

Environmental assessment for water company drought planning – supplementary guidance

Consultation draft, September 2019

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1 Introduction

1.1 About this supplementary guidance

This document provides further technical guidance to water companies wholly or mainly in England on how to complete environmental assessments for their supply side drought management actions as part of their drought plans. It supports the published *Drought Plan Guidelines* for companies wholly or mainly in England. In particular, it supports the section of the *Drought Plan Guidelines* on [Drought plans: environmental assessment and monitoring](#).

For water companies wholly or mainly in Wales, or where your supply side drought management actions may affect sites in Wales, you must also consult Natural Resources Wales [Water Company Drought Plan Technical Guidance](#).

1.2 What you need to do

Your responsibilities

You must demonstrate in your drought plan that you have met your responsibility to monitor, assess and where possible mitigate for the environmental impact of all your supply side drought management actions.

These actions include:

- drought permits and drought orders
- alternative water sources to those normally used (for example, bringing back on-line un-used but licensed sources)
- temporary water transfers (for example, changes to bulk supplies or temporary pipelines)
- desalination
- effluent reuse

Environmental assessments

You must carry out an environmental assessment and produce an environmental monitoring plan for each of your supply side actions in your drought plan. Your environmental assessments should also include any mitigation measures you plan to implement.

For each of your supply side options you must:

- complete an environmental assessment to demonstrate you understand the impact on the environment of your proposed action
- set out the environmental monitoring you will use to understand the environmental impacts of your action
- identify the mitigation measures you will implement in order to minimise the environmental impact of your action

We recommend your environmental assessments (including mitigation measures) and monitoring plans are set out in technical appendices, with a high level summary in your main drought plan.

Informing your drought plan

Your environmental assessments should help you consider how to best balance protecting the environment whilst maintaining a secure supply of water. You should use these individual environmental assessments collectively to inform choices on when and how to use the different supply side drought management actions available to you. For example, to help you prioritise the use of options which free the most additional water supply with the least environmental impact.

You must also consider the combined environmental effects of your supply side drought management actions, and where relevant, the combination effects of your actions with those of neighbouring water companies and other abstractors.

Your [Strategic Environmental Assessment](#) and [Habitats Regulations Assessment](#) for your drought plan as a whole will help you do this.

Importance of upfront assessments

You should complete as much work as possible on your environmental assessments at planning stage. The benefits of doing this are:

- it allows you to make informed choices about when and how to use your various supply side options
- it enables you, the Environment Agency and other regulators to determine if a more detailed assessment is required. For example, an Appropriate Assessment
- completing adequate environmental assessments, monitoring and mitigation plans at planning stage is an essential part of being 'application ready' for drought permits and orders

Updating your environmental assessments

We recommend that you review and update your environmental assessments and associated monitoring plans annually. This will help to keep your environmental assessments up to date with the latest evidence and help reduce uncertainty. It is especially important to refresh your environmental assessments after implementing a supply side action during a drought event. This will allow you to improve your environmental assessments by incorporating datasets generated from in-drought and post-drought (recovery) monitoring which will enable you to ground-truth predicted environmental impacts against any actual observed impacts.

If you apply for a drought permit or order you must provide an updated environmental assessment, including the latest data and information, as part of your environmental report alongside your application. Information on how to do this can be found in guidance on what water companies need to do [before applying for a drought permit, drought order or emergency drought order](#).

1.3 Drought plan directions

Section on Directions relevant to environmental assessment to be added once these are agreed.

We recommend that completing environmental assessments and monitoring plans for each of your supply side drought management actions is an important way to meet these Directions. This will also help you demonstrate compliance with other [relevant legislation](#).

2 Engagement with the Environment Agency and other regulators

You should discuss your environmental assessments (including mitigation measures) and monitoring plans as early as possible with the Environment Agency and Natural England for sites in England, and/or Natural Resources Wales for sites in Wales, when developing your drought plan. This should be part of the preliminary discussions you hold with regulators, other organisations and individuals who could be affected by your actions. More details of who to include in preliminary discussions and what to discuss can be found in the guidance: [before you write a drought plan](#).

You must contact Natural England if your plan is likely to affect protected sites (e.g. Natura 2000 sites and SSSIs) in England or Natural Resources Wales for protected sites in Wales. You must contact the relevant National Park Authority (including the Broads Authority) about any actions that will take place within their boundaries and relevant local authorities in relation to Local Wildlife Sites.

The Environment Agency and Natural Resources Wales will be able to advise you on:

- their understanding of the hydrology, hydrogeology, hydroecology, geomorphology, habitats, species, fish stocks/fisheries and overall environmental sensitivity (to drought) at sites likely to be affected by your actions
- availability of their historical monitoring data and their planned monitoring programmes
- the sufficiency of your planned monitoring programme and potential mitigation measures
- water body status and programmes of measures

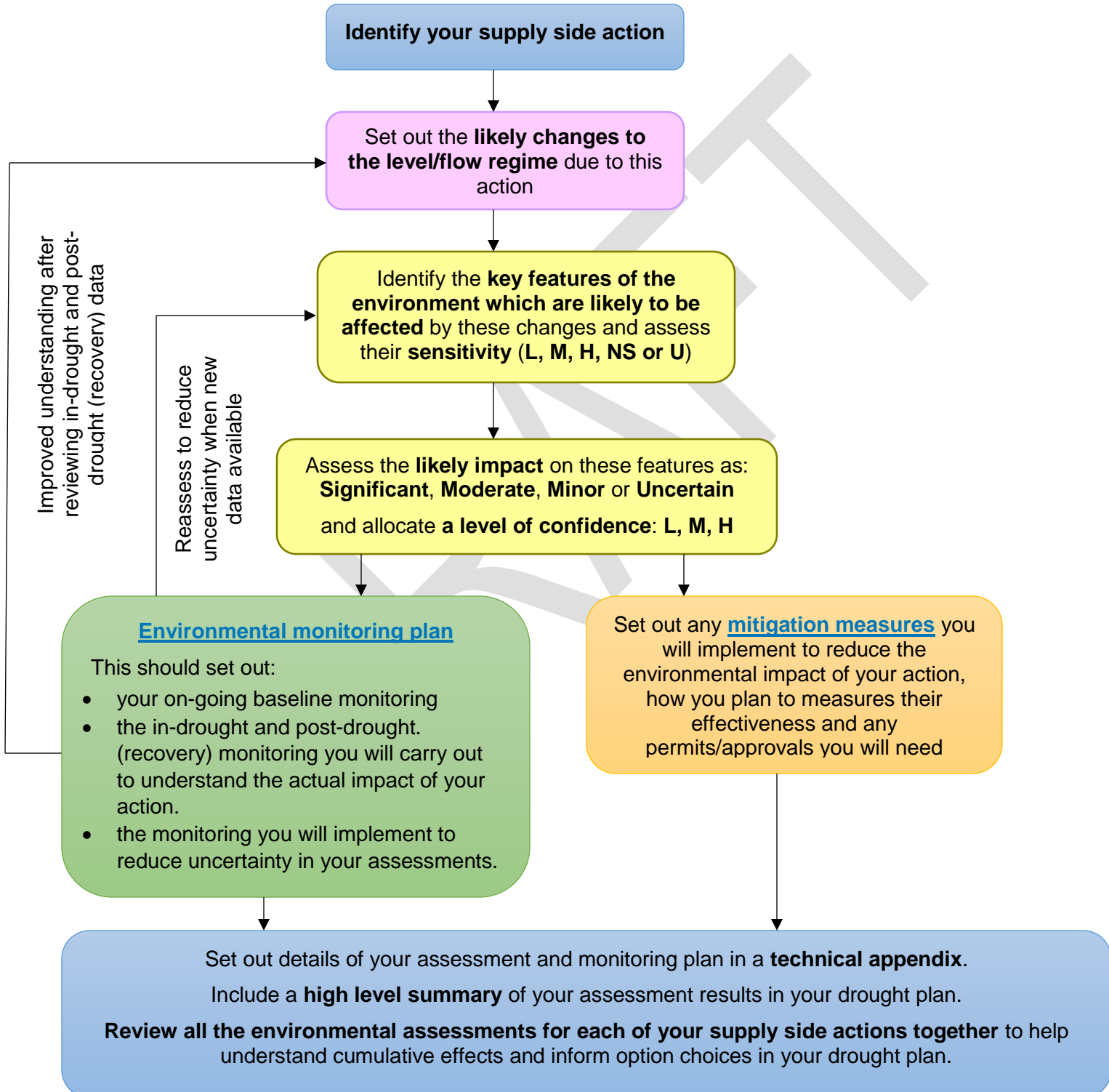
You can view the status objectives for all water bodies in England as part of the published river basin management plans (RBMPs). The plans contain a summary of the programmes of measures needed to achieve water body objectives and more information about the mechanisms used to implement them. The water body status objectives are also available on the Environment Agency's [catchment data explorer](#), along with classification updates and links to protected areas. You should use this information to help your discussions with regulators. You should refer to published [RBMPs on Natural Resources Wales website](#) where appropriate and you can view status objectives for all water bodies in Wales at [Water Watch Wales](#).

After you publish your drought plan you should maintain contact with the Environment Agency and/or Natural Resources Wales, and if relevant Natural England, to understand if there are any changes that might affect your plan. You will need to update your environmental assessment if there is a material change to your drought plan as required by [section 39B\(6\) of the Water Industry Act 1991](#).

3 Environmental assessment

3.1 Approach to environmental assessment

The diagram below sets out the high level approach you should take when developing your environmental assessments for each of your supply side drought management actions.



3.2 Understanding the likely environmental impacts of your actions

Your environmental assessments should set out the likely impacts on the environment of each of your supply side drought management actions and how you will mitigate for them. This section describes how you should approach doing this.

Assessing sensitivity

A key part of your environmental assessments should be understanding how sensitive each environmental feature of interest is to the likely changes in hydrology (or hydrogeology) caused by your supply side action.

To assess environmental sensitivity you need good quality, long-term environmental datasets. This is because long-term datasets are more likely to cover different flow conditions, including drought events, which will help you better understand how the environment at your site of interest responds to changing flow conditions. You can also use modelling tools where available to help assess environmental sensitivity.

You should categorise the sensitivity of your features of interest as:

- High
- Medium
- Low
- Not sensitive
- Uncertain

Predicting likely environmental impacts

Categorising the environmental sensitivity to hydrological changes will then help you predict the likely impacts of your actions on the environmental features of interest. For example, if a feature is categorised as 'not sensitive' it is unlikely that your action will cause an adverse impact on this part of the environment.

Where available you can also use modelling tools to explore how flow alterations due to your actions are likely to affect the environment. For example, [water quality modelling](#) or the new Hydroecological Modelling (HEM – macro-invertebrate) tool. Running modelled scenarios with and without your supply side actions is also a good way to help you understand the difference between the impact of natural drought and your supply side actions.

You should categorise the likely environmental impacts of your actions as either **significant, moderate minor or uncertain**.

What evidence to use

You should use the best available data, evidence and analysis methods to inform your environmental assessments. Types of evidence that you can use include:

- observed historical datasets
- observed datasets from on-going monitoring programmes
- expert judgement relating to specific habitat types
- evidence from other nearby sites which are similar to your site of interest
- modelled/simulated datasets

You should begin by understanding what environmental datasets you require and what is currently available to you. This will help you to understand the level of confidence you can have in the results of your environmental assessments and sources of uncertainty that you need to reduce.

Where you do not have sufficient datasets to undertake an environmental assessment it is your responsibility to implement monitoring to generate the information you need.

Level of confidence

You should allocate a level of confidence (**low, medium or high**) to your environmental assessments. This should be based on the quality of the datasets, evidence and analysis methods you have used to inform your assessment. You should identify sources of uncertainty in your assessment and set out how you plan to reduce these going forward.

Example: If one of your environmental assessments is categorised as low confidence because it is based on very limited datasets, you should set out in your associated monitoring plan the additional baseline monitoring you will carry out to help reduce this uncertainty.

Example templates

You should clearly set out in your environmental assessments the environmental sensitivity, the likely predicted impacts and any mitigation measures you plan to implement. You should also set out the level of confidence allocated to your environmental assessment. Examples of tables you could use to summarise the findings of your environmental assessment are shown in [Appendix 7](#).

Drought permit/orders environmental assessment and designations

The environmental assessment of any drought permit or order application that may affect a SAC (Special Area of Conservation), SPA (Special Protection Area), Ramsar site or SSSI will need to be completed 'in combination' with relevant permits, plans or programmes. This is required to demonstrate how proposed drought permits/orders would affect the environment in combination with the effects of existing licences, consents and plans. Your assessment should include licences, consents and plans of neighbouring water companies and show that appropriate actions will be taken to reduce the impact so as to avoid an adverse effect on a designated conservation site.

3.3 Understanding the actual environmental impacts of your actions

Where possible, you should include in your environmental assessments observed data and information from when your supply side actions have been implemented during a drought. This will help you better understand how your actions have actually affected the environment and ground-truth your predictions of likely environmental impact. In many cases this may not be possible as not all supply side actions will have previously been implemented.

However, at planning stage you should identify how you will generate appropriate datasets to understand the actual environmental impact as and when you need to implement supply side actions during a drought. You should set this out in your [environmental monitoring plans](#). See [Environmental Monitoring](#) for further information.

Following implementation of a supply side action during a drought you should refresh your environmental assessments with the observed evidence you have generated. This will allow you to ground-truth actual against predicted environmental impacts and help improve the confidence in your revised environmental assessments.

3.4 Resources and level of effort

You should focus your resources and level of effort on understanding, and where possible mitigating for, the environmental impacts of the supply side drought management actions which you are most likely to implement. In particular, you should ensure you carry out adequate environmental assessments and monitoring plans for any drought permits and orders for which you need to be application ready.

However, you must also ensure that where your actions may affect protected areas or designated sites that you complete environmental assessments in line with expectations set out in [relevant legislation](#).

You should set out the justification for how and why you have decided on your level of effort/resource on environmental assessment for each of your supply side actions. This is particularly important where you have opted for a reduced level of effort/resource.

3.5 What your environmental assessments should do

The section below sets out the expectations for what the environmental assessments for your supply side drought management actions should do.

Your environmental assessments must demonstrate how you will meet the legislative requirements of:

- Conservation of Habitats and Species Regulations 2017
- fisheries legislation: Salmon and Freshwater Fisheries Act 1975 and the Eel (England and Wales) Regulations 2009
- Water Environment (Water Framework Directive) Regulations 2017 including the objectives set out in river basin management plans
- section 40 of the Natural Environment and Rural Communities Act 2006 (NERC)
- legislation covering invasive non-native species (INNS) – see [Summary of legislation relevant to INNS](#)
- other non-statutory requirements (local wildlife sites etc.)
- protected areas designated under international agreements (incl. Ramsar & Natura 2000 sites)
- protected areas designated under national legislation (SSSIs), nationally protected species and habitats - Wildlife and Countryside Act 1981 and other locally important sites
- For any options affecting sites in Wales you must also consider relevant sections of the Environment (Wales) Act 2016. See Natural Resources Wales [Water Company Drought Plan Technical Guidance](#).

Your environmental assessments should include details of the likely impacts of your actions on:

- hydrology (water flow or level regimes) and hydrogeology (where appropriate)
- water quality
- ecology, including ecological status, as well as quantitative status of groundwater as identified in river basin management plans (RBMPs) and fish populations
- habitats and geomorphology
- designated sites and priority habitats and species
- conservation of biodiversity in your role as a public authority under the Natural Environment and Rural Communities Act 2006 (NERC)
- other physical, economic, cultural and heritage issues

- the spread of invasive non-native species

Your environmental assessments should demonstrate how you have:

- assessed the likely impacts on the aspects of the environment outlined above
- assessed the environmental sensitivity of the ecological community at affected sites

Your environmental assessments should set out how you will:

- minimise the environmental impact of your actions
- mitigate the impacts and assess the effectiveness of these mitigation measures
- where legally required, compensate for the impacts where it's not possible to minimise or mitigate for them

Your environmental assessment should identify:

- environmental monitoring you will carry out to support and ground-truth your environmental assessments (including in-drought and post-drought – recovery monitoring)
- the level of confidence in your assessment of the likely environmental impacts of your actions and how you plan to reduce any uncertainty

3.6 What your environmental assessments should include

Table 1 below shows the minimum you should set out in your environmental assessments for each of your supply side drought management actions.

Table 1: What to include in environmental assessments	
Summary	Provide details of the proposed supply side action to maintain water supply.
Proposal	Set out: <ul style="list-style-type: none"> • the evidence to justify the proposed action • where there is a change to an abstraction or a discharge, where it is from/to and which sites, water bodies and other abstractions will be affected • any proposed and alternative measures, such as different periods of abstraction or a lower hands-off flow (HoF)
Assessing the environmental impact	Set out your assessment of the likely environmental impacts over time (short, medium and long term) of your action. This should include: <ul style="list-style-type: none"> • your understanding of the baseline environment • the hydrological (and if appropriate hydrogeological) impacts of your action (including magnitude, duration and spatial extent) • what aspects of the environment you have assessed, their sensitivity to your action and the likely resulting impact • how you will assess the environmental impacts of your actions during and after a drought (linked to your environmental monitoring plan) • potential impacts on designated sites, priority species and habitats

	<ul style="list-style-type: none"> likely impact on water body status or potential and risk of deterioration the risk of spreading invasive non-native species the likelihood of the impacts being temporary or permanent potential for cumulative effects (e.g. when combined with other actions in your plan and other abstractions likely to be taking place in that reach or area or over a period of time)
Features to consider	<p>You should demonstrate you have considered the elements/features of the environment that are:</p> <ul style="list-style-type: none"> the reason for designation of a protected site, and as part of the wider environment according to your duties under the NERC Act 2006 not included above but which may be affected by your drought actions. This may cover the natural environment and also aesthetics, recreation, navigation, archaeology and heritage. used to determine surface water and groundwater body status and elements that could influence the status used to determine salmon and sea trout status - see information in Salmon stocks and fisheries in England and Wales in 2014 pages 57 – 65 priority substances, priority hazardous substances and other pollutants
Mitigation measures	<p>Set out the mitigation and compensation measures you plan to implement to reduce the environmental impact of your action.</p>
Compliance	<p>Provide sufficient evidence to demonstrate your compliance with all relevant legislation.</p>
Supporting evidence	<p>You should present the detailed evidence, datasets and technical information you have used to complete your environmental assessment in a separate technical appendix. You should also set out in this appendix:</p> <ul style="list-style-type: none"> the process you used to select the datasets and evidence used to complete your environmental assessment the data analysis methods and tools you have used to complete your environmental assessment the main sources of uncertainty in your datasets, the level of confidence in your environmental assessment and how you plan to reduce any uncertainty reference any supporting reports or documents you have used to support your environmental assessment
Environmental monitoring	<p>Alongside each of your environmental assessment you should also produce a separate environmental monitoring plan which sets out the baseline, in-drought and post-drought (recovery) monitoring you will carry out.</p>

4 Environmental monitoring

4.1 Purpose of monitoring

Environmental monitoring plays two distinct roles in the drought planning process. These are:

- helping you to understand the [likely environmental impacts](#) of your supply side actions and set these out in your environmental assessments
- helping you to understand the [actual environmental impacts](#) of implementing your supply side actions during a drought event

It is your responsibility to generate appropriate environmental datasets for you to adequately understand the likely and actual environmental impacts of your supply side drought actions.

4.2 Monitoring to inform assessment of likely environmental impacts

Baseline monitoring

To understand the likely environmental impact of your supply side drought management actions you need appropriate **baseline monitoring** datasets. These monitoring datasets will help you understand the nature of the environment under 'normal' circumstances, along with establishing the sensitivity of the environment to changes in flow and any especially sensitive features of interest that you need to particularly consider.

Baseline monitoring is also essential in enabling you to understand the [actual environment impact](#) of your supply side drought management actions. It allows you to compare the environment under 'normal' conditions against your observed environmental datasets during and after a drought. Without adequate baseline monitoring you will not be able to do this.

Your monitoring should be an on-going activity as the environment is not static. Over time 'normal' circumstances may alter due to climate change, the implementation of sustainability changes or other changes (for example, water quality improvements). Ongoing baseline monitoring will help you better understand this and factor it into your environmental assessments.

Where you have very high quality, long-term datasets you could consider reducing the between year frequency of your baseline monitoring programme. You could also consider, where available, hydroecological modelling tools which could help supplement your baseline monitoring datasets. However, you should discuss the suitability of doing this with Environment Agency and/or Natural Resources Wales before implementing these changes to your monitoring programmes.

4.3 Monitoring to assess actual environmental impacts

In-drought and post-drought (recovery) monitoring

At planning stage, you should also identify the monitoring you will put in place to understand the actual environmental impacts of implementing your supply side actions during and after a drought event. This includes setting out your plans for carrying out in-drought and post-drought (recovery) monitoring.

In-drought monitoring will help you to assess the immediate environmental impacts of your action during a drought along with informing choice and implementation of mitigation measures. **Post-drought (recovery) monitoring** will help you assess any longer term environmental impacts of, or recovery from, your actions.

For drought permit and orders, you may also need to consider splitting your in-drought monitoring into **pre-permit application** and **post-permit implementation** stages.

Combining appropriate baseline, in-drought and post-drought (recovery) monitoring will help generate good quality datasets which you can use to ground-truth and improve your environmental assessments.

4.4 Environmental monitoring datasets and sources

Environmental monitoring datasets

You should tailor your environmental monitoring to the needs of the specific environmental assessment for each of your supply side actions. However, some examples of key environmental monitoring you are likely to need to carry out include:

- ecological (for example, macro-invertebrates, fish, macrophytes, INNS, protected habitats and species)
- hydrological monitoring (for example flow and level)
- geomorphological surveys (including habitats – for example River Habitat Survey or geomorphology walkover surveys)
- water quality
- temperature
- other supporting information (e.g. fixed point photography)

Your monitoring programmes

It is your responsibility to generate appropriate environmental datasets for you to adequately understand the likely and actual environmental impacts of your supply side drought actions. To do this, you should implement your own bespoke environmental monitoring programmes tailored to the needs of your environmental assessments.

You can supplement your bespoke monitoring programmes with datasets generated from regulators and other third party monitoring. However, you should not solely rely on these monitoring programmes and datasets as they will not have been specifically designed to understand the impact of your supply side drought management actions and are subject to change. You should also ensure that any third party data is appropriate for your environment assessment and is compatible with other datasets you are using.

You should set out in any third party monitoring you plan to use in your [environmental monitoring plan](#).

Other available monitoring datasets

The Environment Agency and/or Natural Resources Wales will have various environmental monitoring programmes which you may be able to use to supplement your bespoke monitoring programmes. You should discuss the availability and relevance of these monitoring programmes with the Environment Agency and/or Natural Resources Wales.

You should also consider other third party sources of environmental monitoring data which you could additionally draw on to inform your environmental assessments. For example, the National Biodiversity Network, Country Wildlife Trusts, biological records centres, angling clubs and site managers.

If you plan to use data from existing monitoring programmes of either regulators or other third parties, then you should check their monitoring plans annually to understand if this monitoring is on-going. This

will help you understand how you may need to adjust your monitoring plans should programmes carried out by regulators or third parties that you use for your environmental assessments change.

4.5 Monitoring design

Good monitoring design is essential in helping to ensure you generate appropriate datasets to understand the environmental impacts of your supply side drought management actions.

In particular, your monitoring programmes should be designed to allow you to understand the difference between the natural impact of drought on the environment that caused by implementing your supply side drought management action and your normal level of licensed abstraction. You can only achieve this by planned, effectively designed monitoring programmes.

You should use a Before-After-Control-Impact (BACI) approach. Paired control and impact sites monitored under baseline, in-drought and post-drought (recovery) stages are essential in help you to understand the differences between the impacts of natural droughts and drought management actions.

[Appendix 4](#) provides further information on ecological monitoring and assessment methods.

4.6 Environmental monitoring plan

You should produce environmental monitoring plans which set out all the monitoring you will carry out to understand the environmental impact of each of your supply side actions. These should sit as separate documents alongside, and linked to, each of your environmental assessments.

In your environmental monitoring plans you should set out the details of the monitoring you will carry out during baseline (non-drought), in-drought and post-drought (recovery) phases.

For each of these stages, this should include:

- the elements/features of the environment you will monitor
- the location, in-year and between year frequency of monitoring, sampling/survey methods
- any changes in approach between stages (for example, increasing the frequency of sampling during the in-drought stage)
- who is responsible for carrying out this monitoring

Your monitoring plan should also set out:

- the existing environmental datasets you have and how the additional monitoring you plan to carry out will complement these and improve your environmental assessments
- how you plan to analyse the resulting monitoring datasets and the data analysis tools you will use

[Appendix 7](#) shows an example of how you can set out the details in your environmental monitoring plans.

5 Mitigation and compensation measures

You should set out how you will:

- mitigate for or reduce adverse impacts on the environment of your supply side drought management actions
- provide compensation for adverse effects that remain after you've taken measures to mitigate them

You should set out the details of all your planned mitigation measures in the [environmental assessments](#) for each of your supply side actions.

In your drought plan you should set out:

- **pre-drought mitigation actions:** actions you will implement before or whilst the drought is developing to reduce the likely environmental impact of your proposed actions
- **in-drought mitigation actions:** actions you will implement during a drought to minimise the environmental impact of your proposed actions
- **post drought mitigation actions:** actions you will implement following a drought to reduce any environmental impacts that may occur as a result of the actions you implement

Your drought plan should also:

- provide evidence that the mitigation measures you are proposing will be effective for the features that could be at risk from your drought management actions
- set out how you will monitor the effectiveness of implementing these mitigation measures
- identify the details of any additional permits or approval you need to implement these mitigation measures

As a drought develops it is important to review your planned mitigation measures before implementing them as each drought is unique. Evidence from your in-drought monitoring can also help inform your choice of mitigation measures to implement during a drought.

We also recommend that you consider implementing 'no regrets' mitigation measures during non-drought conditions which will help build environmental resilience to drought.

You should discuss your proposed mitigation activities with the Environment Agency, Natural England and/or Natural Resources Wales and any other affected parties. It is also important to talk to the Environment Agency, Natural England and/or Natural Resources Wales about its own drought plan and to coordinate drought management activities.

6. Relevant legislation

The principles of environmental assessment are the same for all legislation. However, you must ensure your environmental assessments fulfil the requirements of all the relevant legislation outlined below.

6.1 Habitats Directive/Habitats Regulations

Special Areas of Conservation (SAC) or Special Protection Areas (SPA) known as Natura 2000 sites; Ramsar sites (together referred to as Internationally designated sites) all require a high level of confidence for decision making due to their designated status. They may require a more detailed assessment depending on the effects on their designated features. More information on the requirements of the Habitats Directive are in [Appendix 1](#).

Habitats Regulations Assessment (HRA)

The HRA requirements protect European sites from developments and other activities which may harm them directly or indirectly.

Assessment under Conservation of Habitats and Species Regulations is undertaken by the relevant competent authority. Water companies are the competent authority in relation to their drought plans and have an obligation to assess their drought plans under the Habitats Regulations.

You must ensure that your drought plan meets the requirements of the Conservation of Habitats and Species Regulations 2017, and must undertake a HRA on the effects of your plan on European sites, alone or in combination with other plans or projects (e.g. the effects of drought management actions on European sites). You can search for details on designated sites on [Natural England's](#) and [NRW's](#) websites.

The Environment Agency for England and Natural Resources Wales for Wales are the competent authorities for drought permit applications. The Secretary of State for Environment, Food and Rural Affairs is the competent authority for drought orders in England and Welsh Ministers are the competent authority for drought orders in Wales. Guidance on the requirements can be found in the UK Water Industry Research report on [Strategic Environmental Assessment and Habitats Regulations Assessment - Guidance for Water Resources Management Plans and Drought Plans](#). The Environment Agency and Defra may use the information in the HRA together with other information in their assessments of drought permit and drought order applications.

6.2 Wildlife and Countryside Act 1981 (WCA)

Duties under WCA require water companies to take reasonable steps, consistent with the proper exercise of their functions, to further the conservation and enhancement of SSSI features. You should adopt a similar technical approach as used for assessing likely significant effect on Natura 2000 sites when you assess whether a drought action is likely to damage an SSSI. You can also use the site citation specific to each SSSI and the operations requiring Natural England's and/or NRW's consent (formerly known as operations likely to damage the special interest - OLDs) or potentially damaging operations (PDOs) to help decide whether damage will occur. This information can be found in Natural England's [designated site system](#). You should also consider your responsibilities under the Countryside and Rights of Way Act 2000.

6.3 Priority habitats and species and locally important sites

[Section 40 of the Natural Environment and Rural Communities \(NERC\) Act 2006](#) places a duty on every public authority, (which includes statutory undertakers), in exercising its functions, to have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity.

You will need to take account of this duty, and the list of species and habitats published, in accordance with section 41 of the Act in your drought plans.

This duty applies to Local Wildlife Sites (formerly called County Wildlife Sites or Sites of Nature Conservation Interest). Although these are non-statutory designated sites, they are selected for the occurrence of habitats and/or species of principal importance defined under section 41 of the NERC Act. Many are of SSSI quality.

You should also use the Defra published guidance for public authorities [*Biodiversity duty: public authority duty to have regard to conserving biodiversity*](#).

For these receptors you should use the best available information to screen for impacts and follow the mitigation hierarchy for all potential impacts that you identify.

1. Avoid impacts where possible,
2. Mitigate impacts that are unavoidable
3. Compensate for impacts if you cannot mitigate them

Mitigation measures minimise or cancel negative impacts to receptors. Compensation measures offset the negative impacts of a plan or project and are independent of the plan or project and any associated mitigation measures.

Compensation should maintain the ecological function of any impacted habitat and the viability of impacted habitat and/or species at the landscape scale.

If your site is within Wales, as a statutory undertaker, you must have regard to Environment (Wales) Act 2016 Section 6 and Section 7 under this act within your environmental assessment.

The Environment (Wales) Act 2016 (Section 6) contains the Biodiversity and resilience of ecosystems duty, which states that public authorities must “seek to maintain and enhance biodiversity in the exercise of functions in relation to Wales, and in so doing promote the resilience of ecosystems, so far as consistent with the proper exercise of those functions.”

Section 7 - Biodiversity lists and duty to take steps to maintain and enhance biodiversity. This section replaces the duty in section 42 of the NERC Act 2006*. The Welsh Ministers will publish, review and revise lists of living organisms and types of habitat in Wales, which they consider are of key significance to sustain and improve biodiversity in relation to Wales. *Until Section 7 list is published, refer to the Section 42 of the (NERC) Act 2006.

Other locally designated sites (e.g. local nature reserves) may be considered lower risk, but specific consideration may need to be given to particular features.

6.4 Fish and fisheries

The principal fisheries legislation comprises the Salmon and Freshwater Fisheries Act 1975, Water Resources Act 1991 and Environment Act 1995. Certain fish species and fish stocks are also protected by the Habitats Directive legislation, the Wildlife and Countryside Act 1981, Eels Regulations 2009 and the requirements of the Water Framework Directive.

Fish that are protected [*priority species*](#) under the UK Post-2010 Biodiversity Framework as required under the Natural Environment and Rural Communities (NERC) Act 2006 include salmon, trout, eel, lamprey and shad (see [Appendix 3](#) for a full list). These fish are features of interest of a number of Habitats Directive sites and SSSIs. Information on the distribution of priority fish species can be found on the [National Biodiversity Network Gateway](#).

Important fish stocks/fisheries include:

- **principal salmon rivers** - England's 42 principal salmon rivers as identified in the ministerial Directions given to the Environment Agency in 1998 under Section 40(1) Environment Act - 1995. For more information see the [Assessment of salmon stocks and fisheries in England and Wales report](#)
- **principal sea trout rivers** - England's 44 principal sea trout fisheries are designated on the basis that the actual or potential rod catch exceeds 50 per year on average
- **principal trout fisheries** - those that support wild brown trout fisheries and which attract at least 150 angler visits per year
- **principal coarse fisheries** - significant or popular river fisheries where angling matches take place; day tickets are sold; public angling is available (e.g. free fishing); or which are operated by angling clubs with more than 100 members
- **other coarse fisheries** - those that support organised angling, but at a lower level than principal fisheries
- **rivers and stillwaters that support priority species** (for example Lamprey and Shad)
- waters frequented by eels and locally important eel/elver fisheries, notably the River Severn and River Parrett

Significant stillwater fisheries whose water levels may also be affected (for example, directly or indirectly connected to rivers or supported by groundwater levels) must also be considered.

Information about the location of sites that support important fish populations is available from the Environment Agency and/or Natural Resources Wales.

Your assessment for fish should include investigating the potential impact on the important fish stocks/fisheries that are supported by the waters the proposed drought measures could affect. Potential impacts include: delayed/restricted migration, loss of habitat (in particular salmonid spawning or nursery habitat), fish stranding, fish distress leading to disease outbreaks, fish kills, transfer of invasive non-native species and impacts on angling (for example, closure of fisheries and/or cancellation of fishing events). The fish species that are likely to be most sensitive to these impacts are those that migrate to and from rivers from the sea, these are: salmon, sea trout, eels, river and sea lamprey and Allis and twaite shad. Freshwater species that undertake spawning migrations within rivers, including barbel, dace, bream and pike, should also be considered.

[The Eel \(England and Wales\) Regulations 2009](#) provide powers to implement the EC Council Regulation (1100/2007) in the UK. The Environment Agency and/or Natural Resources Wales must take actions to halt and reverse the decline in the European eel stock, aiming to meet a target set for the number of mature adult eels leaving each river basin to return to spawn at sea. The Council Regulation specifically requires us to consider eel passage measures as part of the solution and the England and Wales Regulations provide powers to require measures to protect/improve eel passage. Water companies must consider if the implementation of drought management actions could have an impact on eel passage.

6.5 Invasive non-native species (INNS)

Aquatic and riparian INNS have significant adverse social, economic and environmental impacts, and can cause the ecological status of WFD water bodies to deteriorate or not achieve their ecological objectives. Additionally you are at risk of committing an offence under the [Wildlife and Countryside Act 1981](#) if your operations spread INNS listed in Schedule 9 to the Act. You also need to consider EU

regulation (1143/2014) on invasive alien (non-native species). Other legislation may also apply - see [Summary of legislation relevant to INNS](#) for a comprehensive list.

You must review the supply side options in your drought plan will risk spreading INNS and investigate mitigation and risk reduction measures that you can apply. Your plan should also consider options that can be taken before drought to reduce the risk of spread of existing species (for example, eradication) and the introduction and spread of species (good biosecurity at all assets).

Transfers of raw water pose a significant risk of spread of INNS. You should consider that:

- permanent transfer solutions are subject to the Raw Water Transfer Position Statement and require a full assessment of the current and future INNS risks associated with the pathway created
- within drought, you must consider the risk of spread of current INNS from temporary transfers (temporary infrastructure and operating for a maximum of a few weeks) and temporary changes to movement of water within the existing network

You should consider the impact that changes in operations such as the movement of pumps, machinery or people may have on the risk of spread of INNS and ensure the appropriate biosecurity measures are in place.

You should consider the need for a monitoring programme to allow understanding of INNS distribution and risk at the time of a drought permit/order or changes to operations. If a routine monitoring programme is not in place, the drought plan should include the lead in time and methods required to survey relevant locations for INNS.

The GB Invasive Non-native Species Strategy and more information on INNS and their impact can be found on the [GB non-native species secretariat webpages](#).

6.6 River basin management plans (RBMPs)

The [Water Framework Directive \(WFD\)](#) established a legal framework for managing the water environment across Europe and the requirements are set out in domestic law, principally the [Water Environment \(Water Framework Directive\) \(England and Wales\) Regulations 2017 \(WFD Regulations\)](#).

The overall aims are the sustainable use of water, preventing deterioration of water body status and the protection and improvement of inland surface waters, groundwater and transitional and coastal waters.

The [river basin management plans for England](#) and the [river basin management plans for Wales](#) set out how these requirements will be delivered. The plans include:

- an assessment of the current status of water bodies
- a number of statutory environmental objectives including
 - water body status objectives
 - protected area objectives
- a summary of the programmes of measures required to achieve those environmental objectives

River basin management plans, including the objectives they contain, are reviewed and updated every six years. The plans published in February 2016 are due to be updated by December 2022.

When preparing your drought plan you should consider whether your existing sources are likely to be constrained over the next 6 years to meet the environmental objectives set out in the river basin management plans.

Relevant regulations under the WFD Regulations 2017

Drought has the capacity to affect the status of surface water (rivers and lakes) and groundwater bodies. The regulations relevant to drought plans are Regulations 13, 14, 18 and 19. More details on these regulations are provided in [Appendix 2](#).

Identify any possible deterioration in your plan

You should identify the impacts of your drought actions on all water bodies affected and for all relevant classification elements. Particularly if deterioration (temporary or otherwise) is likely to occur. If you believe deterioration is likely to occur as a result of your actions you should clearly set out what this will be and how you will mitigate it.

Deterioration is a drop in status class of any element set out in Annex V of the [WFD](#), irrespective of whether this causes a deterioration in status of the water body overall. Where an element is in its lowest status class, no further deterioration of that element is allowed.

If you consider that your actions might have an impact on the status of a quality element that is not currently monitored or assessed by the Environment Agency, or Natural Resources Wales, in the affected water body, you should collect the relevant data to assess the risk.

To assess potential changes to water body status, your monitoring should focus on the quality element(s) most likely to be sensitive to your drought actions.

Compliance with Regulation 18

Regulation 18 applies where there is a temporary deterioration in the status of a water body resulting from 'natural cause' or 'force majeure' which is "exceptional" or "could not reasonably have been foreseen" in particular extreme floods and prolonged droughts or due to accidents which could not reasonably have been foreseen. Your drought plan should cover all circumstances that can be reasonably foreseen. You don't need to say what you would do during a civil emergency as this is covered by your emergency plan. However, your drought plan may cover circumstances that are exceptional. Hence, your drought plan may need to contain actions which would cause temporary deterioration.

Regulation 18 can only be invoked to allow temporary deterioration to water body status if all the conditions of the article have been met. To enable the conditions of the article to be met and justify use of such actions your drought plan should:

- clearly identify all actions that could cause temporary deterioration using appropriate assessment methods
- clearly describe why the circumstances are exceptional using hydrological data and any other relevant indicators
- clearly justify why an action that causes temporary deterioration is preferable to the alternatives
- include details of planned mitigation to minimise the impacts of such actions before during and after
- set out what action you will take to restore the water body following the drought

Therefore you should clearly identify all drought orders or permits that might potentially cause a temporary deterioration (as defined by Regulation 18) in your drought plan. In the event of an application for these you will need to provide evidence to the Environment Agency/Defra that you have met these conditions. You should prepare as much of this information as possible in advance and make it available in your drought plan or provide detailed timelines in the plan for its completion if this is not possible. It is important that you carry out collection of this evidence in advance of any drought otherwise you risk delaying the application or even providing insufficient evidence to determine the application successfully.

Exceptional or unforeseen circumstances are likely to be particular to the geography of your supply area. Although the WFD Regulations highlight that ‘prolonged’ droughts are exceptional, it does not prevent the use of Regulation 18 in other circumstances (e.g. acute non-prolonged droughts that are exceptionally severe). The Regulations do not define ‘exceptional’ beyond that it relates to natural cause or force majeure. In relation to drought, exceptional could reasonably relate to shortage of rain, low river flows or levels, low groundwater levels or low reservoir levels where these are due to natural cause or force majeure.

As a water company you are responsible for all the effects of the measures you take to lessen the impacts of drought on people, environment and water supplies. You are not responsible for effects that are a result of natural causes. The European Commission Common Implementation Strategy Guidance Document No. 20 sets out that *“‘Natural cause’ refers to events like floods and droughts which give rise to situations which cause us to make use of the water environment in ways that results in its deterioration of status (e.g. ... by supplying the public with drinking water during prolonged drought; ... It is essential for proper river basin management planning and the application of Article 4(6) to make a distinction between the natural cause itself and the effects of management practices.)”* For more information on this see Guidance Document No. 20.

6.7 Strategic Environmental Assessment

You should consider whether a Strategic Environmental Assessment is required for your drought plan. More information on how to do this can be found here: [Strategic Environmental Assessment Directive: guidance - Publications - GOV.UK and Strategic Environmental Assessment and Habitats Regulations Assessment - Guidance for Water Resources Management Plans and Drought Plans](#).

Appendix 1: Habitats Directive/Regulations, Ramsar Convention, Wildlife and Countryside Act and fisheries requirements

The Habitats Regulations requirements protect European sites from developments and other activities which may harm them directly or indirectly. This section explains the first two stages of the assessment requirements taking account of European and domestic case law.

Assessment under Habitats Regulations is undertaken by the relevant competent authority. Water companies are the competent authority in relation to their drought plans and have an obligation to assess their drought plans under the Habitats Regulations

The Environment Agency (England) and Natural Resources Wales (Wales) are competent authorities for drought permit applications. The Secretary of State (England) and Welsh Minister (Wales) are the competent authorities for drought orders. Where a drought plan action may affect a European designated site, you will have undertaken an HRA. The Environment Agency or Natural Resources Wales and Defra or Welsh Government may use that in their assessment of drought permit and drought order applications.

This section explains the first two stages of the Habitats Regulations Assessment requirements taking account of European and domestic case law. You should contact Natural England or Natural Resources Wales for more information on how to comply with these requirements.

Stage 1: Screening

Before undertaking or giving consent to a proposal, the relevant competent authority is responsible for deciding whether or not it should be made subject to an appropriate assessment. This is the case if the proposal:

- is a 'plan or project' (unless it is part of the conservation management of the site)
- is likely to have a significant effect on the site, alone or in combination with other plans or projects

Identifying potential effects

Before deciding whether effects might be significant, the competent authority should assess the potential effects of the plan or project on a European site. An 'effect' would include anything which would have an impact on a European site. Temporary, permanent, direct and indirect effects need to be considered. A plan or project does not need to be located on a European site in order to affect it. Generally the closer it is to a site, the greater the chance it may affect the site.

The assessment must consider effects on mobile designated features while they are outside the site and any non-designated features that support designated features of the site.

Normally screening should involve a simple assessment to check whether a more detailed appropriate assessment is required.

Adapting proposals to avoid significant effects

Screening for likely significant effect must not take mitigation measures into account. These can only be considered as part of an appropriate assessment. Mitigation measures are those introduced specifically for the purpose of countering likely effects on site features. Elements of a plan or project that are required for other purposes or standards but coincidentally reduce the likelihood or magnitude of impacts to site features are not considered mitigation measures for the purposes of Habitats Regulations Assessment.

Deciding whether there may be a 'significant' effect

'Likely significant effect' only includes effects which would undermine a European site's conservation objectives. Effects which would not undermine a site's conservation objectives would not be considered to be 'significant'. 'Likely significant effect' is a lower threshold of assessment than 'adverse effect on the integrity' of the site. The impacts of a plan or project may be screened in for 'likely significant effect' but be proven not to result in 'adverse effect on the integrity' of a site at appropriate assessment stage.

The threshold of the likelihood of a significant effect happening must be applied on a precautionary basis. An appropriate assessment must be required where, 'it cannot be excluded on the basis of objective information that the plan or project will have significant effects on the site concerned'. If there is any uncertainty whether a plan or project may have a significant effect, an appropriate assessment should be carried out.

Having made its assessment, the competent authority should proceed as follows:

- if the available evidence suggests there may be (or would be) a significant effect, the competent authority must undertake an appropriate assessment
- if there is insufficient evidence to reach a firm conclusion, it should be assumed there may be a significant effect and the competent authority must undertake an appropriate assessment
- if, on the basis of objective information, the competent authority considers there would not be a significant effect, the plan or project can be screened out

As good practice, the competent authority should keep a record of its decision, particularly if it required detailed consideration. As far as possible, this should be understandable to non-specialists.

Stage 2: Appropriate assessment

A plan or project must be made subject to an appropriate assessment if significant effects on a European site cannot be ruled out at the screening stage. The purpose of the appropriate assessment is to inform the competent authority's decision on whether it can conclude that the plan or project does not have an adverse effect on the integrity of the site (the 'AEIS decision'). This decision must take account of the effects of the plan or project alone or in combination with other plans or projects.

The European Court of Justice has ruled that a plan or project can only be authorised if the competent authority has made certain that it will not adversely affect the integrity of any European site, and that 'no reasonable scientific doubt' remains as to the absence of such effects, unless a derogation applies. The appropriate assessment helps to provide the scientific basis for taking this decision.

The competent authority is required to consult the relevant statutory nature conservation body (SNCB) i.e. Natural England or Natural Resources Wales when it is carrying out the appropriate assessment, and must have regard to its advice. The competent authority may also consult the general public, if it considers it appropriate.

What an appropriate assessment should cover

As with consideration of effects at the screening stage, the appropriate assessment should consider temporary, permanent, direct and indirect effects on affected European site(s).

The principal purpose of the appropriate assessment is to understand the implications of the proposal for the site and its conservation objectives, to inform the AEIS decision. The assessment would also be important later in the regulatory process if the derogation tests become relevant (e.g. in judging alternative solutions or deciding the nature of compensatory measures).

The assessment should normally include consideration of detailed information including:

- identifying the site's qualifying features, conservation objectives and conservation status of each of the qualifying features that might be affected
- identifying what each potential effect of the plan or project is and what aspects of the plan or project causes such effect, and consideration of any in combination effects
- identifying how each potential effect could have an impact on each of the site's conservation objectives
- assessing the scale and seriousness of potential effects, including their spatial extent, magnitude, timing, duration and reversibility
- assessing effects over the whole lifetime of the plan or project (e.g. the effects of construction, the ongoing effects of what is constructed, and the effects of deconstruction if relevant)
- assessing the likelihood that the effects might occur and how the risks are proposed to be managed
- identifying the degree of certainty which underpins the assessment of effects
- deciding whether or not there is an AEIS

Based on the findings of the appropriate assessment, the competent authority must decide whether it can conclude that a plan or project does not have an adverse effect on the integrity of a European site, alone or in combination with other plans or projects (the 'AEIS decision').

The competent authority should take the 'integrity' of a European site to mean the coherence of its ecological structure and function across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which the site is (or will be) designated.

Alternative solutions, imperative reasons of overriding public interest (IROPI) and compensatory measures

Article 6(4) of the Habitats Directive, transposed into Regulations 64(5) and 66(2) of the Habitats Regulations provide a route to proceed with a plan or project that cannot be ascertained to have no adverse effect on the integrity of a European site.

You must first have carried out an appropriate assessment and followed three sequential derogation tests:

1. There are no feasible alternative solutions to the plan or project which are less damaging
2. There are "imperative reasons of overriding public interest" (IROPI) for the plan or project to proceed
3. Compensatory measures are secured to ensure that the overall coherence of the network of European sites is maintained

Further guidance is available in Department for Environment, Food and Rural Affairs – [Habitats Directive: guidance on the application of article 6\(4\)](#).

Appendix 2 River basin management plans and water company drought plans– the relevant WFD regulations

The following WFD regulations are most relevant to water company drought plans.

Regulation 13 WFD environmental objectives

- prevention of deterioration in status of surface waters and groundwater
- achievement of objectives and standards for protected areas
- aims to achieve good status for all water bodies by 2015. Where this is not possible and subject to the criteria set out in the Directive, aim to achieve good status by 2021 or 2027 or set a less stringent objective
- aims to achieve good ecological potential and good surface water chemical status for heavily modified water bodies and artificial water bodies
- reversal of any significant and sustained upward trends in pollutant concentrations in groundwater
- cessation of discharges of priority hazardous substances into surface waters
- progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants

Regulation 14 Environmental objectives: application of regulations 15 to 19

Regulations 15 to 19 must be applied in a way that—

- does not permanently exclude or compromise the achievement of the environmental objectives set in relation to any other water body within the same river basin district
- is not inconsistent with the implementation of any other EU instrument
- guarantees at least the same level of protection for bodies of water as the EU instruments repealed by Article 22 of the WFD

Regulation 18 Temporary deterioration in status

In certain circumstances a temporary deterioration in status of a water body, caused by exceptional or unforeseen events such as extreme floods, prolonged droughts or accidents, is allowed.

This defence requires that the following conditions are met:

- all practicable steps were taken to prevent further deterioration in status and in order not to compromise the achievement of the objectives of this Directive in other bodies of water not affected by those circumstances
- the conditions under which circumstances that are exceptional or that could not reasonably have been foreseen may be declared, including the adoption of the appropriate indicators, are stated in the river basin management plan
- the measures to be taken under exceptional circumstances are included in the programme of measures and will not compromise the recovery of the quality of the body of water once the circumstances are over
- the effects of the circumstances that are exceptional or that could not reasonably have been foreseen are reviewed annually and all practicable measures are taken to restore the body of water to its status prior to the effects of those circumstances as soon as reasonably practicable; and
- a summary of the effects of the circumstances and the measures taken are included in the next update of the river basin management plans

Regulation 19 Defence against breach of WFD objectives

Regulation 19 sets out that failure to achieve good status or to prevent deterioration is not a breach of the Directive if this is the result of new modifications to the physical characteristics of a surface water body or alterations to the level of bodies of groundwater provided that all the following conditions are met:

- all practicable steps are taken to mitigate the adverse impact on the status of the body of water
- the reasons for those modifications or alterations are specifically set out and explained in the river basin management plan required under Article 13 and the objectives are reviewed every six years
- the reasons for those modifications or alterations are of overriding public interest and/or the benefits to the environment and to society of achieving the objectives set out in paragraph 1 of WFD Article 4.1 are outweighed by the benefits of the new modifications or alterations to human health, to the maintenance of human safety or to sustainable development
- the beneficial objectives served by those modifications or alterations of the water body cannot for reasons of technical feasibility or disproportionate cost be achieved by other means, which are a significantly better environmental option

Appendix 3: UK priority fish species & occurrence (England)

- *Acipenser sturio* - Common Sturgeon
- *Alosa* - Allis Shad
- *Alosa fallax* - Twaite Shad
- *Anguilla* - European Eel
- *Cobitis taenia* - Spined Loach
- *Coregonus albula* - Vendace
- *Coregonus autumnalis* – Pollan
- *Coregonus lavaretus* - Whitefish (Powan, Gwyniad or Schelly)
- *Lampetra fluviatilis* - River Lamprey
- *Lota* – Burbot (extinct in UK)
- *Osmerus eperlanus* - Smelt (Sparling)
- *Petromyzon marinus* - Sea Lamprey
- *Salmo salar* - Atlantic Salmon
- *Salmo trutta* - Brown/Sea Trout
- *Salvelinus alpinus* - Arctic Charr

For a full list of all UK taxa designations see the [JNCC website](#).

Appendix 4: Guidance on ecological monitoring and data analysis methods

You should use standard Environment Agency and/or Natural Resources Wales sampling / survey methods to collect monitoring data to support your plan, unless you can demonstrate that an alternative method is more appropriate. We recommend you discuss your hydrological and ecological monitoring with the Environment Agency and/or Natural Resources Wales before carrying out your monitoring programmes.

Reasons for using a non-standard method may include:

- to provide better accuracy (in which case we recommend that you should also collect standard Environment Agency samples/surveys in parallel, to allow consistency with historical data)
- to be able to sample / survey freshwater habitats when they are dry
- where a standard method does not exist (e.g. photography)

You should consider sampling methods when using existing historical monitoring datasets. You should try to avoid comparing datasets collected using different sampling methods or, as a minimum, assess the potential effect that different sampling methods across your datasets has on your conclusions. You should consider how you will analyse these datasets to inform your environmental assessments.

Macro-invertebrates

You should:

- use macro-invertebrates as the default biological element you use to assess the environmental impact of your actions on flowing water habitats
- identify samples to Environment Agency or Natural Resources Wales mixed-taxon resolution (River Invertebrate Classification Tool, RICT Taxonomic Level 5: RICT Website hosted by Scottish Environmental Protection Agency)
- sample three times a year (spring, summer and autumn) and generate data from non-drought (baseline), in-drought and post-drought (recovery) conditions
- consider available macro-invertebrate data analysis tools available. These include the Environment Agency Hydroecological Validation (HEV) tool and Hydroecological Modelling (HEM) tool

Fish and fisheries

Understanding the impact of your actions on fish communities can be an important part of your environmental assessments. In particular:

- In waters designated 'important fish stocks/fisheries' or sites designated for fish species you must evaluate the impacts of your drought actions on fish. However, even where waters are not designated 'important fish stocks/fisheries', you should still consider whether it is important to understand the impact on the fish community. For example fish may be more sensitive to drought (and thus any additional effects of a drought plan action) in upland rivers with natural morphology
- If you plan to undertake fish monitoring during drought, you must consider the potential impacts that your monitoring may have, in terms of causing additional stress to an already stressed fish community. This applies particularly during periods of high temperature. Electro fishing should not take place in water temperatures above 20°C for coarse fish and 18°C for salmonids. Monitoring during a drought and/or the coarse fish close season (15 March to 15

June) should be discussed with the local Environment Agency and or Natural Resources Wales fisheries teams

- You may support your assessment using hydraulic-habitat surveys and modelling of fish habitat, e.g. to quantify the effects of a river flow change on suitable habitat for a sensitive fish species. However you should not rely exclusively on such studies
- Impacts on angling are more likely to be experienced at more extreme low flow/low water level conditions (when fisheries close, events are cancelled or anglers choose not to go fishing). You should assess and evaluate the impacts of your drought actions on fishing activity. You should contact the local Environment Agency Fisheries team for any information on angling clubs and other organised angling on an affected river/stillwater. You may also choose to contact the local Angling Trust forum or any local angling consultative organisations. The Environment Agency [Survey of Freshwater Angling in England](#) provides useful information on the economic value of angling

Macrophytes

In most circumstances macro-invertebrates and/or fish are generally more appropriate biological elements to monitor and inform your environmental assessments. However, you should consider monitoring and assessing the impacts of your actions on the macrophyte community where:

- waters have been designated for their macrophyte community
- for rivers and standing waters which dry out (whether naturally or due to abstraction). This is because it is difficult to sample consistently the macro-invertebrate and fish communities during both wet and dry conditions

Algae

- Diatom monitoring and datasets are unlikely to be needed. However, assessing biofilm communities may be useful where your actions affect river flows below reservoirs
- Monitoring of planktonic algae may be appropriate in lakes and larger rivers where there is a risk of algal blooms, whether nuisance or toxic

Appendix 5: Water quality modelling

You should use water quality modelling approaches recommended by the Environment Agency, unless you can demonstrate that an alternative method is more appropriate. You should discuss your water quality modelling approaches and scope of the assessment with the Environment Agency before carrying out your modelling assessment.

It is your responsibility to carry out the modelling you need for your environment assessment. You should use the most up to date models. It is your responsibility to ensure these are the latest, up to date and agreed models with the Environment Agency. For example, SIMCAT or UPM models.

You may choose to use a consultant for your modelling assessment. You need to ensure that communication between your teams, your consultant and the local Environment Agency are consistent and effective.

We expect the following modelling approaches to be mostly used in environmental assessments, though this is not a definitive list:

- For dissolved oxygen, a Streeter-Phelps or similar type approach
- For catchment assessments, SIMCAT using latest agreed models
- For lakes or reservoirs, a modelling approach in line with our guidance
- For combined sewer overflows, approaches in line with UPM methods using latest agreed models

Discussion with your local Environment Agency staff is essential to agree and scope out the modelling approach(es) required.

Appendix 6: Assessing geomorphology in drought planning

You should consider the following for assessing geomorphology

- There is no standard methodology for assessing geomorphology. You should discuss your approach and any available datasets with Environment Agency geomorphologists before carrying out your monitoring programme. Whatever approach you choose, make sure it is robustly recorded so that it can be repeated consistently in the future
- A multi-disciplinary approach is essential. Make sure you consider how your geomorphology monitoring links with other aspects of your environmental monitoring to inform your environmental assessments
- Be selective and monitor representative or sensitive reaches as a priority. Take photographs as a minimum. For example, at the reach scale, plus close ups of interesting features such as channel bed change, channel bar terrestrialisation, residual pools and wet areas beneath boulders and woody debris. Other techniques could include drones and topographical surveys
- Use monitoring to understand what is within natural geomorphological variability for your river and to record change in key locations such as the boundaries between wetting and drying. Know where your sensitive locations are, such as where geomorphological impacts have the greatest implications for ecology

Table 2: Geomorphological evidence of the impact of reduced flows

More dry: lower flows, less water, reduced wetted perimeter	
Impact	Field evidence: what to look out for
Reduced lateral connectivity	Disconnection between the river flow and the channel margins; isolation of the riparian zone; river looks 'shrunk away' from the banks. This is often an early indicator of changing flows.
Reduced longitudinal connectivity	Riffles drying; step-pools and cascades becoming unlinked; flow fragmentation; isolation of backwaters and secondary channels; ponding behind weirs; isolated dry habitats; remnant pools. This often follows after lateral connectivity is reduced. Smaller, headwater streams in upper catchments are often the most vulnerable.
Reduced vertical connectivity	Desiccation of the hyporeic zone – reduced free water; dry patches, cracks and fissures in previously wetted bed and channel margins. This is often the last impact in the sequence of reduced connectivity.
More silty: lower flows, less energy, more deposition	
Impact	Field evidence: what to look out for
Increased siltation	Fine sediment deposition on the channel bed and margins; look for a blanket of sediment and interstitial deposition. Look for deposition that may be greater than natural variability in location and scale – depth and area.
More stable: lower flows, less energy, reduced sediment flux	
Impact	Field evidence: what to look out for
Increased bedform stability	Increased terrestrialisation of bedforms leading to reduced mobility e.g. vegetated point bars; change in microhabitat distribution; shift in channel morphology e.g. cross section, type and number of active bedforms; reduced in-channel sediment supply. Bed concretion due to calcium carbonate precipitation also happens in some river types in response to PDW.
Reduced bank erosion by flow	Dry bank faces; reduced 'fresh' erosion; increased terrestrialisation of banks e.g. re-vegetation.

Appendix 7: Environmental assessment, monitoring and mitigation table examples

Table 3: Example environmental assessment summary table

Supply side action information	Supply side action	
	Trigger/previous action	
	Deployable output of action	
	Implementation timetable	
	Permissions required and constraints	
	Risks associated with the option	
Summary of environmental assessment (including mitigation measures)	Overall environmental impact (minor, moderate, significant or unknown)	
	Level of confidence	
	Summary of likely environmental impacts	
	Summary of baseline information used	
	Summary of additional monitoring required	
	Summary of mitigation measures	
	Permits/approvals needs for mitigation measures	
	Impact on other activities e.g. fisheries, industry.	

Table 4: Example detailed environmental assessment and mitigation table

Supply side action					
Feature of interest	Sensitivity (L,M,H,U)	Summary of likely impact (incl. if short, medium or long term)	Category of impact (Minor, Mod, Sig, Unknown)	Confidence Level (L,M,H)	Proposed mitigation measure (incl. trigger for measures, and how you will assess effectiveness)
e.g. Invertebrates					
e.g. Geomorphology					
e.g. Fish					

Table 5: Example environmental monitoring plan table

Supply side action						
Feature of interest	Location	Control or Impact	Method	Baseline (frequency, timing, responsibility)	In-drought (frequency, timing, responsibility)	Post-drought (recovery) (frequency, timing, responsibility)
e.g. Invertebrates						
e.g. Fish						
e.g. water quality						