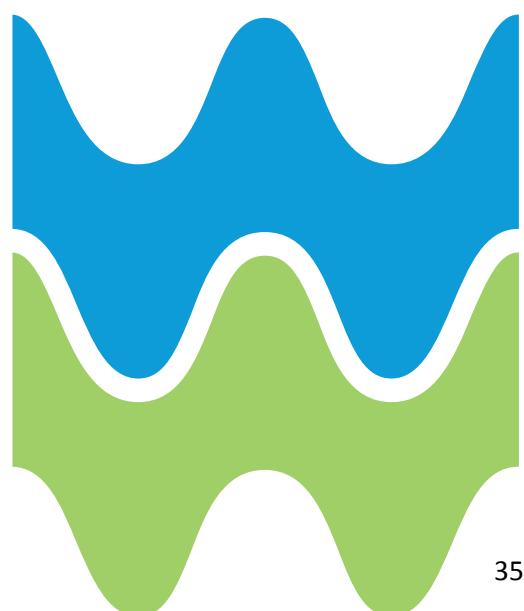


Draft

Drought Plan 2020:

Annex 1c – Alwen Dee  
WRZ

March 2019



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## 1. Alwen Dee – WRZ Reference no. 8014

### 1.1. Alwen Dee Water Resources Overview

The Alwen Dee Water Resource Zone stretches from the floodplains of the River Dee at Llangollen to the coastal waters at Prestatyn and the industrial complexes on Deeside, (see Figure 1).

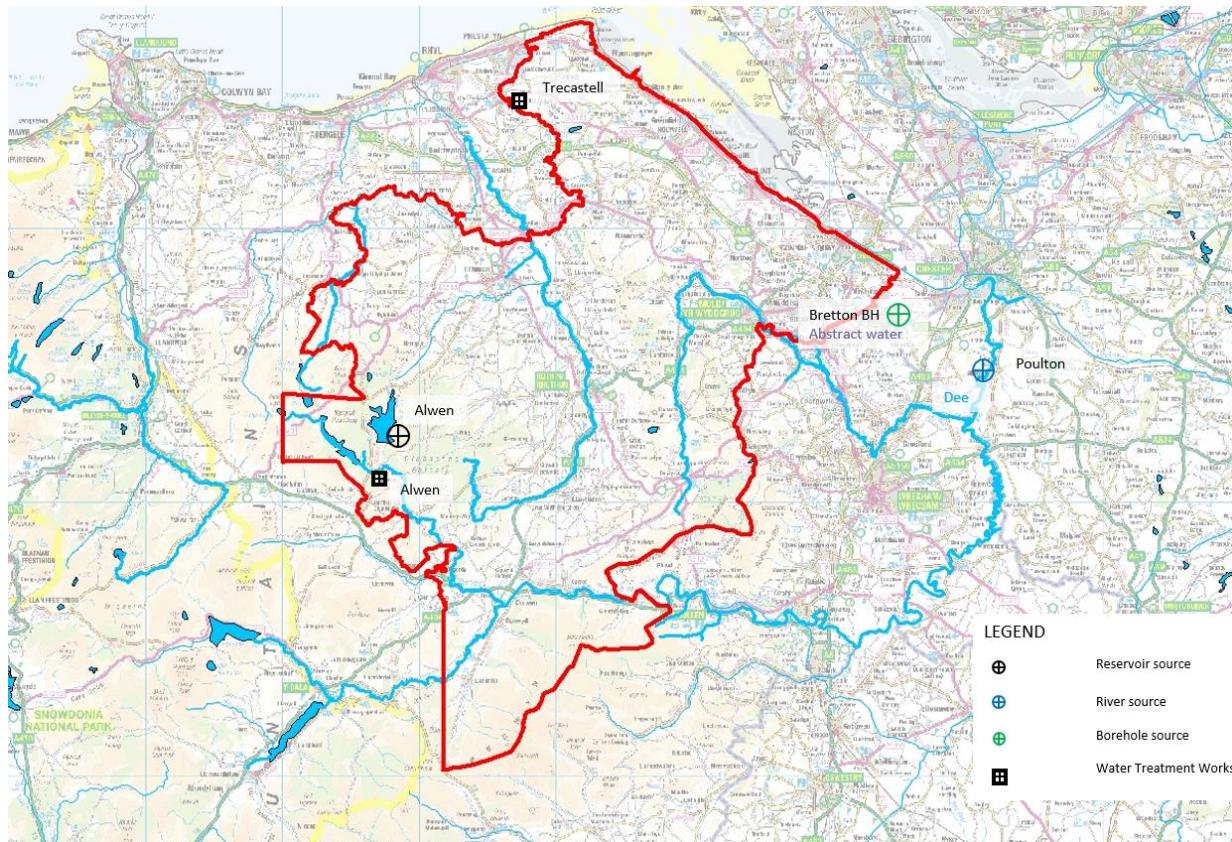


Figure 1 - Map of the Alwen Dee WRZ

The water resources within the zone consist of one impounding reservoir (Llyn Alwen) and one river abstraction (River Dee at Poulton). We also have two boreholes near Bretton that can be used to supplement demand in dry summers. A list of our raw water sources for the zone is presented in Table 1.

Site Name	Licence No.	Source Type	Status
Llyn Alwen	24/67/4/0016	Impounding Reservoir	Operational
River Dee at Poulton	24/67/9/0165 and 24/67/9/0148	Regulated River Intake	Operational
Bretton Boreholes	24/67/10/0087	Groundwater	Standby

Table 1 - Licensed sources in the Alwen Dee WRZ

The River Dee is a regulated river with releases made from Llyn Celyn and Llyn Brenig to support abstractions downstream. The regulation scheme is managed by Natural Resources Wales (NRW) in

accordance with the Dee General Directions. Welsh Water, Severn Trent, Hafren Dyfrdwy, United Utilities and the Canal & River Trust are the main abstractors from the River Dee and so have representatives on the Dee Consultative Committee alongside NRW and the Environment Agency (EA). Flows in the River Dee are also managed to reduce flooding, enhance the biodiversity and fisheries and to support recreation.

Within the zone we have two water treatment works; Alwen and Bretton. Alwen is supplied from Alwen reservoir and Bretton is supplied from the River Dee abstraction at Poulton and the Bretton boreholes when they are in use.

There is a minor export of treated water from the WRZ to Hafren Dyfrdwy. Within the WRZ but not linked to any of our other networks, is the bulk supply of water we provide to Albion Eco. The raw water is a bulk supply to us from United Utilities (abstracted from the River Dee at their Heronbridge intake). This supply is transferred to our works at Ashgrove for partial treatment before being supplied to Albion Eco at their customer's site.

## 1.2.Drought Triggers

The drought status of the zone is assessed by the reservoir storage position at any time in relation to the Drought Action Zones (DAZs), defined for Llyn Alwen, as shown in Figure 2. The use of the DAZs are described in more detail in Section 2 of the main report.

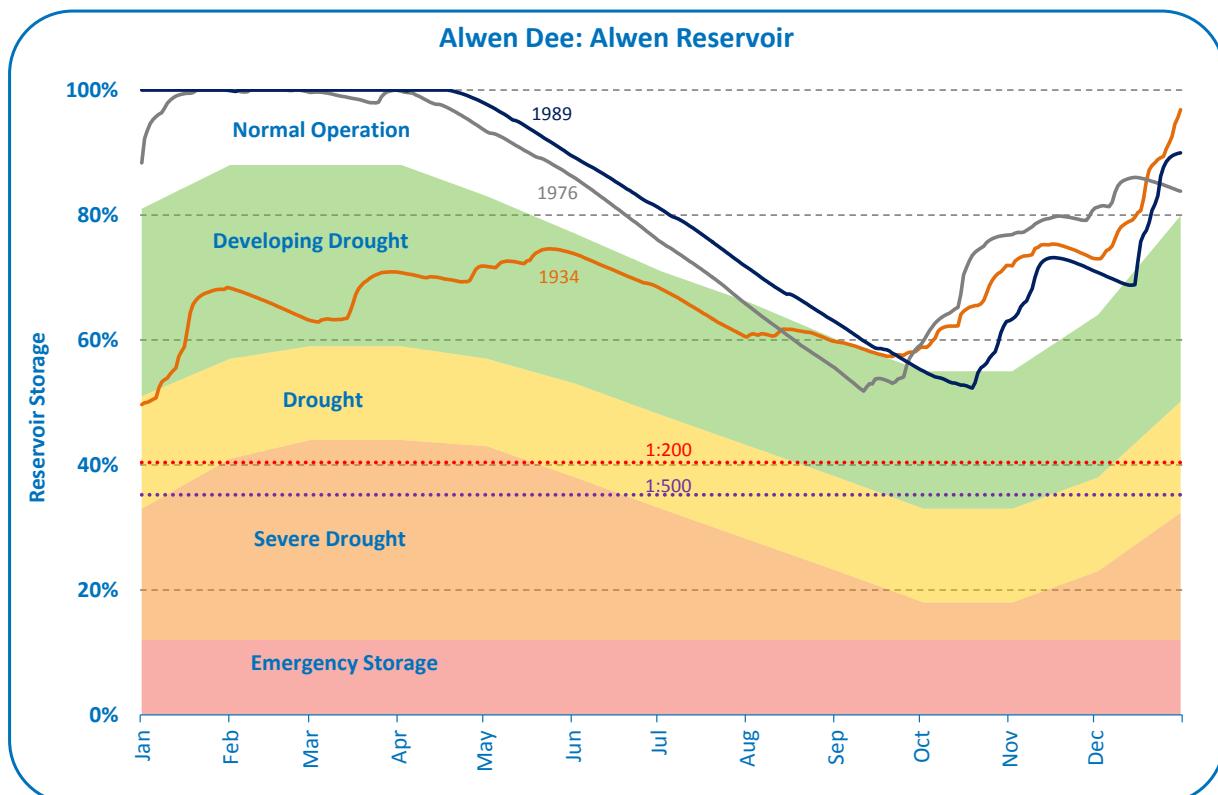


Figure 2 - Alwen Reservoir Drought Action Zones and the results of scenario testing

### 1.3.Assessment of Drought Risk

For our 2019 Water Resource Management Plan we tested our ability to maintain supplies of water to our customers in the Alwen zone using the period 1920 – 2015, which encompasses the known drought events of 1933/34, 1976, 1984, 1989 and 1995. The reported supply demand balance at WRMP19 shows the zone to be in a healthy position with a forecast 2.99 MI/d surplus at 2024/25, increasing to 9.66 MI/d by 2049/50. The WRZ was therefore classified as being at low risk of significant drought impact.

Figure 2 shows the results of our scenario testing. The worst historic droughts, when simulated in our water resource models, do not cause reservoir storage to fall lower than our Developing Drought action zone. However, as the historic drought events were less severe than those of a return period of 1:200, for WRMP19 we used Extreme Value Analysis to provide an estimation of the level of drawdown we could see at Alwen reservoir under a 1:200 and 1:500 year drought return period scenario, as represented on the chart by the red and purple lines respectively.

Our analysis indicates that whilst reservoir levels at Alwen under both a 1:200 and 1:500 year drought event could theoretically fall into the Severe Drought Action Zone, based on the likely timings of minimum reservoir drawdowns seen in the historic record, they would likely not fall further than the Drought Action zone. We can therefore conclude that the Alwen Dee WRZ is at low risk of us having to implement extreme supply side measures e.g. widespread pressure management or water rationing.

The identified drought risk in the zone is low but Alwen reservoir level may fall lower than it has in the past. As a result it is important we operate in line with our control curves and take all necessary actions in good time, the principle being to reduce supplies from Alwen reservoir and make more use of Poulton and bringing the Bretton boreholes into supply. By doing this we will maintain a high level of drought resilience in this zone.

### 1.4.Drought Management of the WRZ

As the identified drought risk in the zone is low then our management philosophy is to ensure we operate our water resources in line with our control curves and take all necessary actions in good time, in order to maintain this high level of drought resilience.

The following sections describe the operation of the zone as we move into a drought period and the actions that we will take to ensure that we minimise the impact on our customers.

#### 1.4.1. Normal Action Zone

During normal weather conditions we optimise our sources to minimise the cost of operations. In the Alwen Dee zone this means that we make maximum use of the Alwen water treatment works as it can gravitate supplies to our customers thus reducing our energy costs.

#### 1.4.2. Developing Drought/ Drought/ Severe Drought Action Zone

As reservoir storages move into the developing drought action zone, we are more likely to have to carry out operations which are not usually undertaken and as a result increase the risk of impacting our customers. To authorise these activities, the ‘Gold’ command centre may convene.

As Alwen reservoir level falls we will move away from our routine mode of operation and begin making changes to our network so that Bretton treatment works now supplies more of the Deeside and coastal areas rather than Alwen works. This will reduce the level of abstraction from Alwen reservoir and so to meet the higher output at Bretton we will increase our abstraction at Poulton from the River Dee.

Once all changes to our water supply systems have been made, the operation of the zone will be fully optimised to balance available water resource across the zone. As reservoir storage enters the Drought Action Zone we will consider the feasibility of bringing our standby source (Bretton Boreholes) back into supply. This is likely to require a significant amount of work and we will need to ensure that this source is compliant with drinking water quality governance prior to being used.

Our abstraction at Poulton is supported by the Dee Regulation Scheme so if stocks in Llyn Celyn and Llyn Brenig are low our permitted abstraction volumes can be reduced. However, our water resource modelling shows that by using our standby source at Bretton Boreholes we can manage these reductions without impacting upon our customers supply.

To supplement these changes we will increase our leakage efforts to minimise losses in the network.

### 1.5. Supply-side drought management action

Given the high drought resilience of the zone, it is not considered necessary to develop further supply-side options. Therefore for the Alwen Dee zone we have not produced any Environment Assessment Reports (EARs) nor populated Appendix G of NRW's Water Company Drought Plan Technical Guideline (Dec 2017).