

**Soil moisture on 30 September 2024** (see back page for explanatory comments).

### Notes on the period to 30th September 2024

**At the end of September, soil moisture was above field capacity for most of the UK after heavy rainfall in many regions, particularly in the South.**

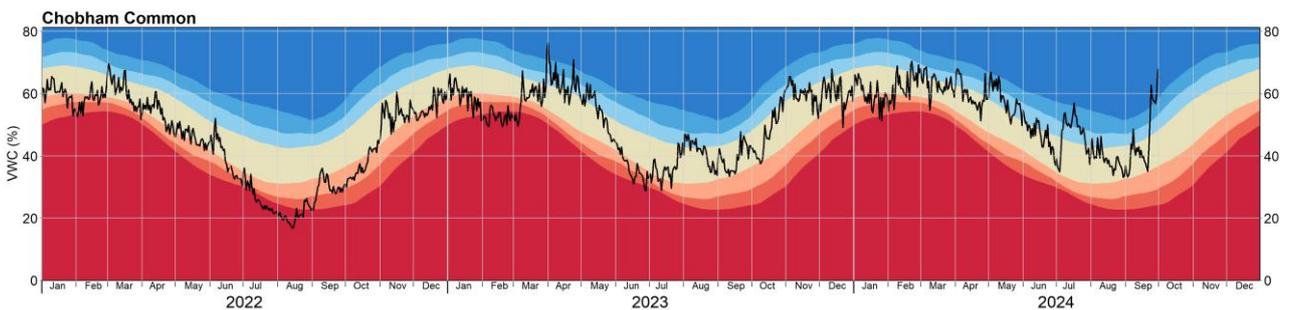
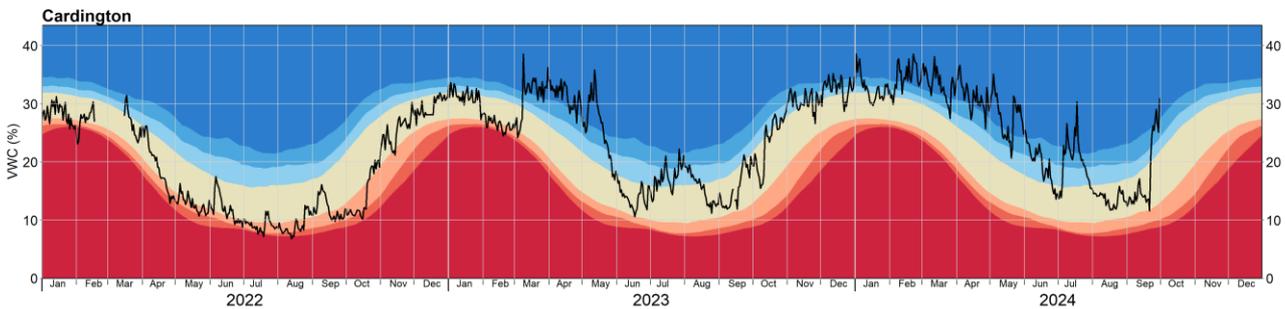
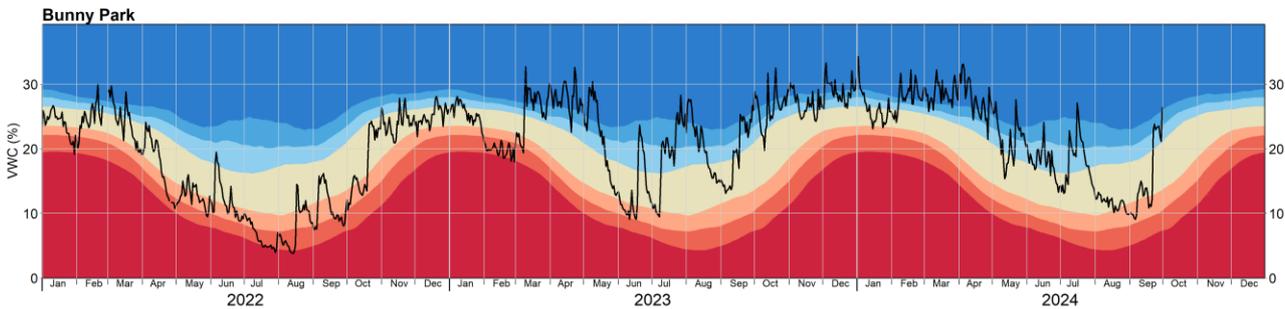
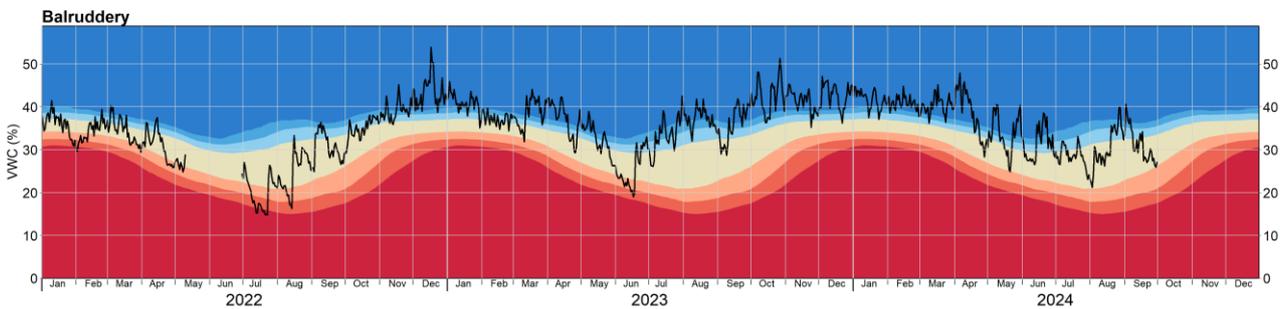
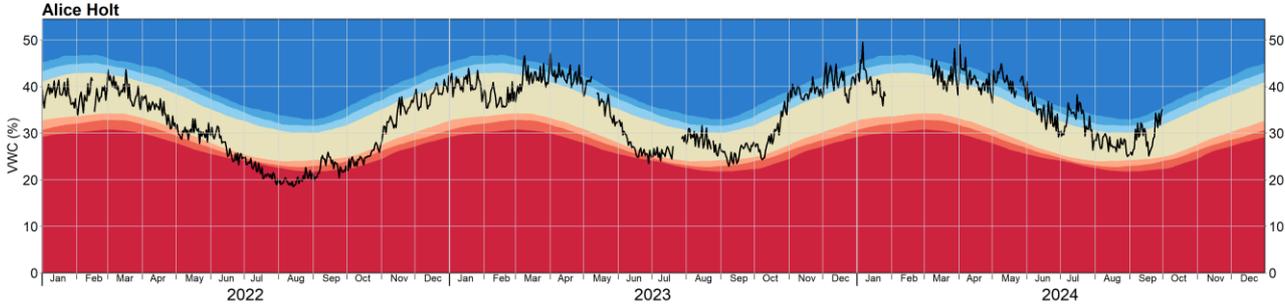
Provisional data indicate that rainfall was slightly above average for the UK overall, but there were strong regional differences. Southeast England recorded 240% more rainfall than the long-term average, whereas Scotland and Northern Ireland were drier than the long-term average. Temperatures were slightly below average across the UK as warm air from continental Europe was replaced by cooler air from the Arctic.

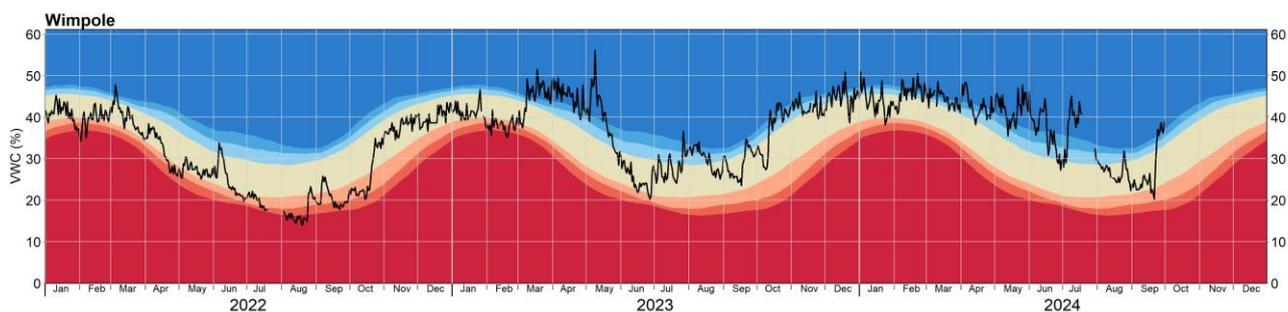
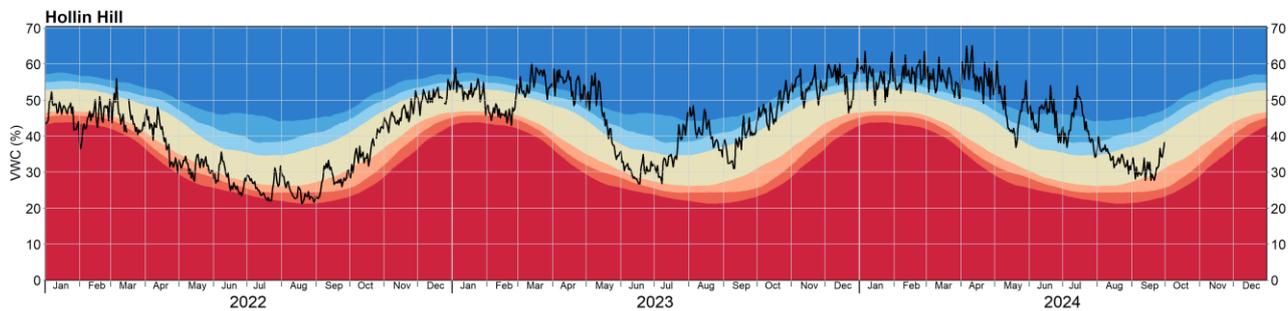
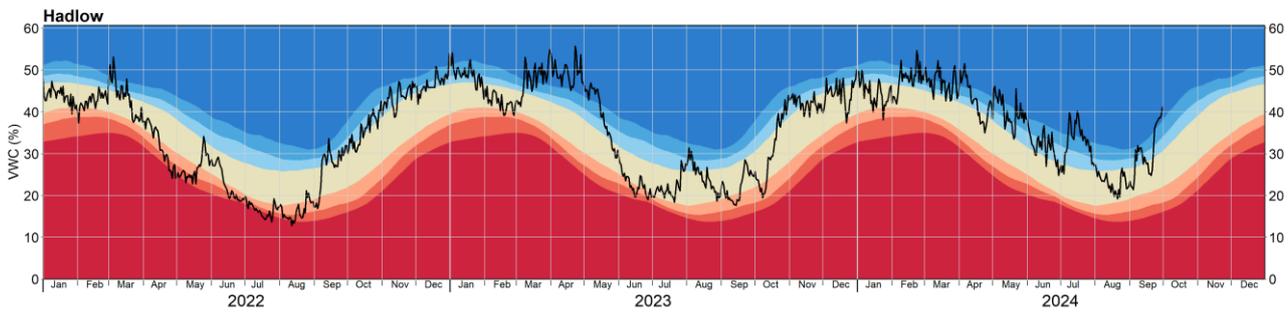
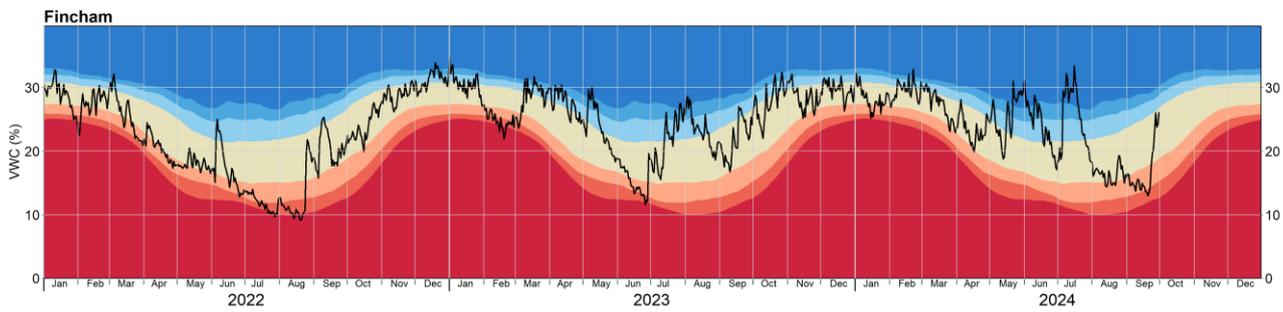
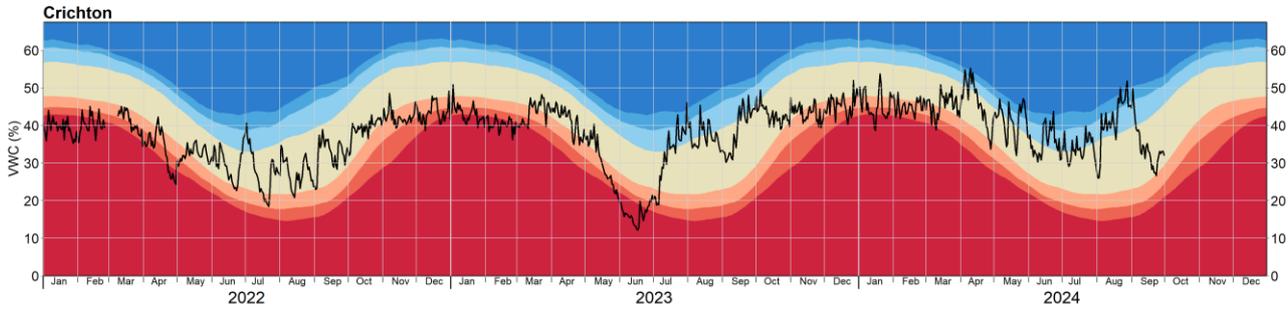
Several sites in England were drier than usual in the first few weeks of September (e.g. Bunny Park, Fincham), following on from the dry end to the summer. However, by the end of the month, soil moisture at the majority of COSMOS-UK sites across England and Wales were above field capacity. Only four sites were well below field capacity, located in Scotland (Balruddery, Crichton), north-west England (Hollin Hill), and the forest site of Alice Holt – however still within normal range for these sites for the time of year. Several sites experienced a sharp increase in soil moisture in the second half of the month following heavy rainfall (e.g. Bunny Park, Cardington, Chobham Common, Hadlow, Wimpole), reaching beyond their normal range and towards near-saturated conditions. Sites in Northern Ireland are generally within their normal range for the time of year.

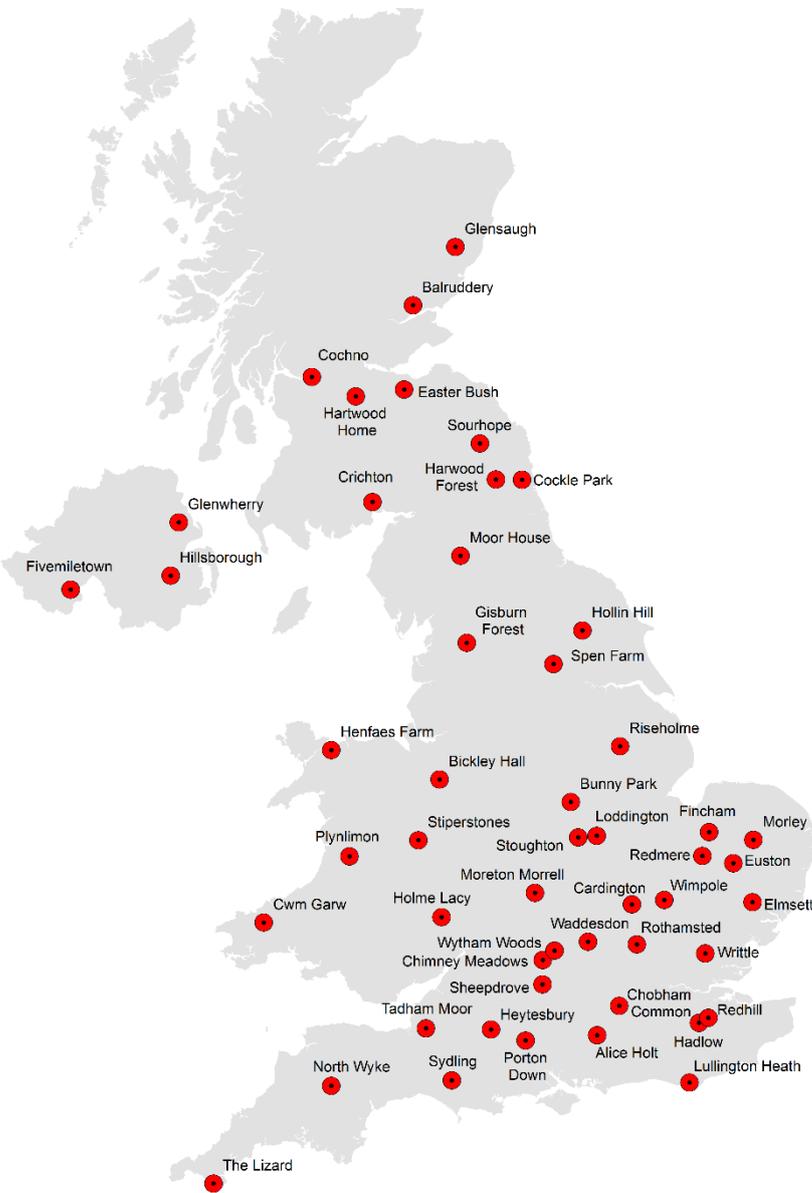
Overall, soil moisture conditions across the UK were considerably wetter than the previous month, particularly in Southern regions that saw record breaking rainfall.

### Network news

As of 10 October, the second round of our Planned Preventative Maintenance is complete. The 7th International COSMOS Workshop 2024 was well-attended and thought-provoking.







**About the maps on page 1:** The maps show daily mean soil moisture on the last day of the month. Colours indicate wetness as in the legends.

The map on the left shows wetness as the volumetric water content (VWC) of the soil which is constrained by soil type, i.e. some soils are able to hold more water than others as indicated by the shape of the symbol.

The map on the right presents soil wetness adjusted for site specific characteristics, i.e. taking account of the possible range of soil wetness at each site. Field capacity (FC) is a key point in this range. When soil moisture is below FC soil moisture is said to be in deficit, i.e. there is a (positive) soil moisture deficit (SMD).

Grey shaded areas on these two maps represent principal aquifers.

**About the graphs on pages 2 and 3:** The black line shows VWC. The coloured bands indicate how VWC compares to historical variability for the site and time of year.

- exceptionally dry
- notably dry
- drier than normal
- normal
- wetter than normal
- notably wet
- exceptionally wet

**About soil moisture:** Soil moisture varies in the short term (hours to days) with rainfall and as water drains through the soil. Longer term variation is driven by the seasonal difference between rainfall and evaporation. Thus soil moisture decreases in the summer when evaporation exceeds rainfall but increases when this is reversed. In most winters under UK conditions, soil moisture reaches a relatively constant value, known as the field capacity. Field capacity is a measure of how much water the soil can hold against gravity and is strongly dependent on the soil type. Soils are expected to be around field capacity after being wetted to above field capacity and the excess water (e.g. from macropores) has drained away under gravity, which can take several days after heavy rain, to reach a near steady state. Differences in soil type and weather patterns cause variations in soil moisture between sites including when the soil returns to field capacity in autumn/winter and when soil moisture decreases in the spring/summer.

**About COSMOS-UK:** COSMOS-UK is supported by the Natural Environment Research Council award number NE/R016429/1 as part of the UK-SCAPE programme delivering National Capability.

