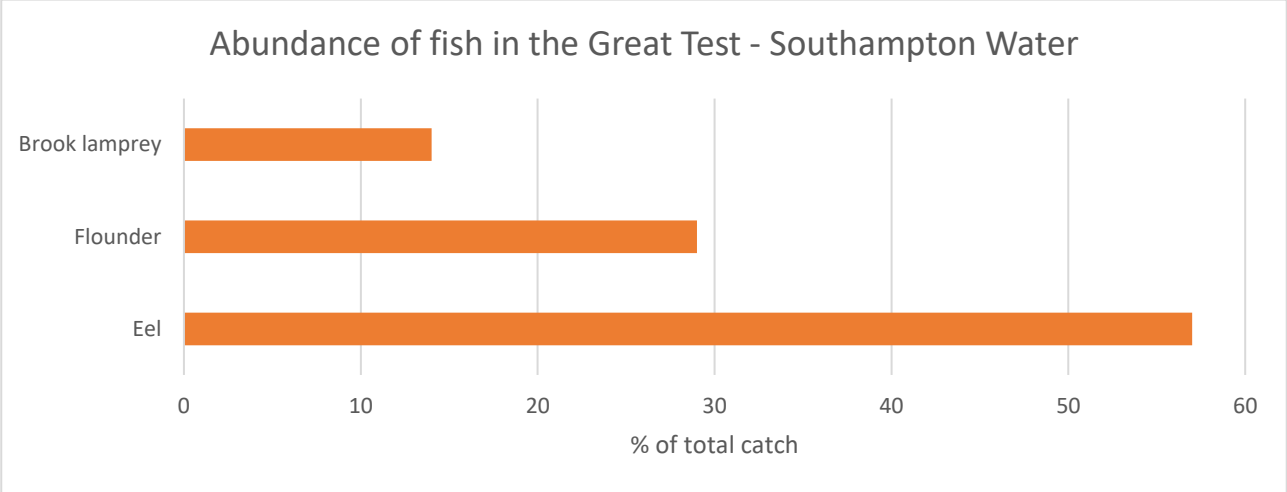
Table 16 Environment Agency fish survey dates and survey method

Watercourse	Site ID	Survey site	NGR	Data range (number of surveys)	Survey method
Great Test	73704	Testwood Cattle Drink	SU3612014929	29/08/2019 - 30/08/2019	Single Catch
	73724	Testwood Pool - The Bay	SU3617014514	29/08/2019	Single Catch
	73725	Testwood Pool - House Bank	SU3614714474	29/08/2019	Single Catch
	73726	Testwood Pool - eel rack	SU3613014501	30/08/2019	Single Catch
Wirehouse Stream	71683	Wirehouse stream - North Arm	SU3621115001	15/10/2018 - 07/10/2019	Single Catch
	71684	Wirehouse stream - South Arm	SU3628114940	15/10/2018	Single Catch

Figure 7**Error! Reference source not found.** shows the abundance of fish data for the Great Test within the Southampton Water Transitional Waterbody, which were only available for 2019, in order of least abundant to most abundant. Only three species were recorded, European eel, European flounder (*Platichthys flesus*) and brook lamprey. While the limited data mean that the findings are somewhat inconclusive, the dominance of eel and presence of flounder, an estuarine and coastal flatfish and absence of other freshwater fish, is indicative of a community that is more typical of transitional waters, compared with the largely freshwater community at sites upstream in the Test (Lower) WFD waterbody. However, the presence of brook lamprey suggests that freshwater species are also found within this stretch. The low diversity (three species) may also reflect limited habitat within this stretch, although no habitat data were available for these sites.

As at the other sites, several fish species recorded are of international conservation interest, including European eel and brook lamprey.

Figure 7 Total fish counts by species – Great Test within Southampton Water WFD Water Body: Environment Agency WFD monitoring 2019

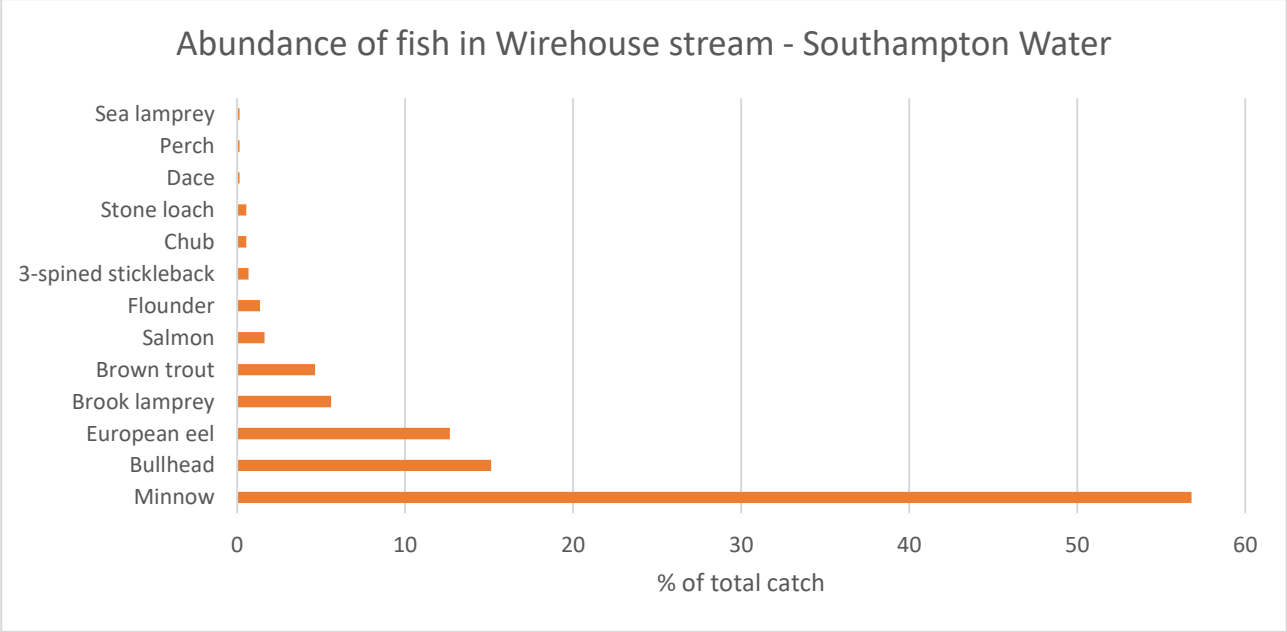


Data from the Wirehouse Stream are presented separately to those from the Great Test watercourse (as this is a different, but connected watercourse), as shown in Figure 8.

Despite the location with the Southampton Water transitional water body, the fish communities are generally dominated by freshwater species, with minnow again being the most abundant species recorded. However, as within the Great Test, truly estuarine/coastal species were also recorded, i.e. sea lamprey (*Petromyzon marinus*) and flounder, indicting the increased saline influence.

As at the other sites, several fish species recorded are of international conservation interest, including Atlantic salmon, European eel, bullhead, sea lamprey and brook lamprey.

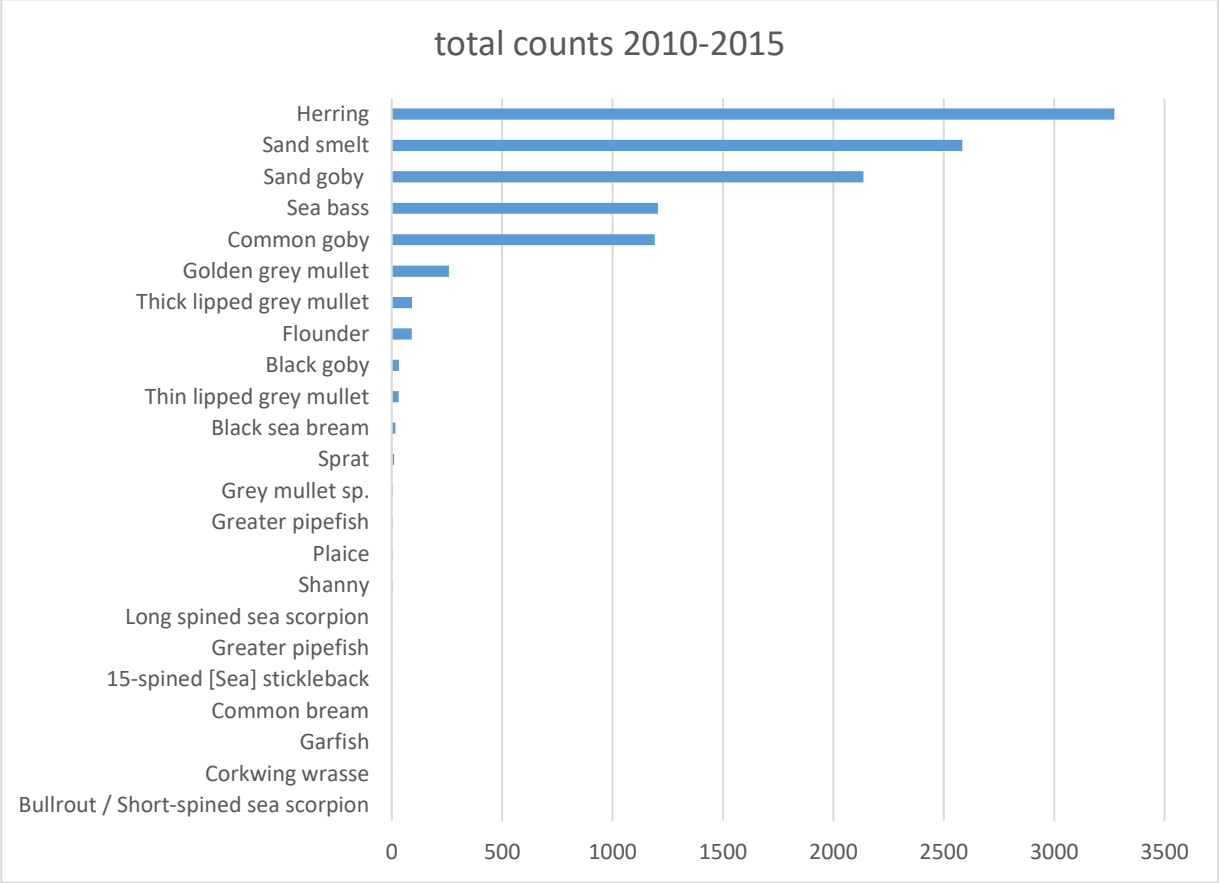
Figure 8 Total fish counts by species – Great Test within Southampton Water WFD Water Body: Environment Agency WFD monitoring 2018 - 2019



There are also several sites downstream of Redbridge within the remainder of the Test Estuary before it joins Southampton Water, including at Goatee Beach (Site ID 34817). The most recent seine net monitoring data for Goatee Beach indicate the presence of a range of fish species: Sea bass; Sand smelt; Thin lipped grey mullet; Thick lipped grey mullet; Sand goby; Herring; Sea bass;

Sand smelt; Thin lipped grey mullet; Golden grey mullet; Herring; Common goby. Several important migratory fish species will also migrate upstream through Southampton Water and into the Test Estuary prior to entering the freshwater River Test: eel, Atlantic salmon, sea trout, sea lamprey. Similarly, these species will leave the freshwater River Test to Southampton Water and then the marine environment of the Solent via the Test estuary. These data, which stop in 2015 (no further data available), are presented in Figure 16, below.

Figure 9 Total fish counts by species – Southampton Water WFD Water Body: Environment Agency WFD monitoring 2010-2015



Assessment

The principal impact on the Test estuary part of the wider Southampton Water transitional water body is the reduction of freshwater input and changes to the salinity regime, particularly in the upper part of the estuary. The fish species present in the estuary display a wide range of salinity tolerances and preferences; potential changes to salinity due to lower freshwater inputs may therefore lead to some changes in species distribution and abundance within the estuary. There may also be an impact on migratory fish species using the estuary to access or leave the freshwater River Test, due to changes to the salinity and freshwater flow "signals" that encourage migration. The precise magnitude and scale of these effects is uncertain.

Whilst impacts on fish due to the Drought Order may arise within the Test estuary, in the context of the overall Southampton Water transitional water body, the risk of deterioration to the WFD fish status due to implementation of the Drought Order is assessed as negligible.

D.3.4 Upstream WFD Water Bodies

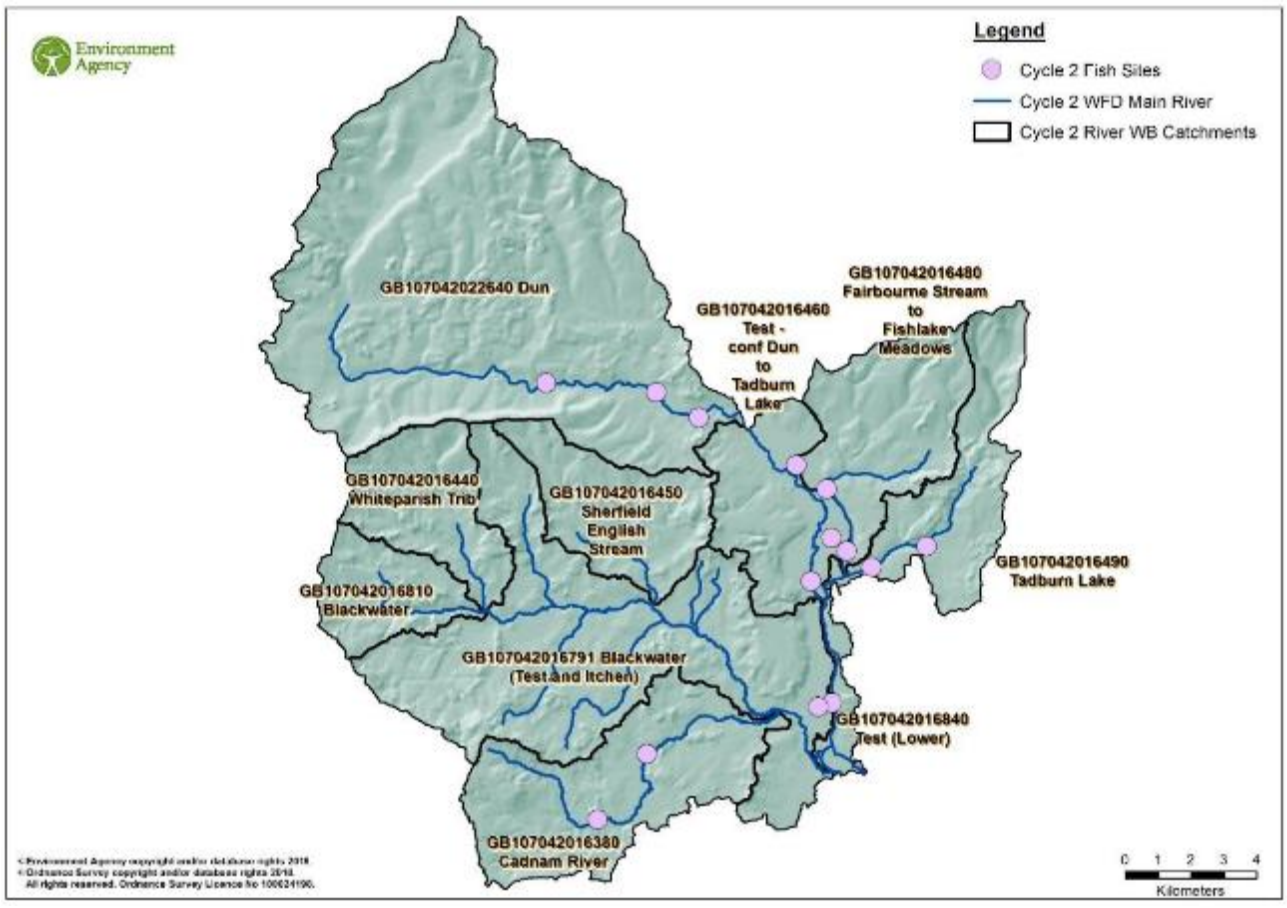
The Testwood abstraction intake is located in the lower section of the Test (Lower) Water Body – this water body is classified as ‘‘moderate’ under the WFD (but ‘Good’ for Ecology). Moving upstream through the catchment there are a number of water bodies. The current WFD fish status of these water bodies (or the biological status where no specific fish status has been assessed) is shown in Table 17.

Table 17 Summary WFD RBMP classification data for water bodies upstream of Test (Lower)

Water body name	Water body ID	RBMP cycle 3 2022 Fish/Biological Status
Blackwater (Test and Itchen)	GB107042016791	High
Test, conf Dun-Tadburn Lake	GB107042016460	Poor
Test – conf Anton to conf Dun	GB107042022670	Good
Tadburn Lake	GB107042016490	Moderate
Fairburn Stream to Fishlake Meadows	GB107042016480	Poor
River Dun	GB107042022640	Poor

Figure 10 shows the location of the WFD water bodies, the Testwood abstraction is located towards the bottom end of the Test (lower) water body on the lower end of the left hand branch (the Great Test), at the bottom edge of this map. The Test Anton-Dun is the next water body on the main river moving upstream from the Test – conf Dun-Tadburn Lake (GB107042016460).

Figure 10 Location of WFD water bodies on the Lower Test



Assessment

- The Drought Order will not affect these upstream water bodies directly and will only potentially affect the fish element status of the overall WFD status assessment due to the impacts on migratory fish species that are also present in the upstream water bodies.
- As described earlier in relation to SSSI migratory fish species and further below in respect of other NERC migratory fish species, the Drought Order may exacerbate the effects of severe drought low flow conditions downstream of the abstraction intake, further hindering the migration (upstream and downstream) of fish, as well as potential impacts on spawning, egg incubation and juveniles depending on the time of the year that the drought order is implemented. As a result, there may be medium term effects on migratory fish species beyond the end of the drought order, recognising the life-cycle of the migratory species. This may lead to impacts to upstream water bodies due to lower returning adults in subsequent years until recovery of the population.
- There will be a medium (but uncertain) risk of deterioration to the WFD fish element status only of the upstream WFD water bodies. This reflects the likelihood that any impacts on migratory species will persist over several years post-implementation of the Drought Orderbefore recovery.
- Data limitations result in uncertainties in this assessment and therefore the assessment is considered precautionary, with any future assessments updated with the results of monitoring data collected since 2020. Monitoring on-going and planned for the Drought Order is detailed in the Monitoring Plan.
- In addition, Southern Water has been working on an enhanced list of mitigation and compensation measures that will be implemented to offset the potential effects of the drought order. . The mitigation available to offset the effects of the Drought Order in 2025 are summarised in the EAR and detailed in the Environmental Monitoring, Mitigation and Compensation Plan (SWS, 2025[59]).

There is no risk to any other WFD elements in the upstream WFD water bodies.

D4. NERC Species and Habitats

This section identifies those habitats and species that are of principal importance for nature conservation under the NERC Act (2006).

D.4.1. Species

D.4.1.1. Baseline

The following are species “of principal importance for the purpose of conserving biodiversity” covered under Section 41 (England) of the NERC Act (2006) and therefore need to be taken into consideration by a public body when performing any of its functions with a view to conserving biodiversity.

The species have been identified from a list of species held by JNCC using information from Natural England and cross-referenced with available data (Environment Agency monitoring data and SSSI citations) as being present in the Lower River Test and Test Valley downstream of the abstraction.

- Macroinvertebrates:
  - Southern damselfly - *Coenagrion mercurial*
  - Fine lined pea mussel - *Pisidium tenuilineatum*

[59] SWS (2025). Test Surface Water Licence 11/42/18.16/54 Stage 0.1 Drought Order 2025. 2.2_Environmental Monitoring, Mitigation and Compensation Plan. July 2025.

- Fish:
  - Sea Trout – *Salmo trutta*
  - Brown Trout – *Salmo trutta*
  - Atlantic salmon – *Salmo salar*
  - Eel – *Anguila anguila*
  - Sea Lamprey - *Petromyzon marinus*
- Mammals:
  - Otter – *Lutra lutra*
  - Water vole – *Arvicola terrestris*
- Birds
  - Bittern – *Botaurus stellaris*

D.4.1.2. Assessment Summary

The River Test SSSI and Lower Test Valley SSSI notified species within the hydrological zone of influence of the Drought Orderhave already been assessed earlier in Section D2 and Section D3. The assessment presented encompassed the effects on species identified as being of principal importance for nature conservation under the Natural Environment and Rural Communities (NERC) Act (2006).

This section therefore presents an assessment for those NERC species not already covered in the earlier SSSI assessments:

- Southern damselfly - *Coenagrion mercuriale*
- Eel – *Anguilla anguilla*
- Sea lamprey - *Petromyzon marinus*
- Brown trout - *Salmo trutta*

Southern damselfly

- Based on information provided by Hampshire & Isle of Wight Wildlife Trust (Dr Ben Rushbrook) surveys were conducted at Manor Farm, Testwood Lakes and Little Test in 2005 or 2006, and the Lower Test was assessed in 2005 and 2012. No Southern damselfly were recorded although potentially suitable habitat was present at that time.
- There are therefore no data confirming the presence of Southern damselfly in the reaches within the zone of hydrological influence of the abstraction.

Eel

- Eel abundance in the UK (and throughout Europe) has decreased rapidly over the last decade to the point where populations are critically endangered.
- Until recently, there were no monitoring data on the presence or abundance of eels in the reaches downstream of the abstraction, the relative importance of these reaches in the context of the river as a whole or on their migratory behaviour within the river system. Recent data indicate the presence of eel (including up to 2020) and that therefore there may be impacts on eel habitat and migration (upstream and/or downstream) due to the Drought Order. The Environment Agency recent data indicates that the highest density and abundance of eel recorded within the Test catchment is within the Drought Order impacted reach
- Risks to eel from the Drought Order particularly relate to reduced habitat available for the migrating and resident eels and increased predation risks. There are uncertainties

surrounding the hydraulic modelling outputs in respect of impacts on habitats important for eel. As explained in the Hydrology and Physical Environment Assessment, the cross-section survey data used in the model did not fully cover the channel margins and there is therefore an absence of robust data on the potential eel habitat within these cross-sections.

- Taking account of the above uncertainties, and applying the precautionary principle, there is not sufficient certainty to conclude that the Drought Order is not likely to adversely affect eel in the impacted reach. The impact assessment of **minor (low confidence)** adverse impacts on eel is therefore considered precautionary, with any future assessments updated with the results of monitoring data collected since 2020. Monitoring on-going and planned for the Drought Order is detailed in the Environmental Monitoring, Mitigation and Compensation Plan (SWS, 2025[60]).
- Further risks arise from entrainment in the abstraction inflow. The Testwood abstraction point has been screened with the appropriate eel/elver screen in order to comply with Eel Regulations 2009. With the successful implementation of the screening, the risk of entrainment is assessed as low.

Sea lamprey

- Sea lamprey are both a NERC species and a Habitats Directive Annex II species. Sea lamprey are known to spawn both upstream and downstream of the abstraction intake and to be resident as juveniles in sediments downstream of the abstraction intake. Adult sea lamprey will migrate into the impacted reach from the estuary and many individuals will migrate through the impacted reach to other upstream reaches, although other adults will not migrate further upstream and will spawn in the impacted reach. Consequently, all life-cycle stages of this species may be affected by the Drought Order depending on the time of year of implementation
- Upstream migration of adult sea lamprey from the estuary into the lower Test impacted reach may be hindered by the Drought Order if it is implemented during the spring/early summer migration season. This is due to the lower freshwater flow into the estuary, the reduced flows in the freshwater reach and the risk of reduced dissolved oxygen and changes river temperatures, all of which may discourage the entry of adults into the river. Upstream adult migration through the impacted reach may also be hindered, increasing the risk that more adults will remain concentrated in the lower reach for spawning and unable to access other spawning habitat upstream.
- If implemented during the summer months (June onwards), the Drought Order may impact on downstream migration of sea lamprey following their metamorphosis from the ammocoete stage to the adult stage There is a risk that downstream migration from reaches above the abstraction intake may be hindered due to the lower flows, higher river temperature and reduced water quality. The metamorphosis of ammocoetes within the impacted reach could be adversely affected by the Drought Order impacts on habitat, reducing the numbers successfully reaching adult stage and/ or successfully migrating out to sea.
- Spawning habitat in the impacted reach may be affected by the Drought Order due to the reduced wetted width and lower flow velocities in areas of shallower water, as well as the increased risk of siltation of gravels used for the nests. Exposure of eggs due to lower flows and/or risks due to temperature changes may impact on egg incubation and subsequent hatching, reducing reproductive success.
- Due to the preference of sea lamprey ammocoetes for river channel margins and areas of shallow, soft silt, the ammocoetes are considered to be at risk from lower flows arising from the Drought Order which may lead to a reduction in wetted width with impacts on channel

[60] SWS (2025). Test Surface Water Licence 11/42/18.16/54 Stage 0.1 Drought Order 2025. 2.2_Environmental Monitoring, Mitigation and Compensation Plan. July 2025.

margins and local water depth over shallow silts, as well as a risk of a local reduction in dissolved oxygen.

- There are uncertainties surrounding the hydraulic modelling outputs in respect of impacts on key habitats important for sea lamprey. As explained in the Hydrology and Physical Environment Assessment, the cross-section survey data used in the model did not fully cover the channel margins and there is therefore an absence of robust data on the potential sea lamprey habitat within these cross-sections.
- Taking account of the above uncertainties, and applying the precautionary principle, there is not sufficient certainty to conclude that the Drought Order is not likely to adversely affect brook lamprey. The impact assessment of **moderate (low confidence)** adverse impacts on sea lamprey is therefore considered precautionary, with any future assessments updated with the results of monitoring data collected since 2020. Monitoring on-going and planned for the Drought Order is detailed in the Environmental Monitoring, Mitigation and Compensation Plan (SWS, 2025[61]).
- In addition, Southern Water has been working on an enhanced list of mitigation and compensation measures that will be implemented to offset the potential effects of the drought order. The mitigation available to offset the effects of the Drought Order in 2025 are summarised in the EAR and detailed in the Environmental Monitoring, Mitigation and Compensation Plan (SWS, 2025[62]).

Brown trout

- Brown trout are known to spawn downstream of the abstraction intake and to be resident as juveniles in the impacted reach downstream of the abstraction intake. Adult brown trout will also be resident and/or be migrating to/from this reach to other reaches upstream of the abstraction intake.
- More specifically, brown trout are generally present in the lower Test (both adults and juveniles), and are confirmed as present in the Wirehouse Streams. There is available habitat for parr in the lower reaches of the main channel (less available habitats in the Wirehouse streams), but surveys are required to map brown trout habitat for different life-cycle stages in the impacted reach.
- The Drought Order may affect all life-cycle stages of this species depending on the time of year of implementation. Lower river flows may adversely affect spawning, egg incubation, juveniles and adults in the impacted reach due to changes to river temperature, flow velocity, wetted width and water quality (dissolved oxygen principally).
- Adult brown trout and juveniles resident in the impacted reaches will already be vulnerable to drought conditions (e.g. elevated river temperatures and lower dissolved oxygen) prior to implementation of the Drought Order. Consequently, any further reduction in flow will exacerbate the drought stress, particularly on juveniles, particularly in summer months when temperatures will be expected to be highest. The impact is uncertain and will depend on the time of year of implementation of the Drought Order (lower risk in winter when dissolved oxygen and temperature effects will be reduced).
- Spawning and egg incubation in the impacted reach could be affected by changes to river habitat conditions, including lower velocities leading to siltation of spawning habitat (discouraging use of the impacted reach for spawning) and/or siltation of redds once spawning has occurred, leading to reduced reproductive success in a spawning reach of the Test (albeit a relatively small length of the total spawning habitat available for brown trout in

[61] SWS (2025). Test Surface Water Licence 11/42/18.16/54 Stage 0.1 Drought Order 2025. 2.2_Environmental Monitoring, Mitigation and Compensation Plan. July 2025.
[62] SWS (2025). Test Surface Water Licence 11/42/18.16/54 Stage 0.1 Drought Order 2025. 2.2_Environmental Monitoring, Mitigation and Compensation Plan. July 2025.

the Test). The impact is uncertain and will depend on the time of year of implementation of the Drought Order (lower risk outside of spawning and egg incubation periods).

- The likely impact assessed as **moderate (low confidence)** (for the reasons previously set out above for SSSI fish species, and not repeated again here), and further survey evidence is required to more accurately assess the potential impact.
- Taking account of this uncertainty, and applying the precautionary principle, there is not sufficient certainty to conclude that the Drought Order is not likely to adversely affect Brown trout. The impact assessment is therefore considered precautionary, with any future assessments updated with the results of monitoring data collected since 2020. Monitoring on-going and planned for the Drought Order is detailed in the Environmental Monitoring, Mitigation and Compensation Plan (SWS, 2025[63]).
- In addition, Southern Water has been working on an enhanced list of mitigation and compensation measures that will be implemented to offset the potential effects of the drought order. The mitigation available to offset the effects of the Drought Order in 2025 are summarised in the EAR and detailed in the Environmental Monitoring, Mitigation and Compensation Plan (SWS, 2025[64]).

D.4.2. Habitats

The following habitats have been identified from available data (Environment Agency monitoring data and SSSI citations) as being of principal importance for nature conservation under the NERC Act (2006).

D.4.2.1. Baseline

Cross-referencing the Natural Environment and Rural Communities (NERC) Act 2006, Section 41 Habitats of Principal Importance in England with available data on the sensitive habitats in the Lower Test Valley (Environment Agency data, SAC designations and SSSI notified habitats) suggests the following habitats of principal importance for nature conservation under the NERC Act (2006) are present in the Lower River Test and Test Valley:

- Freshwater: Rivers;
- Grassland: Lowland meadows;
- Wetland: Floodplain grazing marsh;
- Wetland: Reedbeds;
- Wetland: Lowland Fens;
- Woodland: Wet woodland; and
- Coastal: coastal saltmarsh.

D.4.2.2. Assessment

The River Test SSSI and Lower Test Valley SSSI notified habitats have already been assessed earlier in Section D2 and Section D3. The assessment presented encompassed effects on all ecological receptors and, by definition, those habitats identified as being of principal importance for nature conservation under the Natural Environment and Rural Communities (NERC) Act (2006).

[63] SWS (2025). Test Surface Water Licence 11/42/18.16/54 Stage 0.1 Drought Order 2025. 2.2_Environmental Monitoring, Mitigation and Compensation Plan. July 2025.
[64] SWS (2025). Test Surface Water Licence 11/42/18.16/54 Stage 0.1 Drought Order 2025. 2.2_Environmental Monitoring, Mitigation and Compensation Plan. July 2025.

This section simply identifies those habitats and species already assessed that are also of principal importance for nature conservation under the NERC Act (2006).

D5. Non-native Invasive Species

No non-native invasive species have been screened in for assessment. Himalayan balsam has been observed in the reaches downstream of the abstraction, however these are largely on the embankment of the right bank above the water level and the Drought Order conditions are not considered to favour the propagation or dispersal of the balsam or any other known non-native invasive species within the hydrological zone of influence of the Drought Order. There are concerns in relation to the increase in distribution of invasive species caused by the additional foot traffic required for the monitoring and mitigation plans. Standard control of invasive species procedures including ensuring staff undertaking the check clean dry protocol to prevent spread will be employed and as detailed in the Drought Order Monitorng Plan.

Should the baseline monitoring activities identify any INNS, then their survey will be added to the updated monitoring plan so that any changes to the distribution or extent of the species can be monitored and the impact assessment updated accordingly.

D6. Navigation, Amenities, and Recreation

D.6.1 Navigation

The Southampton to Cowes ferry (Red Funnel Ferry) is located within the lower Test/ Southampton Water. It is primarily influenced by the tidal regime rather than changes in freshwater inputs due to is position on the lower Test. The potential impact is assessed as **minor (medium confidence)**.

There are no organised water sports clubs located on the lower Test, however, there is still access to the reach for sports such as kayaking and paddle boarding. Water levels are supported for navigation, impacts are likely to be **minor (medium confidence)** as these sports are less sensitive to water levels than general motor driven craft with large drafts.

D.6.2 Recreation

Angling activities will already have been impacted by the drought conditions and Drought Order preceding the implementation of the drought order, but the drought order will further exacerbate these effects. Fly fishing on the lower Test is controlled by the Testwood Fishery. Dialogue has taken place with Testwood and Nursling Fishery and the Broadlands Fishery angling stakeholders have been contacted about the proposed drought order: this dialogue will continue.

The impacts on fish identified earlier in this report will have implications for angling and the effects will continue post-cessation of the Drought Order due to the life-cycle of migratory fish species of angling interest (in particular, salmon and sea trout). During the Drought Order, low flows due to the drought would likely preclude angling taking place in the impacted reach, but the Drought Order may extend the period during which angling is constrained by low flow conditions.

Southern Water has been working on an enhanced list of mitigation and compensation measures that will be implemented to offset the potential effects of the droughtorder. The mitigation available to offset the effects of the Drought Order in 2025 are detailed in the EAR and this is expected to increase environmental drought resilience, and this in turn will help to reduce the impact on angling activities.

D.6.3 Amenities

Testwood Lakes nature reserve is located adjacent to the abstraction point. Impacts are likely to be **minor (medium confidence)** as the lake depth in the little lake is maintained as part of the Testwood WSW abstraction process, and the depth in larger lake is not directly impacted by abstraction rates.

Annex 1 River Test SSSI Favourable Condition Table 3a

Favourable Condition Tables for the River Test SSSI were provided by Natural England. This Annex provides includes the cover page, notes for users and Table 3a which provides the site-specific habitat condition objectives. The full 56 page document is not included here but is available on request from Natural England.

Definitions of Favourable Condition for designated features of interest

These definitions relate to all designated features on the SSSI, whether designated as SSSI, SPA, SAC or Ramsar features.

Name of Site of Special Scientific Interest (SSSI)	
River Test	
Names of designated international sites	
Special Area of Conservation (SAC)	Not applicable.
Special Protection Area (SPA)	Not applicable.
Ramsar	Not applicable.
Relationship between site designations	
Not applicable.	

Version control information	
Version	Consultation Draft
Prepared by	David Le Grice
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Date of generic guidance on favourable condition used	CSM Guidance for rivers 2014 Grassland 2000 Lowland Wetland 2004 Mammals 2004 Invertebrates 2008 Birds 2004 Freshwater fauna 2015
Other notes/version history	

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Definitions of Favourable Condition: notes for users

Definitions of Favourable Condition
The definitions comprise one or more condition definitions for the special interest features at this site. These are subject to periodic review and may be updated to reflect new information or knowledge. They will be used by Natural England to determine if a site is in a favourable condition. The standards for favourable condition have been developed and are applied throughout the UK.

Standards for favourable condition are defined with particular reference to the specific designated features listed in Table 1, and are based on a selected set of attributes for features which most effectively define favourable condition as set out in Tables 2, 2a and 3. When an SSSI's features meet these attributes, then they are said to be in 'favourable condition'.

Explanatory text for Tables 2 and 3
Tables 2, 2a and 3 set out the measures of condition which we will use to provide evidence to support our assessment of whether features are in favourable condition. They have been tailored by local staff to reflect the particular characteristics and site-specific circumstances of individual sites. Quality Assurance has ensured that such site-specific tailoring remains within a nationally consistent set of standards. The tables include an audit trail to provide a summary of the reasoning behind any site-specific targets etc. In some cases the requirements of features or designations may conflict; the detailed basis for any reconciliation of conflicts on this site may be recorded elsewhere.

Use under the Habitats Regulations
The Definitions of Favourable Condition (DFCs) are used to periodically measure and assess the condition of both notified SSSI features and designated European Site features.

Where SSSIs also form part of a European Site (such as a SAC or SPA), a separate document containing specific European Site Conservation Objectives will have been prepared. These objectives are those referred to in the Conservation of Habitats and Species Regulations 2010 (the "Habitats Regulations") and the Habitats Directive 1992. They are for use when either the appropriate nature conservation body or a competent authority is required to make an 'appropriate assessment' of the likely effects of a proposed plan or project on the integrity of a European Site under the relevant parts of the respective legislation. The European Site Conservation Objectives are available at Natural England Publications Catalogue.

The concepts of 'site integrity' and 'favourable condition' are similar and the assessment of a feature's condition will measure attributes that also represent aspects of a site's ecological integrity. However, the periodic determination of a feature's condition is separate from a judgement about the effect upon a site's overall integrity. This is because the DFCs do not represent a comprehensive or definitive list of all of the elements that might contribute to site integrity, merely those that are most appropriate to monitor in order to rapidly determine the present condition of a feature. The full range of factors that are components of a site's integrity, and which may need to be considered by an appropriate assessment, will be specified in the European Site Conservation Objectives. Some of the information contained within the DFCs may however contribute to such assessments.

Tables 3 and 4. Site-specific definitions of Favourable condition

Targets are presented in a series of tables, the first 3 apply to units 84-91 only:

Attributes and targets are presented in a series of tables.

- **Riverine habitat – mandatory objectives (Table 3a) -** These targets have implications for the management of the river, floodplain, and catchment as a whole. This table includes information on specific physical habitat conditions favoured by each notified species, conditions that are provided as part of the dynamic habitat mosaic generated by the naturally functioning river (as characterised by Table 3a).

- **Adjacent habitats – mandatory objectives (Table 3b)** - mandatory objectives for all the adjacent habitat compartments of the SSSI should ensure that these continue to support semi-natural communities, remain hydrologically linked to the river where appropriate, and do not negatively impact the riverine interest of the SSSI.

- **Non-riverine habitat mandatory objectives (Tables 3c-3e)**

- **Population targets for notified species Tables 4a (non-riverine species) and 4b (riverine species)** – the habitat requirements of designated riverine species should be broadly catered for through Table 3a, as far as can be accommodated by the river given its natural characteristics. In addition to cross-checks on presence and status of these species using readily available information, at Natural England's discretion, it may be appropriate to undertake quantitative population assessment.

Table 3a Site specific Habitat Condition Objectives

To maintain the following designated interest features at **River Test SSSI** in favourable condition:

River habitat
***Lampetra planeri* Brook lamprey**
***Cottus gobio* Bullhead**
Invertebrate assemblage:
W125 slow flowing river & W114 stream and river margin

Site-specific details of any geographical variation or limitations (where the favourable condition standards apply)

Interest Feature	Attribute	Measure	Site-specific Targets	Comments	Use for CA?
River Habitat Brook lamprey Bullhead	Habitat structure: channel and banks	Assess planform using map data, aerial survey data, historical records and local knowledge.	Planform naturalness: ≤ 5% of the Evaluated Corridor Section (ECS) should be artificial, re-aligned or constrained.	Channel form should be generally characteristic of river type, with predominantly unmodified planform. Watercourses with a high degree of naturalness are governed by dynamic processes which result in a mosaic of characteristic physical biotopes, including a range of substrate types, variations in flow, channel width and depth, in- channel and side-channel sedimentation features (including transiently exposed sediments), bank profiles (including shallow and steep slopes), erosion features (such as cliffs) and both in-channel and bankside (woody and herbaceous) vegetation cover. All	Yes
		HMS scores obtained from River Habitat Survey (RHS) data	Habitat Modification score (HMS): ≥65% or more of condition monitoring sites should fall within the *semi-natural* HMS class 1, with the remainder *predominantly unmodified* (class 2). In addition, no (or minimal) deterioration from the last monitoring cycle.		Yes

Interest Feature	Attribute	Measure	Site-specific Targets	Comments	Use for CA?
		Simplified Phase I habitat survey, carried out at 10 RHS transect locations or as part of the RHS sweep-up survey.	Bankside vegetation naturalness: Mean score for the assessment unit of 4 or 5.	of these biotopes, and their characteristic patterns within the river corridor, are important to the full expression of the biological community. A range of physical habitat modifications cause simplification of biotope mosaics, resulting in declines of characteristic biota dependent upon biotopes that have been lost or reduced in extent. Rivers that have sections that are already significantly physically modified should be subject to a process for planning and implementing physical restoration measures. This should be based on restoring natural geomorphological processes (including restoration of hydrological continuity between river and floodplain) as far as possible to allow restoration of characteristic and sustainable biotope mosaics, working within the practical constraints of essential flood protection for people and the built environment. Excessive levels of livestock grazing denudes the riparian zone, causes artificially high bank instability, and degradation of the fauna and flora of exposed riverine sediments. Low levels of grazing by suitable livestock are important in generating the full expression of riparian biotopes.	Yes

Interest Feature	Attribute	Measure	Site-specific Targets	Comments	Use for CA?
		RHS transect data	Riparian zone vegetation naturalness: Mean score for the assessment unit of 4 or 5.	A mosaic of natural and semi-natural riparian vegetation types provides conditions for all characteristic in-channel and riparian biota to thrive, creating patches of tall and short riparian swards, a mixture of light and shade on the river channel, and tree root systems and a supply of large woody debris that add channel complexity. Patchy tree cover provides shade protection against rising water temperatures caused by climate change. Between 30 and 50% riparian tree cover is generally considered optimal for in-channel and riparian habitats. Intensive cutting across significant proportions of the riparian zone is not appropriate.	Yes
River Habitat Brook lamprey Bullhead	Habitat structure: channel and banks	RHS data. At least 5 RHS sites should be examined for this target – if fewer than 5 sites are available, assessment units should be amalgamated.	Woody debris: Within each assessment unit 75% or more RHS sites have large woody debris 'Present'	Woody debris plays an important role in increasing habitat diversity, providing shelter for fish, supplying a food source for aquatic invertebrates, and for slowing the passage of nutrients downstream. Large woody debris generated naturally by native riparian trees should be present and helping to shape the physical structure of the channel (except in upland areas above the natural tree line). In smaller watercourses, temporary debris dams should be a feature of channel dynamics. Woody debris should be left in situ, unless there are overriding reasons of public safety (for example to prevent flooding or bridge collapse).	Yes

Interest Feature	Attribute	Measure	Site-specific Targets	Comments	Use for CA?
River Habitat Brook lamprey Bullhead	Habitat structure: channel and banks	In-channel structures: Use expert judgement to assess impacts across the whole unit. Data sources may include: * Local/management personnel/expert assessment * Hydromorphological and walk-over surveys * River Habitat Survey (RHS) * Air photos * Fisheries personnel * Special surveys assessing structures * River Obstructions (EA dataset) Rapid assessment methodology to assess obstacles to fish migration (SNIFFER project WFD 111)	In-channel structures: If present, structures should have no effect (or minor effect) on migration, on sediment transport, and habitat structure throughout the assessment unit. Assessments should include the upstream 'ponding' effects that artificial structures have on flow patterns and habitat structure.	In addition to causing serious impacts on dynamic biotope mosaics, in-channel structures have major consequences for the free movement of biota. Many species, including fish and invertebrates, require natural freedom of movement to complete their life cycle in rivers and maximise their population size and genetic diversity. Longitudinal connectivity within the river channel and lateral connectivity between the channel and the floodplain are both critical to a healthy river ecosystem. Constraints to longitudinal movement such as waterfalls and debris dams are a natural feature of rivers and add to the complexity and diversity of the habitat. Natural waterfalls in headwater areas can create unique (often fishless) communities of conservation importance. New artificial constraints to movement should be avoided and existing artificial constraints should be addressed through strategic river restoration. . Vertical drops of >18-20 cm are sufficient to prevent upstream movement of adult bullheads. They will therefore prevent recolonisation of upper reaches affected by lethal pollution episodes, and will also lead to constraints on genetic interactions that may have adverse consequences.	Yes

	Habitat functioning: water flow	Gauging station data and expert assessment from relevant environment agency. Use time series data for a period of 6 years prior to the time of condition assessment. Flow accretion diagrams should be generated for a range of flow conditions (Q99, Q95, Q80, Q50, Q30 and Q10) to identify any non-compliant stretches within the reporting unit. Minor spatial and temporal non-compliances can be tolerated as long as the increased impact on naturalised flows is not dramatic. A total of 10 days of continuous non-compliance in any one year, or 20 days of non-compliance overall, is the maximum that is acceptable. It is also suggested that non-compliance over a total river length of no more than 5% of a reporting unit should be considered as the maximum acceptable. Field observations/spot gauging. Field observations and	Flow regime should reflect the natural hydrological character of the river. For unit 84 (in the headwater flow category) the targets are: <Qn95 (low flows) <5% deviation from daily naturalised flow; Qn50-95 (low – moderate flows) <10% deviation from daily naturalised flow; Qn10-50 (moderate – high flows) <15% deviation from daily naturalised flow; >Qn10 (high flows) <15% deviation from daily naturalised flow. For units 85 to 91 (in the river flow category) the targets are: <Qn95 (low flows) <10% deviation from daily naturalised flow; Qn50-95 (low – moderate flows) <15% deviation from daily naturalised flow; Qn10-50 (moderate – high flows) <20% deviation from daily naturalised flow; >Qn10 (high flows) <10% deviation from daily naturalised flow.	The natural flow regime both shapes and sustains characteristic biotope mosaics, affecting factors such as current velocities and bed hydraulics, water levels and depths, wetted area, temperature regime and dissolved oxygen regime, All parts of the natural flow regime are important, including flushing flows, seasonal baseflows and natural low flows. Natural seasonal flow recession is critical in supporting the full expression of ephemeral habitats (marginal and riparian vegetation, exposed riverine sediments, ephemeral headwaters). Any significant impacts on the natural flow regime should be rectified sustainably by reducing flow modifications, not by artificial augmentation, or by altering channel form to fit reduced levels of flow. River flow affects a range of habitat factors of critical importance to lampreys, such as mentioned above. The results of local hydroecological investigations can be used to refine default generic flow target where appropriate, or to define additional flow targets. In order to refine default flow targets investigations have to consider all key mechanisms of impact on characteristic biological communities, both in respect of changes in habitat character and habitat space. They also have to recognise that flow targets must be consistent with the needs of the river habitat under favourable physical and chemical conditions, necessitating hydroecological evaluation against suitable reference conditions. In instances where locally derived targets are deemed to be adequate replacements for generic flow targets they should still retain the same form of expression (i.e. % deviations from daily naturalised flows).	Yes

Interest Feature	Attribute	Measure	Site-specific Targets	Comments	Use for CA?
		springs/wells as mentioned on OS maps. A map with known spring locations will be added.			
River Habitat Brook lamprey Bullhead	Habitat functioning: water quality	EA water quality data for a period of 3 years prior to the time of the condition assessment. Use all 3 years of data to generate relevant summary statistic. Compliance should be assessed at face value without a statistical significant test (i.e. is the observed value greater than the target value). Targets apply throughout the site, not just at sparsely distributed monitoring sites. Modelling is required to assess compliance fully.	Organic pollution: 10%ile DO: 85% saturation 10%ile DO 85% saturation Mean BOD: 1.5 mg L-1 90%ile total ammonia: 0.2 mg L^{-1} NH_3-N 95%ile un-ionised ammonia: 0.025 mg L^{-1} NH_3-N	Organic pollution effects the biota in a number of ways, including direct toxicity (from ammonia and nitrite), reduced dissolved oxygen levels (from microbial breakdown of organic material), and nutrient enrichment. Reducing organic pollution levels reduces toxic effects but unmasks enrichment effects. Controlling the continuous input of low levels of organic material is critical to controlling the enrichment effect. Generally, water quality should not be injurious to any life stage of brook lamprey/bullhead. All classified reaches within the designated site that contain, or should contain, brook lamprey/bullhead should comply with the targets given.	Yes

Interest Feature	Attribute	Measure	Site-specific Targets	Comments	Use for CA?
River Habitat Brook lamprey Bullhead	Habitat functioning: water quality	EA chemical and biological (diatom) data (see above). EA water quality data for a period of 3 years prior to the time of the condition assessment. Use all 3 years of data to generate relevant summary statistic. Targets apply throughout the site, not just at sparsely distributed monitoring sites. Modelling is required to assess compliance fully.	Nutrients: Nutrient targets for the river should reflect natural/ background concentrations and limit enrichment to levels at which adverse effects on characteristic biodiversity are unlikely. For unit 84 (low altitude, high alkalinity) the Phosphorus target is 40µg/l SRP. For units 85 - 91 (low altitude, high alkalinity) the Phosphorus target is 50µg/l SRP. Trophic Diatom Index (TDI): EQR of 1.0. This is equivalent to the standard for WFD HES. To be used only as an adjunct to, not a replacement for, nutrient targets. Other pollutants: Target is Good Chemical Status according to the WFD.	Note that Soluble Reactive Phosphorus is for the purposes of this guidance equivalent to the EA determinant 'orthophosphate'. See notes below in relation to use of EA orthophosphate data. Elevated nutrient levels interfere with competitive interactions between higher plant species and between higher plants and algae, leading to dominance by attached forms of algae and a loss of characteristic plant species (which may include lower plants such as mosses and liverworts). Through changes to plant growth and plant community composition and structure they also affect the wider food web, altering the balance between species with different feeding and behavioural strategies. The respiration of artificially large growths of benthic or floating algae may generate large diurnal sags in dissolved oxygen and poor substrate conditions (increased siltation) for fish and invertebrate species. Good Chemical Status requires that the Environmental Quality Standards associated with a wide range of toxic chemicals (listed on Annex VIII of the WFD) are complied with.	Yes

Interest Feature	Attribute	Measure	Site-specific Targets	Comments	Use for CA?
River Habitat Brook lamprey Bullhead	Habitat functioning : substrate quality	Siltation: Field observations and site-specific information derived from RHS.	Siltation: No unnaturally high levels of siltation as indicated by: (a) 'silting' highlighted in section P of the RHS form ('Overall characteristics – major impacts') OR (b) one-third or more of the total number of RHS spot-checks in the unit have silt (SI) as the predominant channel substrate.	Siltation is the unnatural accumulation of silt on other substrates (including aquatic plants), and is caused by high particulate loads or reduced scour within the channel. There is general agreement that siltation is one of the most widespread pressures on rivers in farmed landscapes. Siltation within and on top of coarse beds is a major threat to interest features (including species such as salmon and freshwater pearl mussel) and is poorly measured by existing WFD tools used in the classification of ecological status. Lowland rivers are particularly susceptible due to their low energy, but upland streams can also be seriously affected - damage to blanket peat creates enhanced levels of organic particulates that cause considerable change to macroinvertebrate communities. For river types naturally characterised by extensive Ranunculus beds, there should be a predominance of 'clean' gravels, pebbles and cobbles with relatively low cover by silt-dominated substrates. Localised accumulations of silt on the inside of bends or in back channels do not necessarily indicate a problem.	Yes

Interest Feature	Attribute	Measure	Site-specific Targets	Comments	Use for CA?
River Habitat Brook lamprey Bullhead	Negative indicators: Alien and locally absent species	Various data sources. Where a macrophyte survey has been carried out, the presence of alien species in the WFD impact lists should be noted. Where there are no macrophyte survey data, and for other organisms (e.g. invertebrates, mink), contact external organisations (e.g. EA, fisheries trusts) for local reports on alien or locally absent species, this should include non-native crayfish surveys in catchments thought to be at risk.	No high-impact alien species established (i.e. self-sustaining populations), using the standard checklists of species used for WFD assessments. A site will be assessed as unfavourable when there is good evidence that any non-native species or locally absent species is causing an impact on site integrity. For brook lamprey & bullhead there should be no non-native species likely to cause impairment of populations through predation and competition for shelter and food.	Refer to the WFD list of alien/locally absent species (but not to be used exclusively). Non-native species constitute a major threat to many river systems. Impacts may be on the river habitat itself (e.g. damage to banks and consequent siltation) or directly on characteristic biota (through predation, competition and disease), or a combination of these. Assessment of non- native species is based on the principles used in assessing high ecological status under the WFD, and applies to species on the banks and in the riparian zone as well as species of the channel and the margins. If possible, eradication is the first priority, followed by control to 'ecologically acceptable' levels of infestation. Where eradication is not possible, local management thresholds may need to be set for containing the species to acceptable levels in the long-term. Include 'locally absent' species (native to Britain but introduced to parts of the country from which they were previously absent) where there is evidence of significant impacts on favourable condition. Bullhead densities have been found to be negatively correlated with densities of non-native crayfish in the River Great Ouse, suggesting competitive or predator-prey interactions. Larval lamprey are mostly sedentary animals and may be at risk of predation by non-native crayfish.	Yes

River Habitat Brook lamprey Bullhead	Biological community: Macro-invertebrate species compo-sition and abundance	EA biological data (macroinvertebrates). Each monitoring site should be compliant. Where WFD waterbody classification results are used, no part of the assessment unit should overlap with a WFD waterbody that does not comply	WFD WHPT organic pollution tool should give a result of high ecological status for the assessment unit. When set, WFD PSI siltation tool should give a result of high ecological status for the assessment unit. Until then, the PSI EQI should be ≥ 0.9.	The working assumption is that the biological standards to protect HES should generally be consistent with protecting the composition and abundance of the corresponding components of characteristic biological community - however, this has yet to be properly tested and the following limitations must be taken into account. 1) These measures only cover in-channel, fully aquatic components of the characteristic biota (fish, benthic invertebrates, macrophytes and benthic diatoms). 2) These measures are not true measures of anthropogenic changes in taxon composition, just of changes in the values of indices that are based on community composition. 3) The monitoring regimes for the measures used here are not capable of identifying spatial heterogeneity in the level of impact on the biota - spatially limited impacts (i.e. beyond the points on the river that are subject to biological monitoring) can only be inferred from modelling of abiotic measures of habitat integrity. 4) Some of the WFD invertebrate measures only use family-level data rather than species-level data, which limits their sensitivity to impacts. 5) Predictions of the reference community can also be quite uncertain, particularly for invertebrates in chalk streams where taxon richness is often significantly higher than predicted under reference conditions. 6) Non-native species can affect some of these WFD measures in ways that suggest environmental quality has improved. 7) Climate change will influence these measures over time, in ways that may mask catchment management impacts. For all of these reasons, these biological attributes should only be used as a component part condition assessment – the direct environmental indicators of habitat integrity in this table are critical to defining the condition of a site.	Yes

Interest Feature	Attribute	Measure	Site-specific Targets	Comments	Use for CA?
River Habitat Brook lamprey Bullhead	Weed cutting	Field observations and general assessment of adherence to weed-cutting limits	A sufficient proportion of all aquatic macrophytes should be allowed to reproduce in suitable habitat, unaffected by river management practices Any weed-cutting operations should be undertaken to leave at least 50% by area and river length of in-channel and marginal vegetation in the river uncut, to support characteristic biota (in terms of cover, food supply and spawning substrate). Weed-cutting should not interfere with the ability of the river channel to downsize through encroachment of marginal vegetation during the summer flow recession.	Weed-cutting might be undertaken for flood risk management or fishery purposes. Except in situations of extreme flood risk, cutting should be undertaken to leave a mosaic of submerged and marginal vegetation, and should promote a characteristic diversity of plant species. It is recommended that a weed management plan is developed for the site, allowing for higher levels of cutting at flood risk pinch-points, balanced by lower levels of cutting in other stretches.	Yes

Interest Feature	Attribute	Measure	Site-specific Targets	Comments	Use for CA?
River Habitat Brook lamprey Bullhead	Fish stocking	Assessment of stocking consents.	Fish introductions should not interfere with the ability of the river to support self- sustaining populations of characteristic species. Stocking should not raise fish densities above the natural environmental carrying capacity of the river, and should not be increased above historical levels (this means no stocking to previously unstocked rivers or river sections). No stocking/transfers of bullhead unless agreed to be in the best interests of the bullhead population. Trout stocking should not elevate densities of adult trout (stocked plus natural) to more than 3 fish 100m-2, this being the estimated range of natural trout densities in designated rivers.	Stocking represents a loss of naturalness and, if successful, obscures the underlying causes of poor performance (potentially allowing these risks to perpetuate). It carries various ecological risks, including the loss of natural spawning from broodstock, competition between stocked and naturally produced individuals, disease introduction and genetic alterations to the population. There is a large body of evidence indicating that rearing locally sourced juveniles for release has a long-term impact on salmon populations by removing natural selection mechanisms in the juvenile phase of life. The nature conservation aim is to provide conditions in the river that support a healthy and natural population, achieved through habitat protection or restoration and the control of exploitation as necessary. Stocking should be undertaken so as to avoid risks of disease transfer, including crayfish plague where white-clawed crayfish populations are at risk. All stocked trout are sterile. For bullhead, excessively high densities of other fish species may cause unacceptably high predation pressure and competitive interactions. Stocking of Bullhead may cause genetic damage to the population or otherwise reduce population fitness. May also obscure underlying problems with site condition and devalue monitoring of population attributes. Since bullhead are of no angling interest, deliberate transfers between sites are unlikely to have been undertaken in the past, such that the genetic integrity of populations is likely to be intact.	Yes

Interest Feature	Attribute	Measure	Site-specific Targets	Comments	Use for CA?
River Habitat Brook lamprey Bullhead	Exploitation	Assessed through recorded exploitation and status of target species (see comments). Environment Agency data on licences and catch statistics.	Exploitation should not interfere with the ability of the river to support self-sustaining populations of characteristic species (see comments).	Exploitation should be controlled to suitable levels, and net limitations and catch-and-release techniques used where necessary to avoid population impacts. Assessment must include the notified species bullhead and brook lamprey in addition to other site native species that are threatened or are characteristic of the site. Additional species under threat include Atlantic salmon, sea/brown trout and European eel.	Yes
River Habitat Brook lamprey Bullhead	Abstraction intakes and discharges	Environment Agency monitoring and consents	Effective screening on all intakes and discharges.	Entrainment of lamprey in intakes and discharges can occur. Escapes from fish farms are a form of uncontrolled introduction and should be prevented.	Yes

Invertebrate assemblage	Habitat assessment for invertebrate assemblage.	Record surfaces (see below) present within a six meter radius.	See table below. Preferred Surfaces: Green	Invertebrates are catered for by the natural functioning of the river habitat including its adjacent habitat. The targets given here provide for the additional structural requirements of the assemblage. Check with specialists before failing based on habitat assessment as contract surveying may have been carried out on site.	Yes

Habitat Type	Surface 0	Surface 1	Surface 2	Surface 3	Surface 4	Surface 5	Surface 6
Wetlands: River Edges	**Water**	**Marginal bare muds, wet stones**	**Medium layer**	**Taller graminoid layer**	Young scrub	Extensive mature scrub, & trees - (emphasis on edges of unit)	
Typical Species	Algal mats, water weeds	Thin algal mats	*Mentha, Rorippa* spp., *Veronica beccabungae, Alisma* spp.	*Phragmites, Juncus, Phalaris Sparganium,* etc.	*Salix* spp., *Alnus*	As surface 5 + tree species	
Targets		Present in 10% of linear SRSs			Present in <20% of linear SRSs	Present in <20% of linear SRSs (except where shade dependent fauna is notified feature)	
	1 or fewer preferred surfaces present in no more than 50% of SRSs 3+ different preferred surfaces present in at least 20% of SRSs						
Preferred Features							
Small areas of bare mud immediately adjacent to water Aquatic macrophytes with abundant flowers		Full range of layers of emergents		Floating leaved macrophyte cover in appropriate river types		Individual bushes and small areas of scrub or marginal trees, including overhanging trees	

Flowery areas, including those on other habitats (verges, farmland, banks, ruderal areas etc) including 'unwelcome' weeds such as ragwort and thistles	
Negative Factors	
Excessive stock access leading to loss of macrophytes and large poached river margins and siltation of river	Extensive marginal scrub cover leading to shading of macrophytes
Invasive species: - *Impatiens glandulifera*, *Fallopia* species	

Audit Trail

Rationale for limiting standards to specified parts of the site

For flow - Flow category confirmed by the Environment Agency.

Rationale for site-specific targets (including any variations from generic guidance)

Woody debris: chosen for 75% or more RHS sites have large woody debris present, as the morphology of all river units lends themselves for having trees/woodland presen and most units already have trees present.

Rationale for selection of measures of condition (features and attributes for use in condition assessment)

The attributes and targets used for condition assessment in the above table provide a basic evaluation of the integrity of the river habitat, in terms of anthropogenic hydrological, chemical, physical and biological (invasive non-native species, weed cutting, fish stocking) stresses. Assessment against many of the targets uses available Environment Agency data. Specific consideration of notified species is restricted to an assessment of available data on populations from whatever sources are available, as a cross-check on the assessment of habitat attributes.

Other Notes

The Notified invertebrate assemblages W114 and W125 are accounted for in this section (Table 3a).

Whilst not forming part of formal condition assessment, the following detailed information on the physical habitat requirements of individual designated species may be usef for the management of the site and should be considered when judging the detailed effects of activities.

Bullhead

The characteristic channel morphology provides the diversity of water depths, current velocities and substrate types necessary to fulfil the spawning, juvenile and dispersal requirements of the species. The close proximity of different habitats facilitates movement to new preferred habitats with age. Operations that widen, deepen or straighten the channel reduce variations in habitat. New operations that would cause these effects are not acceptable within the SAC, while restoration may be needed in some reaches. Points to consider include the following:

In-channel structures: vertical drops greater than 18-20 cm are sufficient to prevent upstream movement of adult bullheads. They will therefore prevent recolonization of upper reaches affected by lethal pollution episodes, and will also lead to constraints on genetic interactions that may have adverse consequences. New instream structures should be avoided, while the impact of existing structures needs to be evaluated.
Slack-water refuges: these provide important refuges against high-flow conditions. Suitable refuges include pools, submerged tree root systems and marginal vegetation with >5 cm water depth.
Woody debris: bullhead are particularly associated with woody debris in lowland reaches, where it is likely that it provides an alternative source of cover from predators and floods. It may also be used as an alternative spawning substrate.
Tree cover: the relative importance of shade compared with the provision of woody debris is unclear, but the maintenance of intermittent tree cover in conjunction with retention of woody debris ensures that habitat conditions are suitable. In lowland reaches without any riparian trees, it may be desirable to introduce a limited amount of cover.
Siltation: Bullhead require un-silted coarse-dominated substrate (gravel/pebble/cobble). Males guard sticky eggs on the underside of stones. Larger stones on a hard substrate providing clear spaces between the stream bed and the underside of pebbles/cobbles are therefore important. Elevated levels of fines can interfere with egg and fry survival. Sources of fines include run-off from arable land, land (especially banks) trampled by livestock, sewage and industrial discharges.

Brook Lamprey
The characteristic channel morphology provides the diversity of water depth, current velocity and substrate necessary for spawning, and the juvenile and migratory requirements of the species. Lamprey species need coarse substrate for spawning and areas comprising predominantly sand/silt for larval development. The close proximity of these habitats facilitates movement to new preferred habitats with age. Operations that widen, deepen or straighten the channel reduce habitat variability. Operations that may have this effect are not acceptable within the SSSI, whilst restoration may be needed in some reaches.

Spawning habitat comprises well-oxygenated gravel/pebble (1.5–11.0 cm diameter) dominated substrate of at least 10 cm depth and overlain by a range of water depths (0.2–1.5 m). River and sea lamprey typically spawn in deeper water than brook lamprey, but in larger reaches brook lamprey will also spawn in deep water. Elevated levels of fines (< 0.83 mm diameter) can interfere with egg survival.

Larval habitat commonly comprises fine sediment in which organic detritus may or may not be present. Other suitable habitats include organic detritus overlying coarse substrate, submerged tree roots, submerged silt banks and emergent vegetation rooted in silt. Small patches of shallow fine sediment among coarse substrate, submerged cattle drinks and submerged branches/twigs trapping fine sediment may also contain larval lamprey. Larvae are often found in the relatively slack areas of rivers and streams where fine material readily accumulates, e.g. in channel margins, backwaters, behind weirs. The larval habitat requirements of the three species are similar and so they are often found in the same nursery beds. However, greater numbers of sea lamprey may be found in deeper water.

Lampreys can pass some potential barriers by attaching themselves to structures or river banks by their suctorial discs and creeping up by strong bursts of swimming. The passability of barriers by different species and sizes of lamprey should be assessed on a site-specific basis. Brook lamprey will be the only species present above natural or artificial barriers.

Pre-electrofishing walkover surveys to identify suitable habitat may be used to record the presence and passability of natural features and artificial structures. The use of SNIFFER (2010) may provide some insight into the passability of artificial barriers, but note that its use for assessing barriers to lamprey has not yet been validated.

Annex 2 Macroinvertebrate Indexes on the Test

Site ID	NGR	Date	NTAXA	ASPT	LIFE (F)	LIFE (Sp)
Testwood - 43111	SU3517015480	22/05/2000	34	6.44	7.58	N/A
Testwood - 43111	SU3517015480	04/10/2000	42	5.91	7.05	N/A
Testwood - 43111	SU3517015480	31/05/2001	38	6.57	7.54	N/A
Testwood - 43111	SU3517015480	27/09/2001	38	6.4	7.58	N/A
Testwood - 43111	SU3517015480	21/05/2003	39	6.37	7.53	N/A
Testwood - 43111	SU3517015480	01/10/2003	39	5.84	7.03	N/A
Testwood - 43111	SU3517015480	16/10/2006	39	6.1	7.19	N/A
Testwood - 43111	SU3517015480	02/05/2006	42	5.83	6.92	N/A
Testwood - 43111	SU3517015480	11/04/2007	39	6	7.31	8
Testwood - 43111	SU3517015480	11/11/2009	37	6.41	7.53	N/A
Testwood - 43111	SU3517015480	27/04/2009	38	6.26	7.44	N/A
50m u/s Testwood abstraction - 90401	SU3525015350	22/05/2002	39	6.2	7.37	8.02
50m u/s Testwood abstraction - 90401	SU3525015350	20/09/2002	41	6.28	7.29	7.74
50m u/s Testwood abstraction - 90401	SU3525015350	21/05/2003	42	6.5	7.5	8
50m u/s Testwood abstraction - 90401	SU3525015350	01/10/2003	45	6	7.1	7.63
50m u/s Testwood abstraction - 90401	SU3525015350	19/05/2004	39	6.49	7.57	7.75
50m u/s Testwood abstraction - 90401	SU3525015350	22/10/2004	33	5.94	7.27	7.65
50m u/s Testwood abstraction - 90401	SU3525015350	06/05/2005	37	6.47	7.61	7.96
50m u/s Testwood abstraction - 90401	SU3525015350	06/11/2007	35	5.99	7.22	7.52
50m u/s Testwood abstraction - 90401	SU3525015350	15/04/2008	35	6.04	7.38	7.53
50m d/s Testwood abstraction - 90402	SU3535015300	22/05/2002	34	6.13	7.23	7.63
50m d/s Testwood abstraction - 90402	SU3535015300	20/09/2002	43	6.1	7.21	7.71
50m d/s Testwood abstraction - 90402	SU3535015300	21/05/2003	44	5.97	7.23	7.45
50m d/s Testwood abstraction - 90402	SU3535015300	01/10/2003	39	5.62	7.06	7.38
50m d/s Testwood abstraction - 90402	SU3535015300	19/05/2004	34	5.82	6.93	7.35
50m d/s Testwood abstraction - 90402	SU3535015300	22/10/2004	28	5.78	7.04	7.4

Site ID	NGR	Date	NTAXA	ASPT	LIFE (F)	LIFE (Sp)
50m d/s Testwood abstraction - 90402	SU3535015300	06/11/2007	40	5.77	7.11	7.29
50m d/s Testwood abstraction - 90402	SU3535015300	15/04/2008	36	5.85	6.97	7.37
u/s abstraction - 157258	SU3520415419	28/05/2010	38	6.43	7.56	7.87
u/s abstraction - 157258	SU3520415419	16/05/2012	37	6.14	7.48	7.78
u/s abstraction - 157258	SU3520415419	04/11/2010	34	5.72	6.84	7.24
u/s abstraction - 157258	SU3520415419	29/11/2010	36	5.96	7.12	7.6
u/s abstraction - 157258	SU3520415419	29/05/2013	28	6.31	7.58	7.66
u/s abstraction - 157258	SU3520415419	14/11/2013	34	6.03	7.39	7.47
u/s abstraction - 157258	SU3520415419	29/05/2014	27	6.45	7.6	7.86
u/s abstraction - 157258	SU3520415419	30/09/2014	34	6.37	7.57	7.93
u/s abstraction - 157258	SU3520415419	07/05/2015	35	6.43	7.5	7.93
u/s abstraction - 157258	SU3520415419	26/11/2015	36	5.98	7.16	7.64
u/s abstraction - 157258	SU3520415419	31/05/2016	31	6.36	7.41	7.58
u/s abstraction - 157258	SU3520415419	28/09/2016	31	6.11	7.43	7.72
u/s abstraction - 157258	SU3520415419	25/05/2017	37	6.22	7.61	7.88
u/s abstraction - 157258	SU3520415419	30/11/2017	33	5.78	6.84	7.2
d/s abstraction - 157259	SU3535015300	13/04/2010	36	5.81	7.14	7.48
d/s abstraction - 157259	SU3535015300	28/05/2010	34	6.01	7.34	7.6
d/s abstraction - 157259	SU3535015300	16/05/2012	40	5.99	7.14	7.33
d/s abstraction - 157259	SU3535015300	04/11/2010	33	6.29	7.39	7.78
d/s abstraction - 157259	SU3535015300	29/11/2010	38	6.11	7.26	7.64
d/s abstraction - 157259	SU3535015300	30/10/2012	39	6.09	7.2	7.5
d/s abstraction - 157259	SU3535015300	07/04/2011	33	5.87	7.2	7.58
d/s abstraction - 157259	SU3535015300	02/06/2011	27	6.06	7.46	7.61
d/s abstraction - 157259	SU3535015300	02/11/2011	31	5.96	7.31	7.67
d/s abstraction - 157259	SU3535015300	29/05/2013	33	6.22	7.43	7.74
d/s abstraction - 157259	SU3535015300	14/11/2013	37	5.84	7.15	7.59
d/s abstraction - 157259	SU3535015300	29/05/2014	31	6.67	7.54	7.82
d/s abstraction - 157259	SU3535015300	30/09/2014	38	5.63	7.17	7.23
d/s abstraction - 157259	SU3535015300	07/05/2015	35	6.56	7.45	7.79

Site ID	NGR	Date	NTAXA	ASPT	LIFE (F)	LIFE (Sp)
d/s abstraction - 157259	SU3535015300	26/11/2015	40	5.9	7.26	7.49
d/s abstraction - 157259	SU3535015300	31/05/2016	38	6.12	7.33	7.63
d/s abstraction - 157259	SU3535015300	28/09/2016	34	6.3	7.58	7.62
d/s abstraction - 157259	SU3535015300	25/05/2017	38	5.91	7.09	7.36
d/s abstraction - 157259	SU3535015300	30/11/2017	37	5.57	6.85	7.43
d/s abstraction - 157259	SU3535015300	30/05/2018	38	5.67	7	7.47
d/s abstraction - 157259	SU3535015300	30/08/2018	38	5.56	6.88	7.26
d/s abstraction - 157259	SU3535015300	28/11/2018	37	5.65	6.79	7.44
d/s abstraction - 157259	SU3535015300	03/04/2019	39	5.79	6.94	7.24
d/s abstraction - 157259	SU3535015300	29/08/2019	40	5.53	6.95	7.3
d/s abstraction - 157259	SU3535015300	04/10/2019	42	5.54	6.77	7.2
d/s abstraction - 157259	SU3535015300	29/05/2020	42	5.86	7.11	7.26
d/s abstraction - 157259	SU3535015300	27/08/2020	34	5.63	7.13	7.49
d/s abstraction - 157259	SU3535015300	11/11/2020	42	5.49	6.75	7.17
Testwood Bridge - 160230	SU3509315629	01/05/2003	36	6.36	7.53	N/A
Testwood Bridge - 160230	SU3509315629	01/10/2003	36	5.89	7.03	N/A
Testwood Bridge - 160230	SU3509315629	01/05/2006	39	5.97	6.92	N/A
Testwood Bridge - 160230	SU3509315629	01/10/2006	35	6.34	7.19	N/A
Testwood Bridge - 160230	SU3509315629	01/04/2007	36	6.25	7.31	N/A
Testwood Bridge - 160230	SU3509315629	01/04/2009	34	6.21	7.44	N/A
Testwood Bridge - 160230	SU3509315629	22/05/2013	28	6.72	7.83	N/A
Testwood Bridge - 160230	SU3509315629	01/10/2013	31	6.08	7.57	N/A
Testwood Bridge - 160230	SU3509315629	05/05/2016	31	6.48	7.83	8.42
Testwood Bridge - 160230	SU3509315629	01/09/2016	32	6.42	7.79	7.98
Testwood Bridge - 160230	SU3509315629	03/04/2019	41	6.44	7.66	8.04
Testwood Bridge - 160230	SU3509315629	30/08/2019	40	6.28	7.42	7.79
Testwood Bridge - 160230	SU3509315629	04/10/2019	40	5.96	7.32	7.81
Wirehouse Stream - 196434	SU3622415022	18/10/2018	29	5.63	7.08	7.19
Wirehouse Stream - 196434	SU3622415022	03/04/2019	40	6.38	7.26	7.68
Wirehouse Stream - 196434	SU3622415022	30/08/2019	35	5.84	7.25	7.52

Site ID	NGR	Date	NTAXA	ASPT	LIFE (F)	LIFE (Sp)
Wirehouse Stream - 196434	SU3622415022	04/10/2019	33	5.68	7.27	7.57
Wirehouse Stream - 196435	SU3632414962	13/10/2018	27	6.09	7.48	7.85
Wirehouse Stream - 196435	SU3632414962	03/04/2019	40	5.73	6.89	7.33
Wirehouse Stream - 196435	SU3632414962	30/08/2019	33	5.27	6.93	7.23
Wirehouse Stream - 196435	SU3632414962	04/10/2019	31	5.67	7.18	7.37
Nursling Test Carrier - 133941	SU3517015590	04/05/2005	39	5.38	6.56	7
Nursling Test Carrier - 134405	SU3526015510	04/05/2005	32	4.19	5.62	5.81
Nursling Test Carrier - 134406	SU3531815643	04/05/2005	39	5.09	6.21	6.49
Nursling Test Carrier - 134702	SU3551015320	04/05/2005	42	4.86	6.16	6.44
Nursling Test Carrier - 134901	SU3543715387	04/05/2005	36	5.07	6.36	6.71
Test - 196436	SU3582915042	03/04/2019	43	6.52	7.58	8.22
Test - 196436	SU3582915042	29/08/2019	37	5.79	7.24	7.74
Test - 196436	SU3582915042	04/10/2019	42	5.68	7.05	7.56
Test - 196437	SU3611714861	03/04/2019	43	6.25	7.25	7.65
Test - 196437	SU3611714861	29/08/2019	35	5.45	6.94	7.31
Test - 196437	SU3611714861	04/10/2019	40	5.57	6.89	7.39