

# Lower Itchen Drought Order Monitoring Plan

Draft 20 March 2018

This document has been prepared following consultation with the Environment Agency, Natural England and the Hampshire & Isle of Wight Wildlife Trust. The Agency, Natural England the Trust have worked very hard to develop these packages of monitoring, mitigation and compensation in a very compressed time frame.

The contents are broadly agreed but, due to time constraints, are subject to further work. Specifically:

- The costs and budget arrangements which underpin this package are to be agreed.
- The scope of the monitoring packages remains incomplete with regards to the need for monitoring of the mitigation and compensation works.

The Agency and Southern Water are committed to working together and with Natural England and others to refine these documents and complete the missing information in the near future.

In the meantime, this draft document is shared on a without prejudice basis. The observations and advice of interested parties will be a valuable contribution to that process.

## Introduction

This document sets out the package of measures to monitor for the possible environmental impacts on the River Itchen as a result of Southern Water Services Limited's ("**SWS**") abstraction from the River Itchen below the hands off flow ("**HoF**") of 198 MI/d (when measured at Allbrook & Highbridge) pursuant to a Drought Order ("**the Lower Itchen Drought Order**").

This document has been prepared by SWS in respect of the matter before the Planning Inspectorate (ref. RSA/WR/00016/17/18) as part of a settlement agreement ("**the Settlement Agreement**") with the Environment Agency ("**the Agency**"). This monitoring plan has been agreed between SWS and the Agency.

This monitoring package will be incorporated into SWS's Drought Plan Environmental Monitoring Plan.

## Content of this paper

The purpose of this document is to set out an environmental monitoring plan to monitor the impact of abstraction pursuant to the Lower Itchen Drought Order. This monitoring plan has been developed by SWS with advice from Natural England and the Agency.

In accordance with proposals from the Agency and Natural England, in consultation with the Hampshire & Isle of Wight Wildlife Trust, all monitoring will be funded by SWS but delivered by the following organisations:

- The Agency; and
- The Hampshire & Isle of Wight Wildlife Trust (subject to formal agreement).

Involving the Agency and the Hampshire & Isle of Wight Wildlife Trust in the delivery of this monitoring plan increases the chances of achieving the stated objectives, as those bodies can deliver work in ways and locations that SWS cannot, plus optimises budget and resource efficiencies and economies of scale.

The Agency agrees that:

- The agreed programme of monitoring measures set out below provide an assessment of the environmental baseline for the Lower Itchen Drought Order that will ensure that SWS is 'application ready' within the meaning of the Drought Plan Guidance for the purposes of any application for the Lower Itchen Drought Order; and
- These measures represent the maximum extent of monitoring to be required from SWS where a Lower Itchen Drought Order is implemented.

## Summary of proposed measures

The aim of the proposed monitoring plan is to:

- Improve understanding of normal (non-drought) conditions on the River Itchen; and

- Improve understanding of the environmental sensitivity of the Lower River Itchen to low flow events and the risk of drought actions.

The package consists of:

- Hydrometric and water quality monitoring;
- Lower Itchen Valley Southern Damselfly monitoring;
- River Itchen fish monitoring
- River Itchen invertebrate and macrophyte monitoring;
- River Itchen SSSI and NERC habitats monitoring;
- Lower Itchen Valley SSSI wetland monitoring;
- Lower Itchen Valley water vole monitoring;
- Lower Itchen Valley breeding birds monitoring; and
- Walkover surveys during implementation of a Lower Itchen Drought Order.

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# Hydrometry and water quality monitoring

**Monitoring measure 1:** Agreement of a hydrometric network to gather data for abstraction impact investigation.

**Description:**

1. The Agency and SWS will agree a sub-set of existing permanent river flow gauging stations, ground water monitoring boreholes and rainfall gauges that will be used as the core hydrometric network for the purposes of this Monitoring Plan.
2. The Agency will share the results of an existing review of the existing Agency flow gauging stations on the River Itchen, to establish agreement between SWS and EA on gauged flow data confidence bands.

**Objective:** The data collected will enable informed decisions to be made during drought events and will help secure protection of water dependent environments and may also assist in informing future management of sites.

**Funding and delivery:** The Agency is responsible for the maintenance of the existing gauging stations and providing hydrometric data to SWS.

**Monitoring Measure 2:** Installation and maintenance of five telemetered water quality monitoring stations and up to three non-telemetered water quality logger stations.

**Description:**

1. SWS will, dependent on agreement for access and installation, maintain up to five telemetered water quality monitoring stations and up to three non-telemetered water quality logger stations as follows:
  - (i) Three on the River Itchen between the vicinity of the proposed new outfall (for the Candover Drought order augmentation scheme) and the vicinity of Woodmill.
  - (ii) Two on the River Meon (or alternative), related River Itchen Salmonid compensatory habitat work.

The non-telemetered loggers to be allocated to complementary locations, either permanently or temporarily.

2. The proposed parameters to be measured at each telemetered water quality station are listed below:
  - Water temperature;
  - Electrical Conductivity;
  - pH;
  - Turbidity;
  - Dissolved Oxygen; and

- Water Level.

Non-telemetered stations may only provide a sub-set of these.

**Funding and delivery:** SWS will fund and maintain such proposed telemetered and non-telemetered water quality stations as it is able to install.

**Monitoring Measure 3:** Installation, maintenance and monitoring of up to 10 water level monitoring gauge boards.

**Description:** SWS will fund the Agency to install, maintain and monitor up to 10 water level monitoring gauge boards, including appropriate spot flow gaugings in association with Habitats Regulation Compensation schemes and / or drought permit / order mitigation relating to Crayfish, Southern Damselfly, Chalk stream or Salmonid habitat enhancement schemes. The frequency of monitoring will be agreed between the Agency and SWS relative to main river flow triggers.

**Funding and delivery:** SWS will fund the installation, maintenance and monitoring of up to 10 water level monitoring gauge boards. The level of funding appropriate has been agreed with the Agency. The Agency is responsible for delivery the programme of monitoring once funding has been provided by SWS.

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# Ecological monitoring for the River Itchen

**Monitoring Measure 4:** Monitoring plan for Southern Damselfly.

**Objective:** A pre, during and post drought monitoring plan that will provide a robust understanding of the distribution and relative strength of Southern Damselfly populations in the Itchen Valley.

**Description:**

1. Pre-drought: Installation and maintenance of depth gauge boards at 5 key sites for Southern Damselfly.
2. Pre-drought: conduct a desktop and field base study of all historic, existing and potential Southern Damselfly sites between Highbridge and Winchester. This aims to complement a detailed study conducted with Eastleigh Borough in 2017.
3. Pre-drought: Repeat survey programme in 2022 or 2023 across complete range of sites / potential sites identified in studies conducted between 2017 and 2019.
4. Pre/during-drought: When flows at Allbrook and Highbridge drop below **XXXMI/d**, a programme of depth levels collected at 5 key sites for the duration of the period up to and during a Drought Order and until levels at Allbrook and Highbridge naturally exceed **XXXMI/d**.
5. Post-drought: Bespoke survey programme for 2-3 years (to correspond to the species bivoltine life history and severity of impacts noted in year 1) after the implementation of the Lower Itchen Drought Order.

**Funding and delivery:** SWS will fund the Southern Damselfly monitoring programme. The level of funding appropriate has been agreed with the Agency. The Hampshire & Isle of Wight Wildlife Trust (subject to formal agreement) will be responsible for delivery the programme of monitoring once funding has been provided by SWS.

**Monitoring Measure 5:** River Itchen invertebrate and macrophyte monitoring programme.

**Objective:** A pre, during and post drought monitoring plan to provide an understanding of how macro-invertebrates and macrophytes on the River Itchen respond to low flow events.

**Description:**

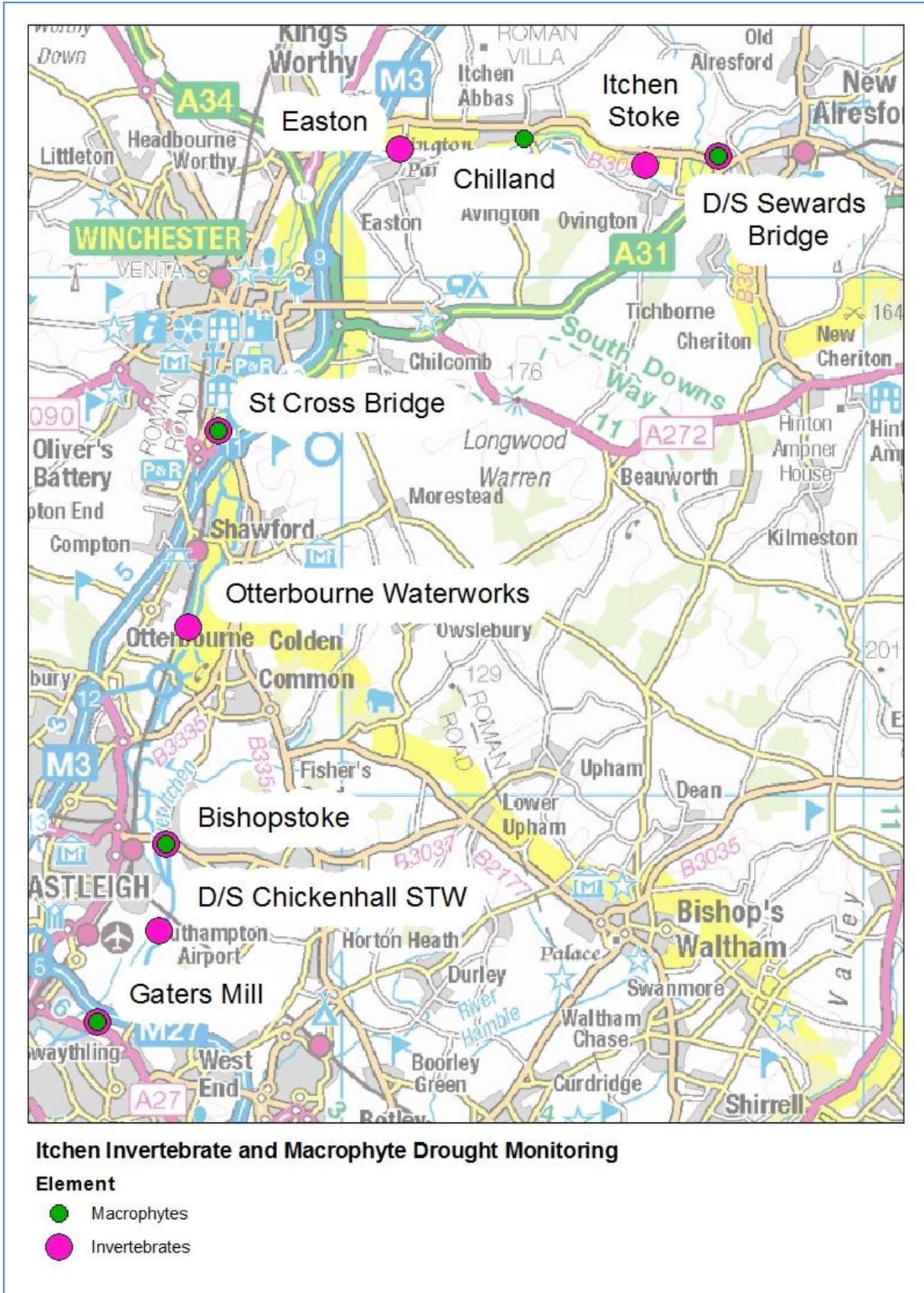
All monitoring will be performed to standard methodology as set out in the Agency's Operational Instructions:

- 018\_08 Freshwater macro-invertebrate sampling in rivers;
- 024\_08 Freshwater macro-invertebrate analysis in riverine samples; and
- 131\_07 Surveying freshwater macrophytes in rivers.

Any deviation from standard methodologies will be stated in the following tables and on any site sheets that are completed during surveying. The package of monitoring measures is set out in the table below. It is to take place three times a year, in Spring, Summer and Autumn. For the stages of in-drought and post-drought, this monitoring shall continue at these sites to enable assessment of impact and recovery.

Biosys River Name	Biosys ID	Site	NGR	Element	Method	Spring			Summer			Autumn			Annual Frequency	Funding
						March	April	May	June	July	August	September	October	November		
River Itchen	41998	Itchen Stoke	SU5582032150	Invertebrates	3-min kick		x			x			x		3	SWS
River Itchen	42048	Otterbourne Waterworks	SU4706023240	Invertebrates	3-min kick		x			x			x		3	Both
River Itchen	42204	Bishopstoke	SU4665019040	Invertebrates	3-min kick		x			x			x		3	Both
River Itchen	42204	Bishopstoke	SU4665019040	Macrophytes	MTR					x					1	SWS
River Itchen	43091	St Cross Bridge	SU4764027030	Invertebrates	3-min kick		x			x			x		3	SWS
River Itchen	43091	St Cross Bridge	SU4764027030	Macrophytes	MTR					x					1	SWS
River Itchen	43100	Gaters Mill	SU4533415628	Invertebrates	3-min kick		x			x			x		3	SWS
River Itchen	43100	Gaters Mill	SU4533415628	Macrophytes	MTR					x					1	SWS
River Itchen	43307	Easton	SU5113032470	Invertebrates	3-min kick		x			x			x		3	SWS
River Itchen	43313	D/S Chickenhall STW	SU4652017380	Invertebrates	3-min kick		x			x			x		3	SWS
River Itchen	43391	Chilland (Itchen Abbas)	SU5350332657	Macrophytes	MTR					x					1	Both
River Itchen	43102	D/S Swards Bridge	SU5724032330	Invertebrates	3-min kick		x			x			x		3	Both
River Itchen	43102	D/S Swards Bridge	SU5724032330	Macrophytes	MTR					x					1	Both

The proposed monitoring sites for the River Itchen are shown on the plan below.



The site locations and monitoring frequency was chosen by following guidance in the Agency's Operational Instruction 776\_15 Hydroecological monitoring for flow pressure assessment.

**Funding and delivery:** SWS and the Agency will jointly fund the River Itchen invertebrate and macrophyte monitoring programme. The level of funding appropriate has been agreed with the Agency. The Agency is responsible for delivery the programme of monitoring once funding has been provided by SWS.

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# Fish monitoring for the River Itchen

**Monitoring Measure 6:** River Itchen fish monitoring programme.

**Objective:** SWS will fund a drought monitoring plan for River Itchen fish which has been devised and will be implemented by Dominic Longley, the Agency's Solent & South Downs Senior Environmental Monitoring Officer, with input from Dr Adrian Fewings and Dr Nigel Milner.

**Description:** The Agency's proposed River Itchen Fish Drought Monitoring Plan expands on existing Agency fish monitoring programmes in order to optimise spatial coverage and temporal frequency.

A draft of the River Itchen Fish Drought Monitoring Plan is attached to this monitoring plan. In summary, fish monitoring will comprise:

- CPUE fish surveys;
- Single catch electric fishing;
- Juvenile lamprey sampling by quadrat; and
- Standardised winter salmon / sea trout spawning redd surveys.

**Funding and delivery:** SWS will fund the River Itchen Fish Drought Monitoring Plan monitoring programme. The level of funding appropriate has been agreed with the Agency. The Agency is responsible for delivering the programme of monitoring once funding has been provided by SWS.

**Monitoring Measure 7:** River Itchen eel monitoring.

**Objective:** Adult eel and elver entrainment monitoring at the Otterbourne Surface Water intake and Gaters Mill surface water intake during the period that a DP or DO is implemented.

**Description:**

1. It is assumed that both adult and young eels (elvers) are likely to be present (subject to seasonality). Adult eels are present year-round.
2. Adult eel sampling
  - a. Sampling location - Monitor the intake for adult eels by interception of the washed-off debris from the intake screens.
  - b. Sample timing - Eels generally are more active at dusk and dawn, so are more likely to be observed by sampling during hours of darkness. Sampling frequency proposed for two nights, once a month, for a 2 month period.
2. Elver entrainment sampling
  - a. On-site elver sampling would be carried out from mid March until XXXX to coincide with the start of the elver migration period. Samples would be taken within and adjoining the intake structure using a coarse-meshed net consisting of 1.5 mm mesh. The net would be installed into a cylindrical plastic tank, fitted with an overflow pipe to return overflow to the river.

- b. The entrainment sampler would be set up on day one. Staff will return to the site after a period of 168 hours (7 days) to collect the sample and immediately re-deploy the entrainment net for the next sample. In the event that fish are caught, subsequent daily checks will be carried out to ensure fish are returned to the river.

***Funding and delivery:*** SWS will fund and deliver the eel monitoring programme. SWS will deliver such monitoring as can be secured within its landownership, and any that is deliverable with the consent of landowners and lessees. Where consent is withheld, monitoring will not be undertaken.

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# Monitoring for River Itchen SSSI and NERC habitats and species

These monitoring measures are proposed to address those SSSI and NERC habitats and species at risk of impact from the Lower Itchen abstractions and not already addressed by the above measures, namely:

- Lower Itchen valley wetlands
- Water Vole
- Breeding Birds associated with lowland open waters and margins

**Monitoring Measure 8:** Lower Itchen Valley SSSI Drought Order monitoring programme.

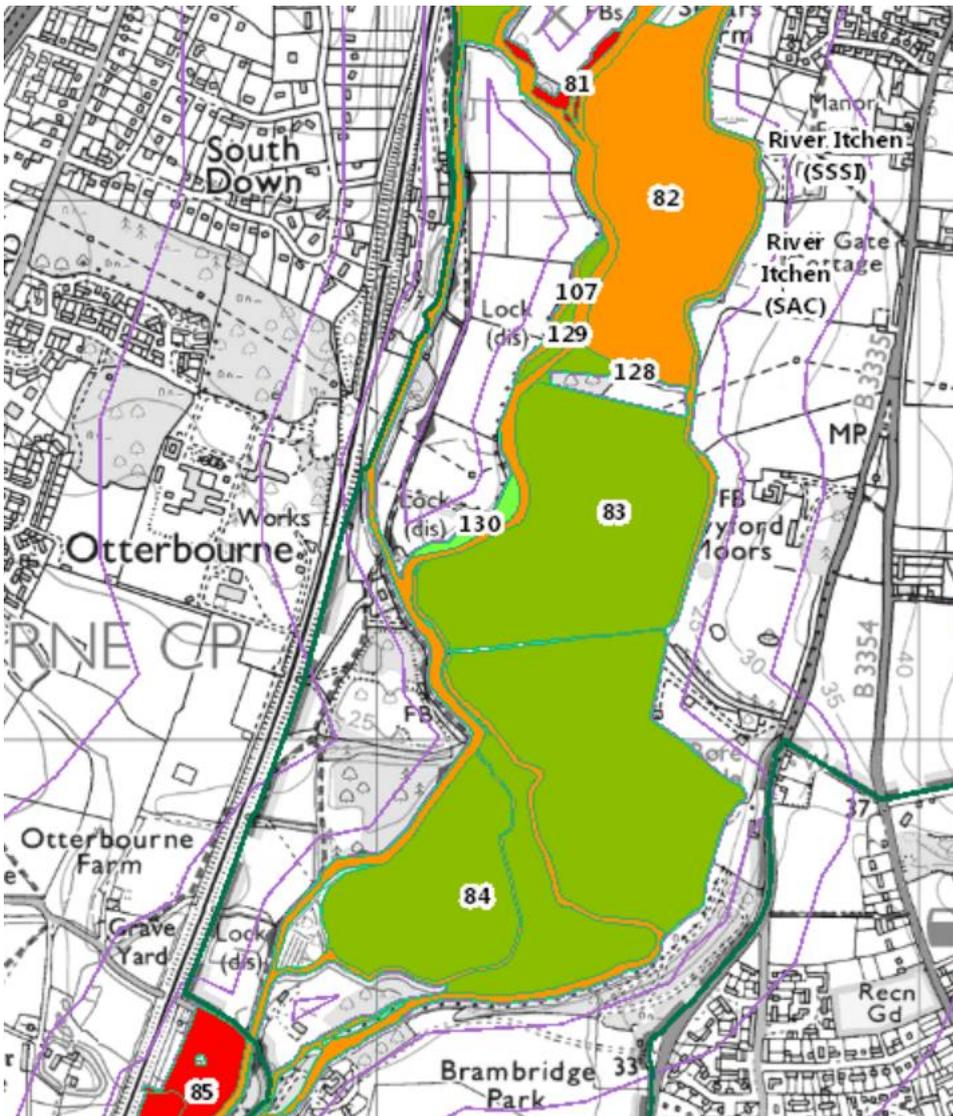
**Objective:** Monitoring to gather baseline information about the River Itchen SSSI wetland units and NERC habitats and species and to monitor the potential impacts of a Lower Itchen Drought Order.

**Features to be monitored:** Lower Itchen Valley wetlands

**Description:** The relationship between the river flows and Otterbourne SSSI wetlands is the subject of a WINEP investigation, which should significantly improve understanding of the interaction between river flows and the wetlands. A limited monitoring programme is proposed for the purposes of Drought Order. It is proposed that the Lower Itchen Valley SSSI Drought Order monitoring programme will complement the WINEP investigation such that the two will provide a better understanding of the interactions between the abstraction and the wetlands.

Due to the unknown relationship between the Itchen Valley wetlands and abstraction, the proposal is to restrict the SSSI wetland monitoring at present to Units 83/84. These are the units most closely associated with the river downstream of the abstraction and therefore most likely to be adversely affected by abstraction from the Lower Itchen. If a relationship is evident, monitoring of these wetlands should provide the earliest possible warning of potential effects.

Location of proposed focus of investigation for the SSSI wetland monitoring



The full details of the WINEP project are still under development. At this stage, the scope of the monitoring provided under the Lower Itchen Valley SSSI Drought Order monitoring programme has been delineated by agreement between the Agency and SWS as to the amount that SWS will fund as part of the Lower Itchen Drought monitoring package. The Lower Itchen Drought monitoring package will comprise the following (note that monitoring for WINEP will go further than this and complement the Lower Itchen Drought monitoring package):

- Walkover to confirm appropriateness of proposals and confirm design;
- Consents for works in SSSI;
- Botanical survey (NVC) to define the SSSI interest features present (once). Already available from NE surveys;
- Shallow augering to determine geology of the bed of the wet area. Already available from NE surveys;
- Shallow dipwell (max 1-1.25m deep) in ecological interest feature near to river (logger monitored for up to 10 years);
- Shallow dipwell (max 1-1.25m deep) in ecological interest feature distant from river (logger monitored for up to 10 years);

- Topographic transect to relate level of ecological features to river level and piezometer and dipwell levels (once);
- Topographic cross section, and flow gauging, ideally in low flow conditions, plugged into RHEFT to enable appropriate changes in extent of in channel river habitat with changes in flow – alongside Unit 83 or 84 (once);
- River level Gaugeboard and logger alongside Unit 83 or 84 (logger monitored for up to 10 years). Already factored in to hydrometric monitoring;
- Piezometer (tube well – 4-5m deep) into chalk (presume single only needed as would be shallow, on edge of SSSI wetland) (logger monitored for up to 10 years); and
- Piezometers (tube well – 4-5m deep) in the chalk up the valley between the wetland and the abstractions. Akin to the design used in the 1970s study – 1 downstream of the discharge, 1 upstream and 1 in the vicinity of the Coastal and Floodplain Grazing Marsh up the valley then this would give an indication of the levels in this habitat also (logger monitored for up to 10 years).

**Funding and delivery:** SWS will fund the Lower Itchen Drought monitoring package comprising 10 years of monitoring and annual update reporting. The level of funding appropriate has been agreed with the Agency. The Agency and Hampshire & Isle of Wight Wildlife Trust (subject to formal agreement) will be responsible for delivering the programme of monitoring once funding has been provided by SWS.

**Monitoring Measure 8:** Lower Itchen Valley water vole monitoring.

**Objective:** Assess the impact of the Lower Itchen Drought Order on the water vole population in the Lower Itchen Valley.

**Description:** The exact status of water voles in the Itchen Valley is largely unknown as monitoring efforts have been intermittent in scale and frequency. Their presence in the Valley is known and they are potentially vulnerable to changes in water levels, such as may occur in drought conditions and exacerbated by abstraction.

Natural England have requested that water vole are included in the monitoring plan. The monitoring will comprise annual / biannual monitoring of a 500m stretch of known water vole habitat. This is one of two methods recommended by the Hampshire & Isle of Wight Wildlife Trust. The monitoring proposals are subject to landowner access/agreement and walkover to confirm whether the proposals are appropriate or require refinement.

**Funding and delivery:** SWS will fund the package of water vole monitoring in the Lower Itchen Valley. The level of funding appropriate has been agreed with the Agency. The Hampshire & Isle of Wight Wildlife Trust is responsible for delivering the programme of monitoring once funding has been provided by SWS.

**Monitoring Measure 9:** Lower Itchen Valley breeding birds monitoring.

**Objective:** Assess the impact of the Lower Itchen Drought Order on breeding birds in the Lower Itchen Valley.

**Description:** Wetland drying is of concern in the Itchen Valley and the potential impact on breeding birds is of concern.

Wetland monitoring carried out under the Lower Itchen Valley SSSI Drought Order monitoring programme will provide useful information on the impact of the abstraction and river flows on the wetlands habitat and therefore potential for impact on the bird populations.

The Hampshire & Isle of Wight Wildlife Trust and the British Trust for Ornithology carry out bird counts on the Lower Itchen Valley. This data will be combined with wetlands monitoring to provide a good indication of the potential impact of the abstraction on birds in the Lower Itchen Valley.

**Funding and delivery:** SWS will fund monitoring of breeding birds in the Lower Itchen Valley. The level of funding appropriate has been agreed with the Agency. The Hampshire & Isle of Wight Wildlife Trust (subject to formal agreement) will be responsible for delivering the programme of monitoring once funding has been provided by SWS.

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# Monitoring during implementation of drought permit and drought order

**Monitoring Measure 6:** Walkover surveys during implementation of a Lower Itchen Drought Order.

## **Description:**

SWS will fund the Agency to carry out walkover surveys to assess and monitor the impact of the abstraction throughout the duration of a drought order and post drought order on a range of habitats and species in particular those designated under the SAC, SSSI and NERC priority habitats and species.

Walkover surveys will be carried out focus on the following features:

- Watercourse of plain to montane levels with the *Ranunculus fluitans* and *Callitriche-Batrachion* vegetation (with Sub-Type 1 chalk river habitat)
  - Identify any key sources of nutrient loading exacerbating low flow effects
  - Carry out additional water quality sampling particularly Soluble Reactive Phosphorus (SRP)
  - Consider addressing nutrient loading sources
  - Consider in-stream measures or adjustments to improve habitat conditions during drought conditions.
- Atlantic salmon
  - Targeted salmon habitat walkover surveys focussing on spawning and holding areas
  - Consider any measures to improve depth/velocity over spawning habitat e.g. temporary in stream flow deflectors.
  - Additional water quality sampling to check temperature, conductivity and dissolved oxygen levels in key spawning and holding areas.
  - Consider any measures to improve temperature and dissolved oxygen levels e.g. aerators and temporary shading.
- Other fish community
  - Targeted walkover surveys in areas known to contain high densities of fish – not already covered by salmon areas identified above.
  - Additional water quality sampling to check temperature, conductivity and dissolved oxygen levels in key spawning and holding areas.
  - Consider any measures to improve temperature and dissolved oxygen levels e.g. aerators and temporary shading.

**Funding and delivery:** SWS will fund this package of walk over monitoring on the Itchen on a weekly basis for the duration of a Lower Itchen Drought Order. The level of funding appropriate has been agreed with the Agency. The Agency is responsible for carrying out walk over monitoring once funding has been provided by SWS.