

managing water resources

A guide to the updated Kielder operating agreement

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Introduction

Kielder is the largest man-made reservoir in Northern Europe, holding just under 200 billion litres of water. Northumbrian Water (NW) own and operate the reservoir and we are responsible for the way water is released from Kielder.

Kielder operating agreement

The Kielder Operating Agreement describes the requirements, procedures and guidelines for the management of the Kielder Water Scheme and other reservoirs and river abstractions which depend upon Kielder for support in dry summers.

The agreement is a technical document written by and designed for operational staff at NW and the Environment Agency and, as such, is not available to the public. It forms the technical appendix for the Section 20 agreement which is the legal document controlling the operation of the system.

This document details what is covered by the Kielder Operating Agreement and explains the responsibilities of the Environment Agency and NW.

Our responsibilities

NW has responsibility for implementing the agreed operating policy. We are responsible for developing the agreement and, as a regulator, are responsible for monitoring the policy to ensure compliance. To do this we measure river flows and compensation releases from reservoirs at gauging stations around the area. We exchange information with NW on releases, reservoir and river levels and planned operation of the system on a daily basis.

Kielder water scheme

Figure 1 shows the key features of the Kielder Water scheme which consists of Kielder Dam and associated infrastructure, including:

- Hydropower plant;
- Weir and pumping station at Riding Mill on the River Tyne;
- Airy Holm reservoir;
- Tunnel from Letch House to Frosterley on the River Wear and Eggleston on the River Tees (known as the Tyne Tees tunnel);
- Connection from the Tyne Tees tunnel into the Derwent pipeline and licensed abstraction into Mosswood water treatment works;
- Licensed abstraction from the Tyne Tees tunnel air shaft at Waskerley.

Water is released from Kielder into the North Tyne either as compensation water or to support river flows below NW's abstraction points on the rivers Tyne, Wear and Tees.

Regulation releases for other proper uses of water resources may be complementary or conflicting. These policies have been developed to balance numerous interests, including:

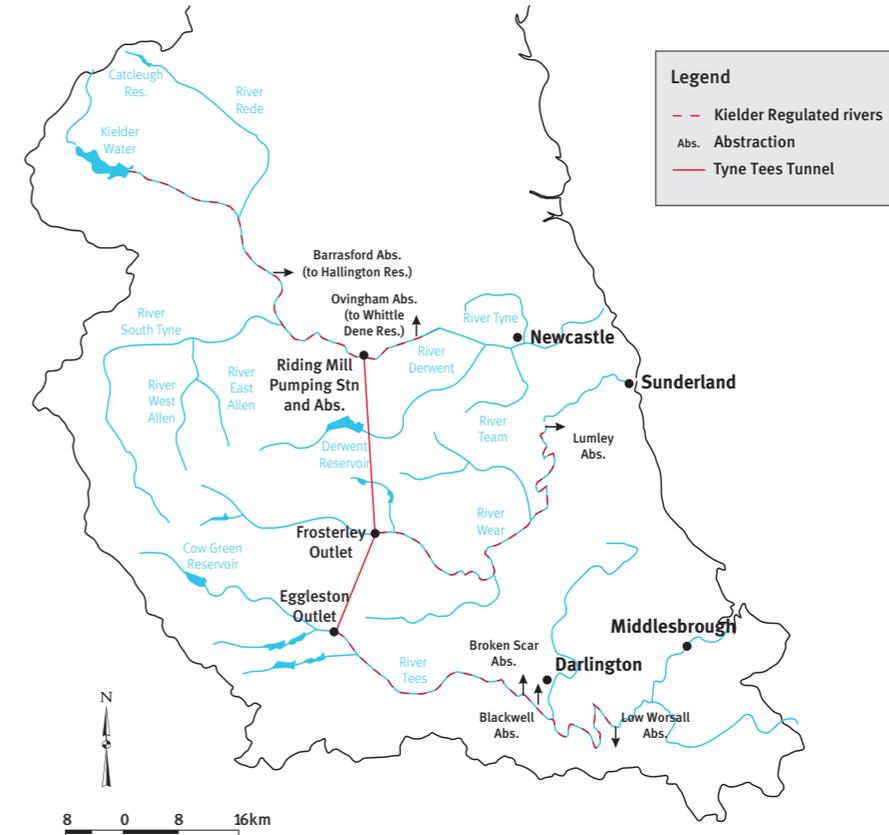
- protecting the environment
- the health of the North Tyne and Tyne fishery
- recreational users
- dilution in occurrences of serious pollution events on the Tyne and the Derwent, Wear and Tees via the Tyne-Tees transfer tunnel
- downstream flood alleviation
- hydroelectricity generation

Hydropower and releases

Water released from Kielder can pass through two turbines, generating renewable hydroelectricity. Compensation water flows through the smaller of the two turbines continuously. Releases above compensation levels can flow through the second turbine. These releases are made in three, five or seven day blocks.

Releases made between November and March start at 6.00am on a Monday morning to coincide with peak electricity demand. Between April and October releases through the second turbine start on different days and times to allow the river to experience rising and falling flow conditions on different days and times of the week. Release times may be altered from June to October to coincide with high tides. This is in an attempt to encourage the upstream migration of salmonid fish out of the upper estuary where oxygen levels can be depleted during warm summers.

Figure 1 – Kielder Scheme Map.



We prepare and issue an annual programme of proposed release dates and times in December to NW and other interested parties. The actual releases from the reservoir depend on the weekly reservoir contents.

The time taken to increase from compensation levels to the maximum release (ramp up rate) for hydropower or other purposes, is designed to provide minimal risk to downstream river users. It's our responsibility to monitor this. Ramp down rates are designed to minimise stranding of invertebrates and juvenile fish by mimicking natural rates of stream flow recession.

The programme of releases is prepared weekly to cover a two week period from the Thursday of that week. The proposed releases for the second week are an estimate based on expected reservoir inflows and may therefore be adjusted in the following week in response to changes in the weather.

Planning the releases from Kielder is a complicated process. This means that we can only respond to other requests for releases where these can be made without:

- compromising the support of river ecology
- significant detriment to other users
- loss of revenue

We can only consider requests from recognised organisations and not from individuals. These requests must be submitted to us and agreed as part of the annual review for implementation in that year.

Operation of resources in the Kielder supported catchments

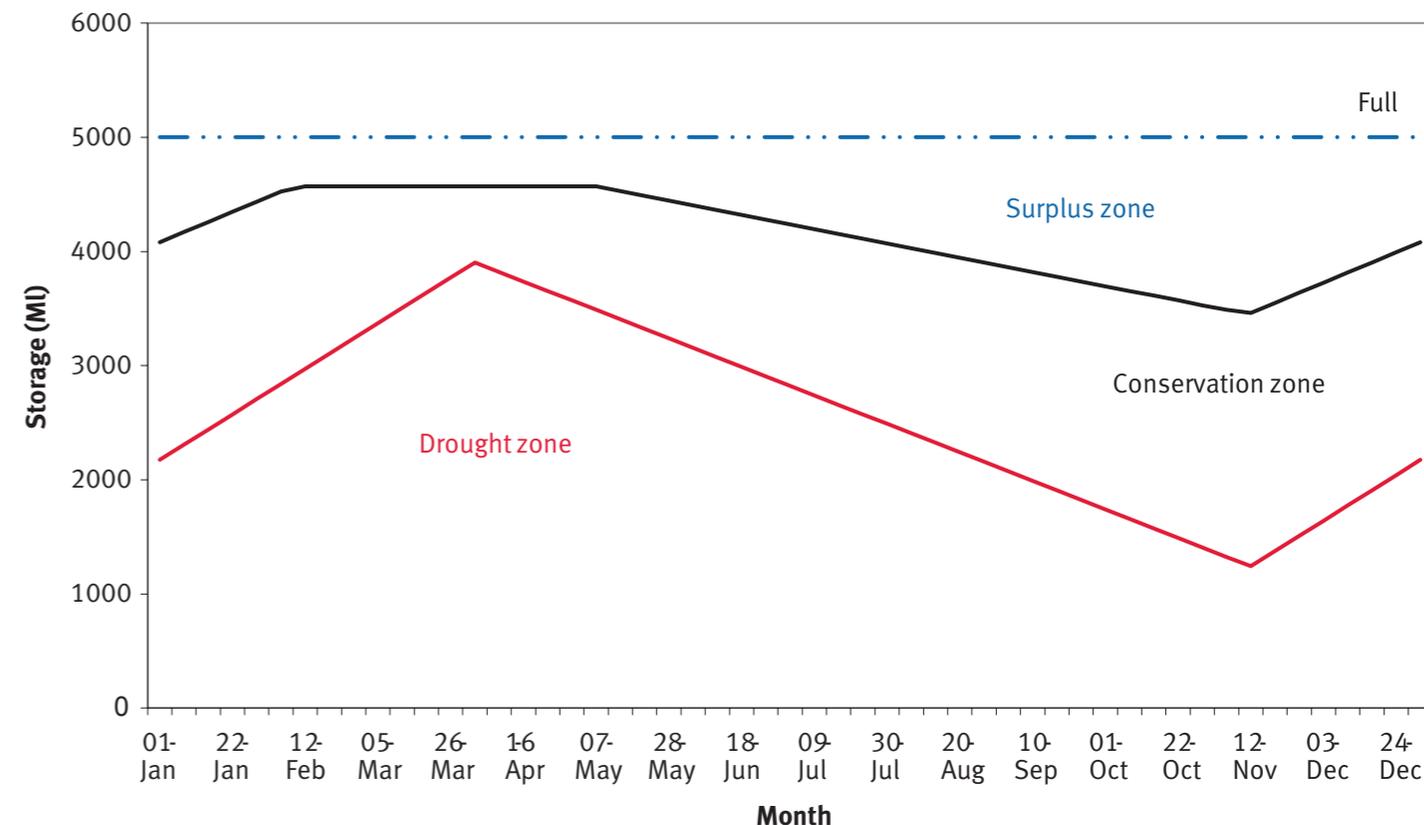
NW control the day to day operation of all of the reservoirs and other resources described below. Releases from the reservoirs vary, depending on reservoir control rules, a sample of which is shown in **Figure 2**.

Control rules are used to ensure that reservoirs do not empty too quickly during dry summers, thus preserving water to be used later in the year. They are calculated using historic records of reservoir inflows to ensure that water is always available at the end of the drawdown season (generally assumed to be the end of October), even during the driest summer on record.

The rules show three distinct zones:

- **surplus zone** – where there is plenty of water available
- **conservation zone** – when reservoir stocks start to become low
- **drought zone** – where only minimum demands can be guaranteed to be met

Figure 2 – Example of a reservoir control rule



River Tyne

Figure 3 shows NW's infrastructure and our monitoring network across the Tyne catchment.

Urban areas of Tyneside and rural areas within the Tyne catchment are supplied with water from river abstractions and a series of reservoirs including Catcleugh, Colt Crag, Hallington and Whittle Dene. The Kielder Scheme provides a strategic backup for these resources by supporting the river abstractions in dry periods of the summer.

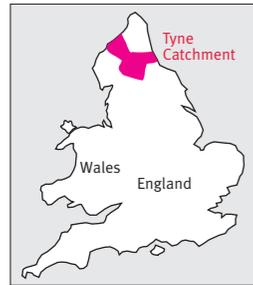
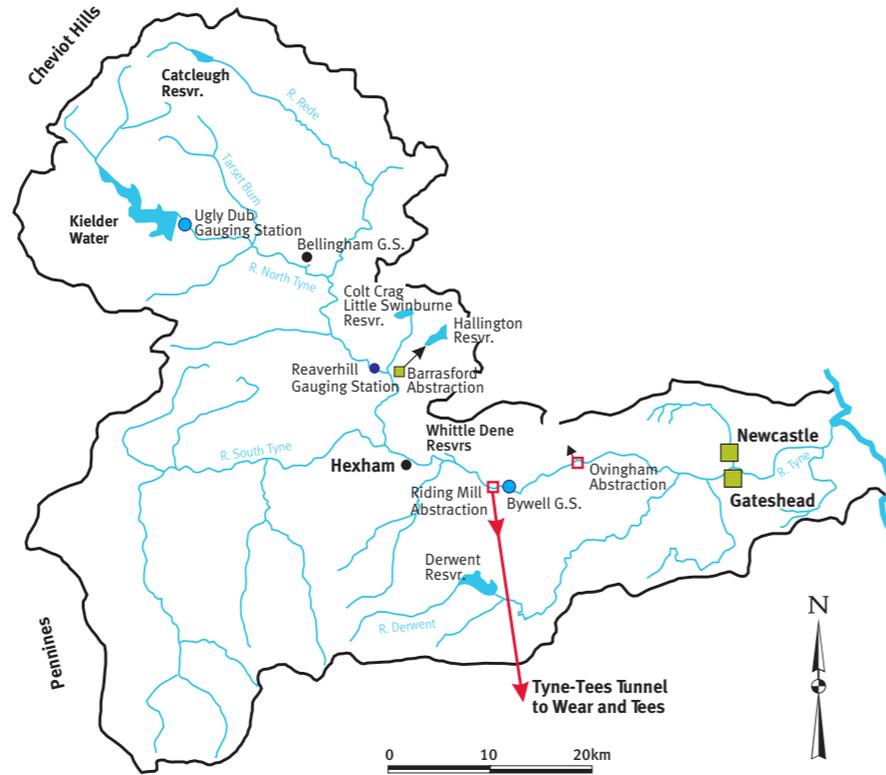


Figure 3 – River Tyne reservoirs, abstractions and key monitoring river gauging stations.

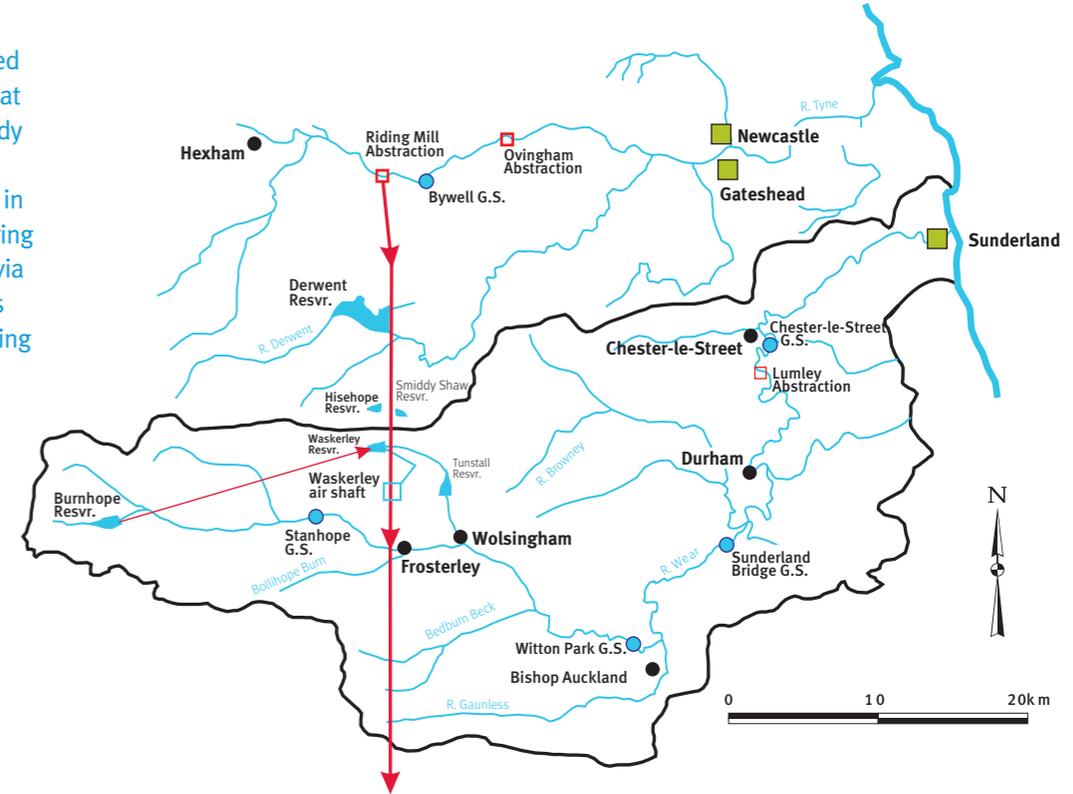


River Wear

Figure 4 shows NW's infrastructure and our monitoring network across the Wear catchment. Residents of the Wear catchment can be supplied with water from a river abstraction at Lumley; Derwent, Burnhope, Smiddy Shaw, Hisehope and Waskerley reservoirs; groundwater boreholes in the Sunderland area and some spring sources. Water can be transferred via the Tyne Tees tunnel into the Rivers Wear and Derwent, as well as topping up the level in Waskerley reservoir.



Figure 4 – River Wear reservoirs, abstractions and key monitoring river gauging stations.

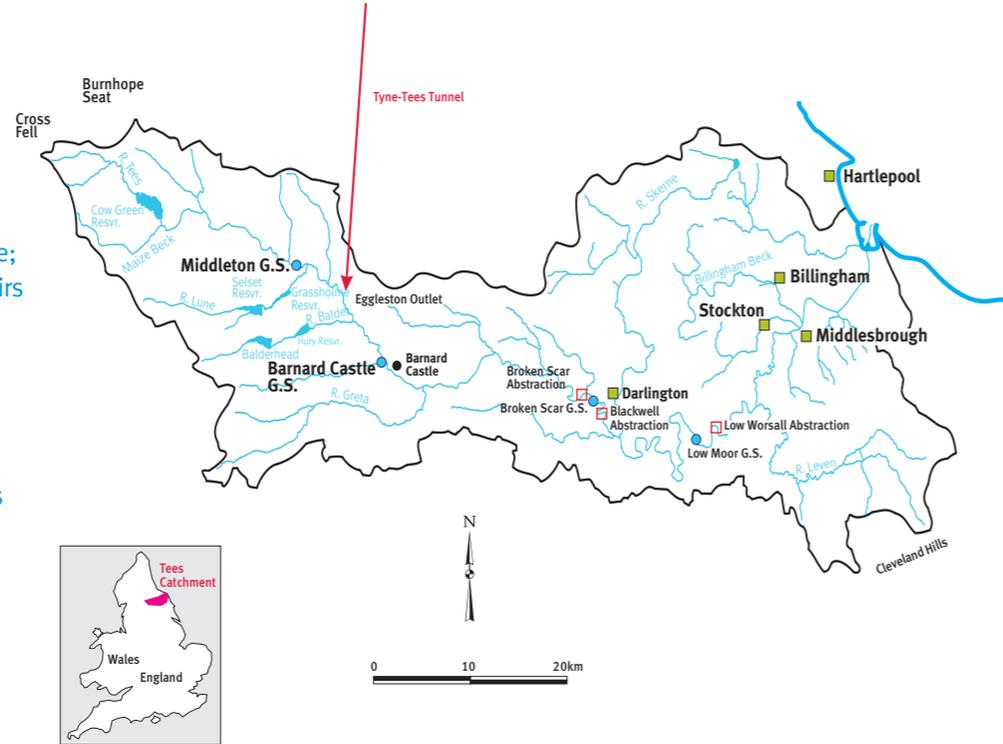


River Tees

Figure 5 shows NW's infrastructure and our monitoring network across the Tees catchment.

Residents in the Tees valley are supplied with water from river abstractions at Broken Scar; Cow Green reservoir on the upper Tees; Selset and Grassholme reservoirs on the River Lune; Balderhead, Blackton and Hury reservoirs on the River Balder; groundwater boreholes at Broken Scar and support from the Kielder transfer system, if required, at Eggleston. There is also an abstraction of untreated water at Low Worsall and Blackwell on the lower Tees to supply industrial demand.

Figure 5 – River Tees reservoirs, abstractions and key monitoring river gauging stations.



Further information

If you would like more information about the operation of the Kielder Reservoir system please contact us at:

kielder.reservoir@environment-agency.gov.uk

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