River Blithe Pump Back - Environmental Action Plan

Environmental Action Plan

Stantec

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Acronyms / Abbreviations

Acronym / Abbreviation	Full Term
EA	Environment Agency
EAR	Environmental Assessment Report
EAP	Environmental Action Plan
EMP	Environmental Monitoring Programme
INNS	Invasive Non-Native Species
NRFA	National River Flow Archive
NVZ	Nitrate Vulnerable Zone
Ramsar	Wetland of International Importance (Ramsar Convention)
SERC	Staffordshire Ecological Record
SSSI	Site of Special Scientific Interest
SSW	South Staffordshire Water
WFD	Water Framework Directive

1 Introduction

1.1 Background

Stantec UK Ltd were commissioned by South Staffordshire Water (SSW) to support the environmental assessment elements of their statutory draft Drought Plan 2027 submission. The new Drought Plan will define the operational, supply-side and regulatory measures available to manage water supply during periods of drought and are required to demonstrate that all retained, modified or newly proposed drought actions have been subject to appropriate environmental consideration in accordance with Environment Agency (EA) guidance and relevant environmental legislation. Stantec's commission includes the preparation of Environmental Action Plans (EAPs) for several existing and potential drought actions, including the River Blithe pump back scheme.

The EA's Water company drought plan guidance (2025)[1] requires water companies to demonstrate a clear understanding of the potential environmental impacts associated with drought actions, such as changes to abstraction regimes, drought permits, drought orders, and conjunctive use. The commission of EAPs is structured to align with EA guidance on environmental assessment for drought plans, which permits submission of action plans/programmes of work in lieu of completed Environmental Assessment Reports (EARs) at the draft stage, provided they are sufficiently detailed, realistic, time-bound, with committed resources and clear delivery timelines.

The River Blithe pump back scheme is an existing drought action within the SSW drought planning framework. An EAR has previously been prepared for this scheme; however, changes in operating context, updated guidance, and emerging environmental risks necessitate a review and update of the existing environmental evidence. In particular, the transfer of raw water as part of pump back operations introduces potential risks associated with the spread of Invasive Non-Native Species (INNS).

To support the Drought Plan 2027 update, SSW have adopted a phased approach to environmental assessment. Phase 1 comprises the preparation of EAPs as early deliverables for submission in March 2026. The outcomes of this EAP will inform Phase 2 of the programme, during which a targeted update to the River Blithe EAR and associated environmental documentation will be undertaken, where required. Phase 2 will deliver environmental evidence to support the final 2027 drought plan submission, ensuring that the River Blithe pump back scheme remains compliant with current environmental legislation and EA guidance.

1.1.1 Role of the EAP

This EAP provides a structured screening and scoping assessment to determine the likely environmental risks associated with the River Blithe drought action.

In accordance with the project proposal and EA guidance, the EAP:

- Defines the assessment boundaries,
- Identifies key receptors and potential impact pathways,
- Screens for Water Framework Directive (WFD) deterioration risk,

[1] (EA, 2025) Water company drought plan guideline. Available at: https://www.gov.uk/government/publications/water-company-drought-plan-guideline-2025/water-company-drought-plan-guideline-2025 [Accessed January 2025]

- Identifies monitoring requirements and data gaps.

Where potential risk has been identified (e.g. preliminary medium WFD risk rating), these matters will be examined in greater technical detail within the subsequent EAR, which will provide quantitative assessment, modelling outputs where required, and a final regulatory position.

At this stage, the EAP has not undertaken detailed hydrological modelling or element-level WFD deterioration testing. This level of analysis is proportionate to the subsequent EAR stage and will be undertaken once the hydrological inputs and operational assumptions are confirmed. This phased approach aligns with the structured assessment process set out in the EA's environmental assessment supplementary guidance.

1.2 Description of Drought Action

1.2.1 Type of Action

The River Blithe pump back scheme is an existing drought action involving the transfer of raw water to support public water supply during drought conditions. This is an existing licenced abstraction which has hands off flow conditions that means during drought it cannot be used for a large part of the year. It seeks to override the HOF conditions (at N Muskham). No changes to the 9Ml/d continuation flow licence condition are being considered.

For the purposes of the 2027 drought plan, the action updates the existing EAR to reflect updated operating conditions, together with the preparation of a new INNS risk assessment associated with raw water transfer.

1.2.2 Current Status

The pump back scheme is an existing licenced abstraction used under normal conditions. Use of the scheme under drought conditions requires a permit to override licence conditions. It is already anan established component of the CAM/SSW drought planning framework and is supported by an EAR prepared for earlier drought plan submissions. The scheme remains available for use under defined drought conditions.

1.2.3 Operational parameters

The pump back scheme would be operated during periods of drought in accordance with the CAM/SSW drought plan and associated triggers. The frequency, duration and magnitude of operation are constrained by hydrological conditions, environmental sensitivity of the receiving and donor waterbodies, and the requirements of relevant licences and permits.

The EAR will include details of the following drought action information:

- Donor and receiving water bodies;
- Maximum transfer rate;
- Duration;
- Trigger conditions;
- Intake/discharge configuration;
- Fish screening assumptions; and

- Constraints (HoF, Q95 etc.).

1.2.4 Licence/Permit Reference

Operation of the River Blithe pump back scheme is regulated under existing abstraction licence number 3/28/6/84/S held by SSW. Any operation would be undertaken in accordance with the conditions of the relevant EA licences and the provisions of the statutory drought plan.

2 Assessment Scope

2.1 Assessment Type

The proposed assessment for this action comprises a targeted update to the existing EAR, supplemented by a standalone INNS risk assessment, reflecting modified operating conditions and emerging environmental risks.

The updated EAR will focus on reviewing and, where necessary, refreshing existing baseline data, impact assessments and conclusions to ensure they remain valid in the context of:

- Updated EA guidance and regulatory expectations;
- Changes in the environmental baseline since completion of the previous EAR; and
- The current and anticipated operational use of the pump back scheme under drought conditions.

In parallel, a dedicated INNS risk assessment will be undertaken to address risks associated with raw water transfer inherent to pump back operations.

2.2 Assessment Boundaries

The River Blithe is a tributary of the River Trent, originating to the southeast of Stoke-on-Trent in Staffordshire and joining the Trent near Kings Bromley. It is approximately 30 km in length, draining a largely agricultural catchment. The river is impounded by Blithfield Reservoir, approximately 8 km from its confluence with the River Trent, which is the main source of water used by SSW[2].

The spatial scope will include the Blithe Rivers and Lakes Operational Catchment and other environmental receptors identified as potentially sensitive to the water transfer. Based on existing EA evidence, this is expected to include:

- Blithe from Source to Tad Brook Water Body (GB104028052290);
- Tad Brook from Source to River Blithe Water Body (GB104028046520);
- Blithe - Tad Bk to R Trent Water Body (GB104028046491); and
- Blithfield Reservoir (GB30435478)

The assessment will also consider any designated sites, aquatic or riparian habitats, or other protected receptors located within the predicted zone of influence identified through screening and model evidence.

The temporal scope will cover:

- The period of pump back during drought operation; and

[2] *APEM (2018) Review and Update of Drought Permit Environmental Assessment Report: River Blithe and River Trent. South Staffordshire Water. APEM Scientific Report P00000270, version 5, January 2018, ix + 69 pages.*

- An appropriate post-operation recovery period to assess the return of surface water flows to baseline conditions.

The assessment will focus on receptors relevant to WFD compliance and wider environmental protection, including:

- WFD surface water bodies and their supporting hydrological and ecological elements;
- Designated sites and priority habitats with potential hydrological connectivity to the abstraction; and
- Protected species and habitats where dependence on baseflow is identified.

2.3 Assessment Scenarios

The environmental assessment will consider the following scenarios:

- Baseline (recent actual abstraction and hydrological conditions, including naturalised where required);
- Drought (no-action scenario);
- Drought permit in effect with licence conditions overridden(and
- Post-drought recovery (return to baseline abstraction)

The EAR will compare drought with and without drought action conditions to isolate the incremental effect of the proposed drought action.

2.4 Impact Pathways to Assess

The River Blithe pump back scheme involves the transfer of raw water during drought conditions and therefore presents a defined set of potential impact pathways. The following pathways will be assessed proportionately within the updated EAR and supporting technical appendices:

- Hydrology / Hydrogeology – Temporary changes to flow regime, hydraulic habitat availability and reservoir–river interactions during drought operation.
- Water Quality – Potential changes in dissolved oxygen, temperature, turbidity and nutrient concentrations associated with raw water transfer.
- Ecological Receptors – Flow- and water quality-dependent responses of macroinvertebrates, macrophytes and fish, including protected species.
- INNS Transfer Risk – Risk of entrainment and spread of aquatic invasive non-native species through pump back operation.
- WFD Compliance – Risk of element-level deterioration or prevention of progress toward Good ecological status/potential.
- Designated Sites – Potential effects on hydrologically connected designated sites and qualifying features.

These pathways define the scope for Phase 2 assessment. Ecological receptors will be fully determined in the EARs, following a review of all of the datasets required.

3 Baseline Data to be assessed

This section summarises the baseline datasets required to support the Phase 1 assessment of the River Blithe pump back scheme drought action. These datasets form the minimum evidence base needed for the preliminary WFD screening, receptor appraisal and environmental risk assessment. They will also support development of the Environmental Monitoring Programme (EMP) for Phase 2.

3.1 Key datasets required

The datasets listed in Table 1 are those required to characterise baseline river hydrology, reservoir levels, water quality and ecological conditions within the waterbodies connected to the River Blithe pump back scheme. They include regulatory datasets, existing operational records and additional information to be requested or collected as part of Phase 1.

Table 1: Summary of baseline datasets required for assessment.

Dataset	Source	Status	Responsibility
River flow data (10+ years)	River Blithe at Hamstall Ridware (National River Flow Archive (NRFA) 28002), Tad Brook – no EA/NRFA flow gauge and hydrology informed by WFD data only SSW operational flow data associated with Blithfield Reservoir inflow/outflow	Available	CAM/SSW
Reservoir levels and storage (Blithfield Reservoir)	SSW operational reservoir monitoring datasets for Blithfield Reservoir	Available	SSW
Pump-back operational logs (historic)	SSW operational records for pump-back activity associated with abstraction licence 3/28/6/84/S.	Available	SSW
WFD classification	EA Catchment Data Explorer	Available	Stantec
Water quality datasets (5–10+ years)	EA water-quality archive	Partially available	Stantec
Fish records (historic WFD datasets 2009–2022)	EA fish datasets	Partially available	Stantec
Protected species records	Staffordshire Ecological Record (SERC)	To obtain	CAM/SSW
INNS records	EA datasets / local sources / SERC	Available	Stantec
Habitat survey records	To collect	Not yet collected	Stantec

3.2 Critical Data Gaps

The following data gaps have been identified based on currently available information and will be addressed in a proportionate way through Phase 1 and Phase 2.

1) Existing EA records confirm several INNS within the catchment, including New Zealand mud snail *Potamopyrgus antipodarum*, zebra mussel *Dreissena polymorpha*, demon shrimp *Dikerogammarus haemobaphes*, and signal crayfish *Pacifastacus leniusculus*s. However, these datasets are uneven across the donor and receiving reaches used for pump back, and many water bodies lack recent surveys. This is a key gap because raw water transfer increases the likelihood of spreading INNS if their distribution is not known.

   Mitigation: Undertake targeted INNS surveys at donor and receiving points prior to Phase 2 to define current distribution and abundance.

2) Some macroinvertebrate and fish datasets used in previous assessments are several years old. The 2018 EAR noted limited recent fish sampling and variable ecological status within the Blithe system. Updated biological evidence is required because macroinvertebrates and fish respond directly to changes in flow and water quality, and several waterbodies in the operational catchment show Moderate or Poor status.

   Mitigation: Complete updated macroinvertebrate surveys and ecological walkovers in sensitive reaches during Phase 2.

3) Although long term EA flow data exists, fine scale hydrological information for reaches directly affected by pump back operation is limited. The 2018 EAR highlighted uncertainty in flow behaviour downstream of Nethertown and the need for improved understanding of drought-period hydrology. This limits the confidence in predicting potential operational impacts.

   Mitigation: Undertake targeted spot flow gauging during low flow periods to characterise drought response.

4) Limited recent joint water quality sampling at the intake and discharge locations means uncertainty around potential mixing risks during raw water transfer. Conditions such as turbidity, nutrient levels and dissolved oxygen may differ between reaches and could influence the receiving waterbody under drought.

   Mitigation: Complete pre-operation water quality sampling at pump intake and discharge points.

Where baseline ecological data are older than five years or pre-date recent hydrological pressures, updated surveys will be commissioned to ensure EAR conclusions are robust and defensible.

4 Preliminary Receptor Screening

Table 2 summarises the preliminary screening for the River Blithe pump back drought action with justifications provided for the screening in/out of each receptor. Any receptors not included here will be included in a full version in the EAR, once full datasets have been reviewed.

Table 2: Preliminary receptor screening for the River Blithe pump back drought action

Receptor	Distance/Link	Scoped In/Out	Justification
Blithe from Source to Tad Brook (GB104028052290)	Directly hydrologically connected upstream reach	In	Within operational catchment. Moderate ecological status with limited headroom.
Tad Brook from Source to River Blithe (GB104028046520)	Direct tributary to River Blithe	In	Within operational catchment. Currently Poor ecological status and sensitive to flow and water quality changes.
Blithfield Reservoir (GB30435478)	Direct operational interaction (donor/receiving waterbody)	In	Integral to pump back operation; currently Moderate ecological status; potential water quality interaction during raw water transfer.
Blithe – Tad Brook to River Trent (GB104028046491)	Downstream hydrological connection	In	Within operational catchment. Moderate ecological status and directly influenced by flow regime and water quality changes.
Midland Meres and Mosses Ramsar	Hydrological link via Blithe catchment	In (HRA screening)	Identified hydrological connection to GB104028052290; requires HRA screening to determine likely significant effect.
Blithfield Reservoir Site of Special Scientific Interest (SSSI)	Co-located with reservoir	In	Reservoir designated for wintering birds (including goosander); potential indirect effects via water level and quality changes.
European bullhead *(Cottus gobio)*	Recorded in GB104028046520 and GB104028052290	In	Confirmed presence in connected waterbodies; sensitive to flow and dissolved oxygen changes.
White-clawed crayfish (*Austropotamobius pallipes)*	Recorded in GB104028052290	In	Schedule 5 species present within operational catchment; sensitive to water quality and INNS interaction.
Aquatic INNS (e.g. signal crayfish, zebra mussel, New Zealand mud snail)	Present within hydrologically connected donor and receiving reaches	In	Raw water transfer creates a direct pathway for spread between connected waterbodies; confirmed baseline presence within the catchment.

5 Preliminary Risk Assessment

5.1 WFD Deterioration Risk

The Blithe Rivers and Lakes Operational Catchment includes the following WFD waterbodies:

- Blithe from Source to Tad Brook Water Body (GB104028052290);
- Tad Brook from Source to River Blithe Water Body (GB104028046520);
- Blithe - Tad Bk to R Trent Water Body (GB104028046491); and
- Blithfield Reservoir Water Body (GB30435478).

SSW's previous EAR[3] determined that the drought action would be unlikely to influence WFD classification. Table 3 presents historical WFD classification results for the Blithe Rivers and Lakes Operational Catchment covering multiple reporting cycles between 2009 and 2022.

Blithe from Source to Tad Brook has shown variability in ecological status over time, being classified as Good in 2009 before declining to Poor during the period from 2010 to 2012. From 2013 onwards, classifications fluctuated between Poor and Moderate, with a general improvement evident in more recent years. Since 2016, ecological status has been consistently recorded as Moderate. Biological quality elements demonstrate a clearer improving trend, increasing from predominantly Poor in the early 2010s to Good status in assessments from 2019 and 2022. Fish status has similarly improved to Good in recent years, while invertebrate status has remained High or Good throughout the entire assessment period, indicating a resilient invertebrate community. Macrophyte and phytobenthos sub-elements, where assessed, have consistently been classified as Good from 2014 onwards.

Tad Brook from Source to River Blithe has exhibited a sustained decline in ecological status. Ecological status was classified as Moderate between 2009 and 2014, before deteriorating to Poor from 2015, where it has remained through to 2022. Biological quality elements show a similar decline, with early Moderate or Good classifications giving way to persistent Poor status in later years. Fish assessments indicate sustained Poor status where data are available, while invertebrate status has fluctuated between Moderate and Good, with some improvement recorded in the most recent assessments. Macrophyte sub-elements have generally been classified as Poor to Moderate.

Blithe – Tad Brook to River Trent has been assessed since 2013 and has generally maintained Moderate ecological status through to 2022. Biological quality elements follow the same pattern; Fish and invertebrate elements have consistently achieved good status in all years assessed, while macrophyte and phytobenthos sub-elements have remained Moderate in recent assessments.

Blithfield Reservoir has been consistently classified at Poor ecological status from 2009 through to 2019, with an improvement to Moderate ecological status recorded in 2022. Biological quality elements follow a similar pattern, remaining Poor throughout earlier assessments before improving to Moderate in the most recent reporting year. Macrophyte assessments, where available, have generally been Moderate from 2013 onwards.

Risk rating: Medium

[3] *APEM (2018) Review and Update of Drought Permit Environmental Assessment Report: River Blithe and River Trent. South Staffordshire Water. APEM Scientific Report P00000270, version 5, January 2018, ix + 69 pages.*

Basis: The proposed drought-related operation of the River Blithe pump back scheme would involve temporary raw water transfer between hydrologically connected reaches of the Blithe catchment and Blithfield Reservoir during low-flow conditions. Historical WFD classifications indicate that the Blithe from Source to Tad Brook and Blithe – Tad Brook to River Trent are at Moderate ecological status, with limited headroom before deterioration to Poor, while Tad Brook from Source to River Blithe is at Poor status. Given the sensitivity of these watercourses to flow and water quality pressures during drought, there is a potential risk of short-term hydrological and physico-chemical stress.

Where preliminary screening indicates moderate or greater risk of deterioration or impediment to objectives, a full EAR including element-level WFD assessment will be required

Table 3: WFD classifications for the Blithe Rivers and Lakes Operational Catchment.

Classification Item	2009 Cycle 1	2010 Cycle 1	2011 Cycle 1	2012 Cycle 1	2013 Cycle 1	2013 Cycle 2	2014 Cycle 1	2014 Cycle 2	2015 Cycle 2	2016 Cycle 2	2019 Cycle 2	2019 Cycle 3	2022 Cycle 3
GB30435478 – Blithfield Reservoir													
Ecological	P	P	P	P	P	P	P	P	P	P	P	P	M
Biological quality elements	P	P	P	P	P	P	P	P	P	P	P	P	M
Macrophytes Sub Element	NA	NA	NA	NA	NA	M	NA	M	M	M	M	M	M
GB104028052290 - Blithe from Source to Tad Brook Water Body													
Ecological	G	P	P	P	M	P	P	M	P	P	M	M	M
Biological quality elements	H	P	P	P	M	P	P	M	P	P	G	G	G
Fish	NA	P	P	P	M	P	M	M	P	P	G	G	G
Invertebrates	H	H	H	H	H	H	H	H	H	H	H	H	G
Macrophytes and Phytobenthos Combined	NA	NA	NA	NA	NA	NA	NA	G	G	G	G	G	G
Phytobenthos Sub Element	NA	NA	NA	NA	NA	NA	NA	G	G	G	G	G	G
NA	NA	NA	NA	NA	NA	NA	NA	G	G	G	G	G	G
GB104028046491 - Blithe - Tad Bk to R Trent Water Body													
Ecological	NA	NA	NA	NA	NA	G	NA	G	M	M	M	M	M
Biological quality elements	NA	NA	NA	NA	NA	G	NA	G	M	M	M	M	M
Fish	NA	NA	NA	NA	NA	G	NA	G	G	G	G	G	G
Invertebrates	NA	NA	NA	NA	NA	G	NA	G	G	G	G	G	G
Macrophytes and Phytobenthos Combined	NA	NA	NA	NA	NA	NA	NA	NA	M	M	M	M	M

Classification Item	2009 Cycle 1	2010 Cycle 1	2011 Cycle 1	2012 Cycle 1	2013 Cycle 1	2013 Cycle 2	2014 Cycle 1	2014 Cycle 2	2015 Cycle 2	2016 Cycle 2	2019 Cycle 2	2019 Cycle 3	2022 Cycle 3
Phytobenthos Sub Element	NA	NA	NA	NA	NA	NA	NA	NA	M	M	M	M	M
Macrophytes Sub Element	NA	NA	NA	NA	NA	M	NA	M	M	M	M	M	M
GB104028046520 - Tad Brook from Source to River Blithe Water Body													
Ecological	M	M	M	M	M	M	M	P	P	P	P	P	P
Biological quality elements	NA	NA	M	M	M	G	M	P	P	P	P	P	P
Fish	NA	NA	NA	NA	NA	NA	NA	NA	P	P	P	P	P
Invertebrates	NA	NA	NA	NA	NA	NA	M	M	M	M	G	G	M
Macrophytes and Phytobenthos Combined	NA	NA	NA	NA	NA	G	NA	P	M	M	P	P	P
Macrophytes Sub Element	NA	NA	NA	NA	NA	NA	NA	P	M	M	P	P	P
Phytobenthos Sub Element	NA	NA	NA	NA	NA	G	NA	NA	NA	NA	NA	NA	NA

5.2 Designated Site Risk

A review of Environment Agency data and designated site information indicates that the River Blithe Operational Catchment is hydrologically linked to certain internationally designated sites. Consequently, the drought action has the potential to affect habitats supporting internationally protected wetland and fen ecosystems. A Habitats Regulations Assessment (HRA) may therefore be required to determine whether the proposed abstraction could have a significant effect on these designated sites, summarised in Table 4.

Blithfield Reservoir designated as a Nitrate Vulnerable Zone (NVZ) under the Nitrates Directive[4], and its shores classed in the Priority Habitat Inventory - Lowland fens and reed beds. Much of the land in the near vicinity of the Blithe and Trent is categorised as Priority Habitat Inventory – Floodplain grazing marsh.

Blithe from Source to Tad Brook Water Body has hydrological connection to the Midland Meres and Mosses Phase 1 Ramsar site, West Midlands Mosses SAC, while Blithfield reservoir is itself a designated SSSI for the Goosander and its variety of wintering birds. No other designated sites were identified as having hydrological connection according to the EA data. An HRA will be required to determine whether the drought action is likely to have a significant effect on the Midland Meres and Mosses Ramsar site.

Table 4: Environment Agency-designated sites hydrologically linked to the Blithe Operational Catchment.

Site	Distance	LSE (Y/N)	Reason	Link
Midland Meres & Mosses - Phase 1 Ramsar, overlapping with West Midlands Mosses SAC	Connected hydrologically to River Blithe via Stony Brook, downstream of Blithfield Reservoir	Yes	Designated for open water transition fen, lowland raised bog and associated habitats, as well as it's wetland invertebrate assemblage and wetland plant assemblage.	Designated Sites View
Blithfield Reservoir SSSI	Part of the river system	Yes	Designated for extensive open water, drawdown mudflats, swamp and marginal wetland habitats, together with adjacent farmland and woodland, provide feeding, roosting and migratory stop-over resources for a diverse assemblage of wintering and passage birds.	SSSI detail

[4] *Council Directive Of 12 December 1991 Concerning The Protection Of Waters Against Pollution Caused By Nitrates From Agricultural Sources (91/676/Eec) The Council Of The European Communities*

5.3 Protected Species Risk

This section presents a preliminary qualitative screening of protected and flow-sensitive aquatic receptors. Table 5 summarises the species recorded within the WFD surface water bodies potentially influenced by River Blithe.

The scope is proportionate to the Phase 1 EAP and does not include quantitative ecological modelling. Detailed assessment of macrophyte and macroinvertebrate elements, including modelling-informed evaluation of flow sensitivity and class headroom, will be undertaken within the EAR (refer Section 7.3).

Key Species: Baseline protected species records, as shown in Table 5, within the Blithe Operational Catchment indicate the presence of European bullhead, recorded within the Tad Brook from Source to River Blithe (GB104028046520) and the Blithe from Source to Tad Brook (GB104028052290) water bodies. Baseline macroinvertebrate records include mayflies, stoneflies, caddisflies, molluscs and aquatic beetles. Other notable species also include the white-clawed crayfish, which is protected under Schedule 5 of the Wildlife and Countryside Act 1981 and listed under Annex II of the Habitats Directive.

Table 5: Baseline Species Records in Blithe Operational Catchment.

WFD Water Body ID	No. of species	Species recorded
	Fish	
GB104028046520	1	*European bullhead*
GB104028052290	1	*European bullhead*
	Macroinvertebrates	
GB104028046520	1	*Gyraulus laevis*
GB104028052290	11	*Atherix ibis; Theodoxus fluviatilis; Austropotamobius pallipes; Amphinemura standfussi; Pisidium henslowanum; Potamanthus luteus; Hydraena rufipes; Potamophylax rotundipennis; Caenis pusilla; Rhithrogena germanica; Laccobius atratus*

SSW's 2018 EAR[5] states that the river provides a range of habitats suitable for fish spawning, juvenile and adult life stages, with in-channel features such as coarse substrates, variable flow velocities and localised cover. Fish movement within the system is influenced by the Nethertown weir and associated fish pass, which has been modified to improve upstream passage and to maintain downstream flows during abstraction shutdowns. The River Trent, into which the Blithe flows, was deemed an important migratory corridor for Atlantic salmon *Salmo salar*. As part of a wider project to restore salmon to the Trent catchment, 10,000 salmon parr were released into the River Blithe on 20 September 2013. However, none of these fish were subsequently recorded, and the only fish listed by EA data as current protected species is the European bullhead.

[5] *APEM (2018) Review and Update of Drought Permit Environmental Assessment Report: River Blithe and River Trent. South Staffordshire Water. APEM Scientific Report P00000270, version 5, January 2018, ix + 69 pages.*

The 2018 EAR predicted only small adverse impacts on fish populations in the River Blithe and negligible impacts in the River Trent. Any effects were expected to be limited to minor reductions in adult, juvenile and spawning habitat, reflecting the short length of river affected and the existing scarcity of suitable habitat downstream of Nethertown. Potential medium-term effects could arise where spawning success or juvenile development is constrained; however, these impacts were anticipated to be mitigated through monitoring and operational controls, particularly through the continued effective operation of the Nethertown fish pass (9 Ml/d flow continuation). Water quality impacts were assumed to be negligible, subject to confirmation through monitoring during drought conditions. Similarly, impacts of the drought plan on macroinvertebrate communities were predicted to be minor or negligible, and no effects were expected on otter populations.

Risk level: Medium

Mitigation approach: To minimise potential impacts on protected and sensitive fish species, the following measures are recommended:

- Consideration of seasonal sensitivity during drought operation, particularly in relation to key fish life-cycle periods (e.g. spawning and juvenile development).
- Maintenance of fish pass functionality at Nethertown weir (9 Ml/d flow continuation).
- Continued baseline and operational monitoring of fish communities, supported by macroinvertebrate monitoring as an early indicator of ecological stress.
- Weekly dissolved oxygen and habitat stress monitoring during operation; and implementation of trigger levels requiring reduction or cessation of pump back if ecological stress indicators are exceeded.

Post-operation checks will confirm recovery of habitat condition and continued presence of protected species.

5.4 INNS Risk

The River Blithe pump back scheme involves the transfer of raw water between water bodies during drought conditions and therefore presents a potential pathway for the introduction or spread of INNS. INNS risk will be determined fully in the EAR, and appropriate mitigation will be developed if required.

The 2018 EAR identified uncertainty regarding the presence and distribution of aquatic INNS within the River Blithe, particularly signal crayfish and zebra mussel. That assessment recommended targeted surveys in River Blithe, alongside riparian invasive plant surveys, to confirm baseline conditions.

Available records, as shown in Table 6, indicate the presence of several aquatic INNS within the Blithe Operational Catchment, including New Zealand mud snail *Potamopyrgus antipodarum*, signal crayfish , zebra mussel, tiger scud *Gammarus tigrinus*, and non-native amphipods *Crangonyx pseudogracilis / floridanus*. The presence of these species indicates that parts of the catchment are already subject to INNS pressures and that water transfer operations could exacerbate spread if not appropriately managed.

Table 6: Invasive Species Presence in Blithe Operational Catchment

WFD Water Body ID	No. of species	Species recorded
GB104028046491	1	*Potamopyrgus antipodarum*

WFD Water Body ID	No. of species	Species recorded
GB104028046520	3	*Potamopyrgus antipodarum; Crangonyx pseudogracilis/floridanus; Potamopyrgus jenkinsi*
GB104028052290	7	*Potamopyrgus jenkinsi; Gammarus tigrinus; Dreissena polymorpha; Dreissenidae; Potamopyrgus antipodarum; Crangonyx pseudogracilis/floridanus; Pacifastacus leniusculus*

Transfer probability: Medium - High

To address this risk, a dedicated INNS risk assessment will be undertaken during Phase 2 of the programme. This will include:

- Confirmation of baseline INNS presence and distribution within donor and receiving water bodies through targeted surveys;
- Assessment of the likelihood and consequences of INNS transfer associated with pump back operation; and
- Identification of proportionate mitigation measures, which may include operational controls, physical screening, biosecurity protocols, and pre- and post-operation surveillance.

The outcomes of the INNS risk assessment will inform the updated EAR and the EMP, ensuring that appropriate measures are in place to prevent the introduction or further spread of INNS as a result of drought operation of the River Blithe pump back scheme.

The Phase 2 INNS risk assessment will identify species of concern in donor and receiving catchments, define survey methods where required, and confirm monitoring lead-in time prior to implementation.

6 Environmental Monitoring (Preliminary)

This section describes the preliminary EMP for the River Blithe pump back scheme. Monitoring is required to confirm baseline environmental conditions, detect changes during pump back operation and verify recovery afterwards. Because the scheme involves raw water transfer, monitoring must consider hydrology, water quality, ecology, protected species and the potential spread of INNS. This approach aligns with EA drought guidance and reflects the sensitivities identified in the earlier baseline review and screening.

6.1 Pre-Operation Baseline Monitoring

A minimum 12-month rolling baseline dataset will be established, using a combination of historic and ongoing monitoring data, recognising that it may not always be possible to secure a full 12-month lead-in period prior to drought operation. This approach ensures that sufficient baseline evidence is available to support robust interpretation of any drought-related effects, and provides the seasonal coverage necessary to describe normal hydrological, water quality and ecological patterns within the catchment. It also ensures that the monitoring framework captures the natural variation important for assessing drought impacts.

Additional data, such as site condition assessment from Natural England will be sought to support the development of the EAR.

Hydrological and water quality monitoring

Baseline hydrology and water quality monitoring will establish the pre-operation conditions of the River Blithe system. These datasets are essential because previous assessments highlighted uncertainty in hydrological response in reaches affected by pump back and variable water quality conditions during low flow periods.

- Flow measurements at representative upstream and downstream locations to characterise baseline hydrology;
- Reservoir level and storage monitoring at Blithfield Reservoir to understand donor hydrological status;
- Field measurements including dissolved oxygen, temperature, conductivity, turbidity, nutrients (nitrogen and phosphate) and pH at donor and receiving monitoring points; and
- Baseline water quality sampling at pump intake and discharge nodes to identify any pre-existing nutrient or oxygen pressures.

Aquatic receptors

Ecological surveys will confirm the condition of in channel and marginal habitats and provide a biological baseline for flow dependent species. Ecology within the Blithe catchment has shown historical variability and several water bodies are sensitive to changes in flow and water quality, making updated ecological evidence essential. This will include:

- Macroinvertebrate surveys in spring and autumn to provide seasonal representation;
- Habitat walkovers to map channel form, sediment characteristics, aquatic vegetation and drought refugia; and
- Fish habitat walkovers focusing on spawning and juvenile habitats, particularly downstream of Nethertown weir where earlier constraints were identified.

Protected species

Protected species records from local data centres and monitoring will verify the presence and use of riparian habitat by species potentially affected by drought abstraction. Checks will be proportionate and targeted, ensuring that any species known or expected to use the local riparian habitats are appropriately considered before drought operation. Historical records confirm bullhead and otter within the catchment, and there have been possible signs of beaver within the Blithe catchment, this requires targeted attention, including:

- Desk based updates for bullhead, white clawed crayfish and otter;
- Field checks for otter signs including spraints or footprints;
- Field checks for beaver signs; and
- Opportunistic crayfish checks where habitat and access allow.Review of designated sites and groundwater-dependent terrestrial ecosystems (GWDTEs) hydrologically connected to the Fleam Dyke abstraction, to establish baseline condition, sensitivity to groundwater level change and potential drought vulnerability, drawing on published site condition assessments, citations and available hydrological dependency information.
- Baseline observational context for groundwater-dependent habitats, to support interpretation of any subsequent ecological responses during drought operation, recognising that these receptors may respond early to reductions in groundwater availability or baseflow.

INNS surveillance

Baseline INNS surveillance is essential because several aquatic invasive species are already present in the catchment. Establishing current distribution will help identify any changes associated with pump back operation. Existing EA data do not provide complete spatial coverage. This will include:

- Surveys for aquatic INNS including mussels, crayfish and amphipods at donor and receiving sites;
- Riparian surveys for invasive plants such as Himalayan balsam *Impatiens glandulifera*;
- Mapping of INNS distribution and abundance to form a baseline; and
- Photographic records to support change detection during and after the drought action.

Summary

The pre-operation baseline monitoring will provide a clear understanding of current hydrological, water-quality and ecological conditions across the River Blithe, Tad Brook and Blithfield Reservoir system. Establishing this baseline is essential for interpreting any changes associated with pump back operation during drought conditions, particularly given the known variability in ecological status and the presence of multiple INNS within the catchment. It will also ensure that subsequent operational and post-operation monitoring remains proportionate, targeted and aligned with the environmental sensitivities of the connected surface-water system, including reaches influenced by Blithfield Reservoir and sections previously identified as hydrologically and ecologically sensitive.

6.2 Operational Monitoring

Full monitoring details will be provided in the EAR however operational monitoring will take place weekly throughout any pump back period. Weekly operational monitoring is considered proportionate for this drought action, with frequency subject to escalation under an adaptive management framework where environmental thresholds or early warning indicators are approached. Weekly frequency ensures rapid detection of hydrological, water quality or ecological change, which is essential during drought when river systems are most sensitive. This monitoring will help identify how surface water systems can respond rapidly to drought pressure and operational changes, particularly in reaches influenced by Blithfield Reservoir regulation and downstream of Nethertown where ecological sensitivity has previously been identified. The focus remains on waterbodies identified earlier as hydrologically connected or sensitive to flow and water quality changes, including key reaches of the River Blithe and Tad Brook, ensuring any emerging signs of stress are detected early and that pump back remains within acceptable environmental limits.

Hydrology

Hydrological monitoring during operation will confirm that flows remain within expected drought patterns and will help identify any flow reduction or local hydraulic alteration associated with pump back. This will include:

- Spot flow measurements upstream and downstream of the discharge point to confirm flow behaviour; and
- Observations of wetted width, channel narrowing or scour that may indicate stress conditions.

Water quality

Water quality can deteriorate rapidly during drought, particularly under reduced flow conditions. Monitoring will confirm whether pump back is contributing to short term effects and will involved the following:

- Weekly dissolved oxygen, temperature, turbidity and conductivity check at representative monitoring points; and
- Visual checks for algal accumulation, stagnation or sediment mobilisation.
- Where practicable, continuous water-quality monitoring (for example using sondes) will be deployed during drought operation to provide higher temporal resolution and early warning of rapidly developing water-quality stress, particularly during low-flow, high-temperature periods.

Ecological condition

Monitoring ecological conditions during the drought action will help identify early signs of biological stress. This will include:

- Walkover inspections to identify stranded fish or invertebrates, or visible stress in sensitive habitats; and
- Observations of vegetation collapse or drying of marginal areas.
- Macroinvertebrate sampling may be undertaken, where appropriate, to provide evidence of ecological response during drought operation.
- Designated sites and groundwater-dependent terrestrial ecosystems (GWDTEs) hydrologically connected to the abstraction will be treated as sensitive receptors during drought operation, recognising their potential to respond early to changes in groundwater availability and baseflow.
- Observations from designated sites and GWDTE-linked habitats will complement in-channel ecological monitoring, including habitat walkovers, macroinvertebrate response and fish habitat availability, to provide a rounded understanding of environmental conditions during drought.
- Changes observed within designated sites and GWDTE-linked habitats will be used to inform environmental review and proportionate management responses, alongside hydrological and water-quality evidence, during the drought action.

INNS observations

INNS monitoring during operation will confirm whether the transfer is contributing to the spread of invasive species. This will include:

- Weekly INNS checks in downstream receiving reaches to identify new occurrences;
- Inspection of pumps, screens and pipework for fouling organisms; and
- Comparison with baseline photos to detect new species.

Triggers and adaptive management

Trigger levels will be confirmed in Phase 2 and will include minimum flow thresholds based on baseline and WFD expectations, dissolved oxygen thresholds aligned with WFD High and Good boundary values, ecological indicators signalling emerging stress, and the first detection of any high-risk INNS in a new section of the catchment; if trigger levels are approached, abstraction may be reduced or temporarily halted to avoid significant environmental effects. Full descriptions of triggers will be provided in the EAR.

6.3 Post-Operation Monitoring

Post-operation monitoring will confirm whether environmental conditions return to baseline patterns following cessation of drought abstraction, focusing on hydrology, water quality, ecological condition, protected species and INNS. Monitoring will continue for a minimum of 12 months after operation and will follow the same approach used in the baseline period to ensure comparability. Where receptors have not recovered within this period, monitoring may be extended to allow sufficient time for ecological, hydrological and water-quality conditions to return to expected baseline levels.

Hydrology and water quality

Hydrology and water quality will be monitored to confirm re-establishment of typical seasonal conditions and identify whether operational effects persist beyond the drought period. This will include:

- Spot flow measurements at baseline locations to confirm hydrological recovery; and
- Follow-up field measurements such as dissolved oxygen, temperature, conductivity and nutrients checks monthly for three months after operation, then seasonally.

Ecological condition

Ecological monitoring will assess whether biological communities and habitats recover to baseline condition, including:

- Habitat walkovers to confirm reinstatement of channel form, marginal vegetation and aquatic habitat; and
- Macroinvertebrate sampling in spring or autumn to verify ecological recovery.
- Where appropriate, repeat macroinvertebrate sampling will also be undertaken to confirm recovery of ecological condition relative to the baseline.

Monitoring will remain responsive to the condition of sensitive receptors, including designated sites and groundwater-dependent ecosystems where relevant.

Protected species

Protected species monitoring will check for continued use of riparian habitats and absence of long-term disturbance. This will include:

- Opportunistic checks for otter presence, including spraints and footprints;
- Opportunistic checks for beaver presence, including feeding signs, etc; and
- Opportunistic checks for water vole where habitat is suitable.

INNS observations

Follow up INNS monitoring will help confirm that pump back has not contributed to the spread of invasive species, including:

- Repeat INNS surveys at the donor and receiving locations to identify any changes in distribution; and
- Comparison of INNS patterns with baseline and operational findings.

Summary

Post-operation monitoring will confirm that any environmental effects from the drought action are temporary and reversible. Recovery across hydrological, water quality, ecological, protected species and INNS indicators will demonstrate that the River Blithe pump back scheme remains environmentally acceptable and aligns with EA drought planning requirements.

7 EAR Development Programme

7.1 EAR/ EMP Development Timeline

Table 7 below outlines the activity timeline for each phase of the EAR/ Environmental Monitoring Programme (EMP) development.

Table 7: EAR/EMP Development Phases, Activities, and Timeline.

Phase	Activity	Timeline
Data synthesis	Baseline data collation and analysis	April 2026
Impact assessment	Hydrological modelling, ecological assessment, WFD/HRA	May - August 2026
EMP finalization	Detailed monitoring protocols and trigger levels	September 2026
EAR report prep	Report writing, figures, internal review	September - October 2026
Client review	CAM/SSW comments and revisions	November 2026
Final submission	EAR/EMP submitted to CAM/SSW	December 2026

7.2 Further Hydrological Impact Assessment

This EAP provides a qualitative screening of potential hydrological and hydrogeological impacts associated with the River Blithe pump back. The subsequent EAR will undertake a quantitative assessment of hydrological change, including:

- Comparison of historic pump back volumes, current operational constraints and maximum licensed abstraction under drought conditions;
- Assessment of predicted changes in river flow magnitude, duration and velocity within affected reaches of the River Blithe and Tad Brook;
- Evaluation of altered hydraulic habitat availability downstream of the discharge location, including low-flow sensitivity;
- Consideration of flow recovery patterns following cessation of operation; and
- Review of predicted changes in the context of historic drought variability within the Blithe catchment.

This quantitative assessment will be used to refine the magnitude, duration and spatial extent of potential hydrological effects and inform the final WFD deterioration risk assessment.

7.3 WFD Deterioration Assessment to be Undertaken in the EAR

The EAP provides a preliminary, qualitative deterioration risk screening in accordance with the EA's drought planning guidance. The EAR will undertake a structured element-by-element assessment of potential deterioration risk, including:

- Assessment of relevant biological quality elements (e.g. fish, invertebrates, macrophytes);
- Assessment of supporting hydromorphological and physico-chemical elements;
- Identification of current classification headroom and proximity to class boundaries; and

- Evaluation of whether predicted hydrological changes could result in a temporary or permanent class deterioration.

The EAR will explicitly determine whether the proposed drought action presents:

- No risk of deterioration;
- A temporary deterioration compliant with Regulation 18; or
- A risk requiring further mitigation or permit constraint.

This will provide the regulatory evidence required to support drought permit readiness.

7.4 Monitoring Refinement within the EAR

The monitoring framework presented within this EAP defines the baseline, operational and recovery monitoring principles. The EAR will refine this framework by:

- The review and screening of additional designated sites and receptors, including GWDTE, wetlands, local nature reserves and other hydrologically linked habitats;
- Targeted gap-filling including the acquisition and assessment of EA datasets, compilation of long-term flow records and localised flow data, targeted habitat surveys and sampling, and acquisition of updated species data;
- Defining quantitative trigger thresholds linked to hydrological change;
- Establishing clear adaptive management triggers (e.g. ecological response indicators);
- Confirming monitoring frequency and duration requirements; nad
- Linking mitigation measures to specific environmental triggers.

This approach ensures compliance with Section 4 and Section 5 of the EA's drought environmental assessment guidance.

7.5 Key Dependencies

Key dependencies of the EAP include:

- EA agreement on this Action Plan (by end March 2026) to enable Phase 2 can commence.
- Third-party data availability (by April 2026) to enable baseline assessment to proceed.
- New surveys, if required (by July 2026) in order to finalise impact assessment.

8 Assumptions And Constraints

Assumptions and constraints of the EAP include:

- Action plan assessment limited to this specific drought action; additional actions subject to separate proposals;
- EAR required only if WFD deterioration risk identified, otherwise targeted summary and monitoring plan per EA (EA, 2025 - Table 3);
- Existing EAR available for targeted refresh (not full redevelopment);
- Existing baseline data available without need for extensive new surveys; any additional data needs identified early; and
- Regulatory guidance assumed to remain stable during 2026

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