

Soil moisture on 31 January 2024 (see back page for explanatory comments).

### Notes on period to 31 January 2024

**At the end of January, there was high soil moisture across much of the COSMOS-UK network.**

Provisional data indicate that January monthly rainfall totals as a whole were about average for most of the UK, however there were distinct periods of wet and dry weather through the month. There was a very wet start to January, with Storm Henk bringing strong winds, heavy rain and flooding, particularly to southern and central parts of England and Wales. A cold and dry spell followed, after which Storms Isha and Jocelyn arrived in late January bringing heavy rain, particularly across north-western parts of the UK, and milder temperatures.

At the end of the month, soil moisture was high or above field capacity for most COSMOS-UK sites. The pattern of soil moisture at most sites followed the pattern of rainfall; a high peak at the start of the month, followed by a drop in soil moisture due to drier weather, with a gradual increase towards the end of the month (e.g. Bunny Park, Euston, Moreton Morrell). Some sites remained wet throughout the month, e.g. Cardington, Hartwood Home, Hollin Hill. As noted last month, several sites had standing water on the surface, and this will be interpreted as 'soil moisture' by the integrated large area Cosmic-ray neutron sensing technique, hence soil wetness reported can be well above saturation values for those sites.

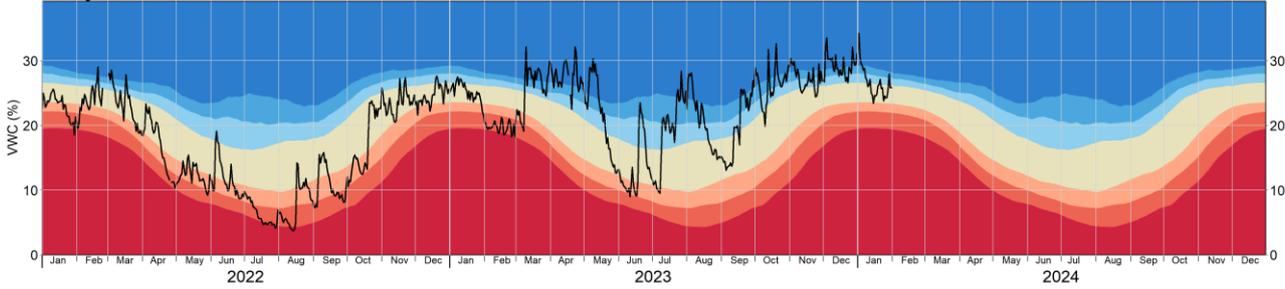
Overall, soil moisture remains high for much of the COSMOS-UK network, following a very wet December and the large storms bringing heavy rainfall across the UK in January.

### Network news

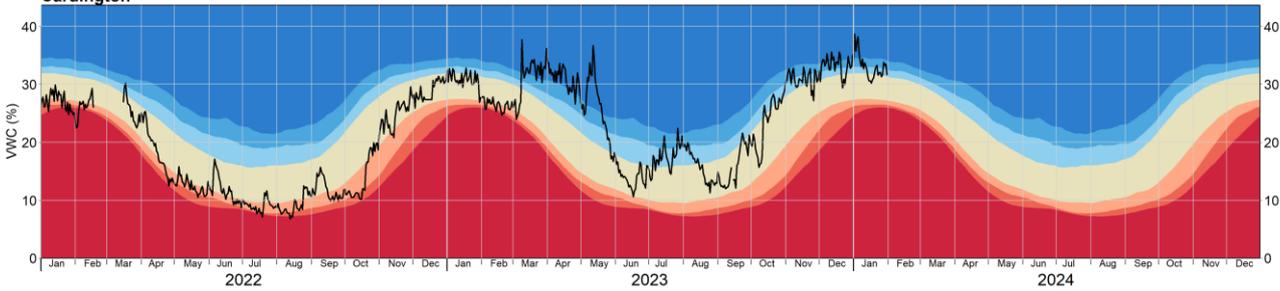
The network has recovered from a period of low solar radiation affecting power generation at sites. Site visits to Cardington and Hartwood Home have fixed intermittent communication issues. Planning for this year's PPM season has started. We welcome Andy Retter to the team as our new RA Instrument Technician.



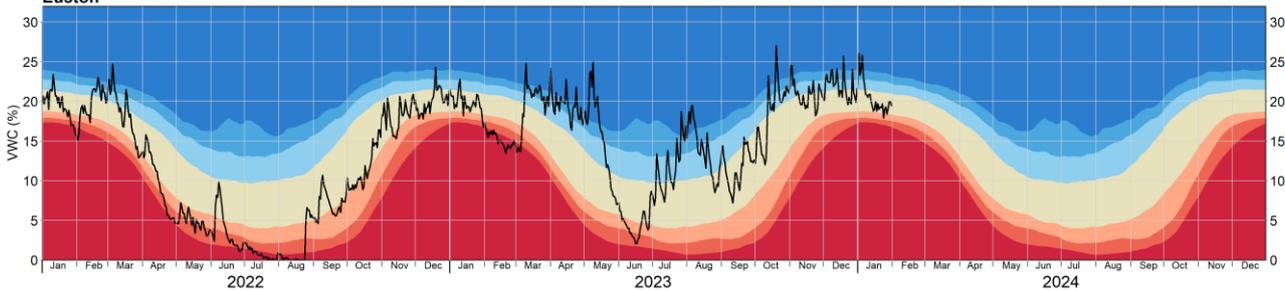
Bunny Park



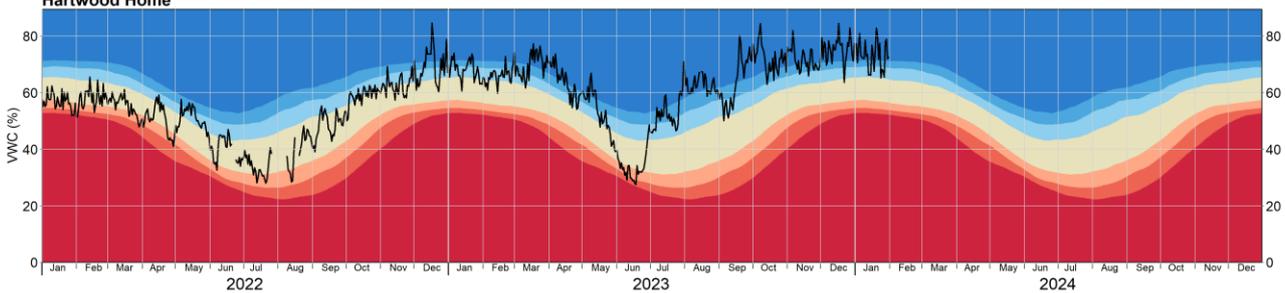
Cardington



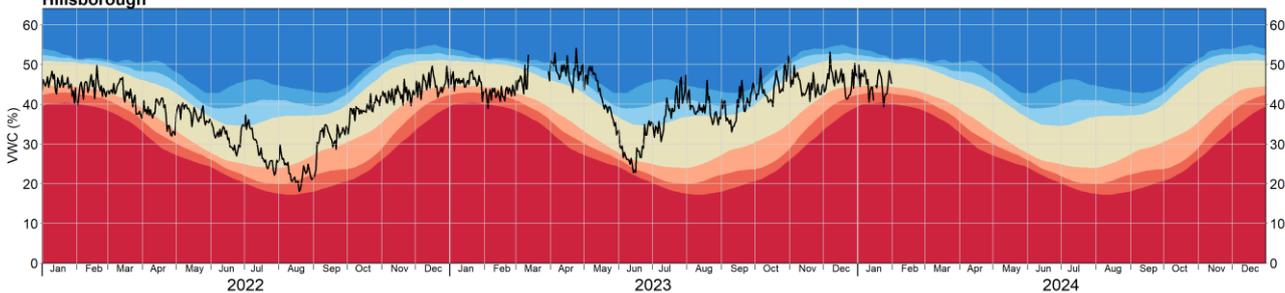
Euston

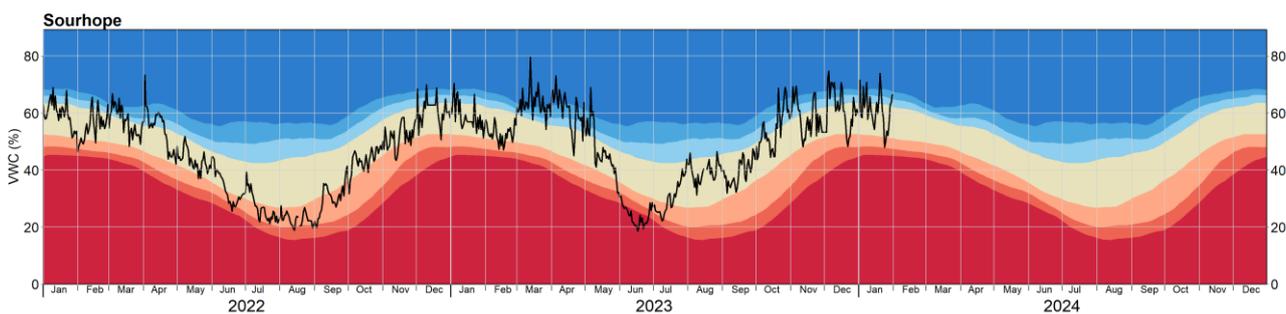
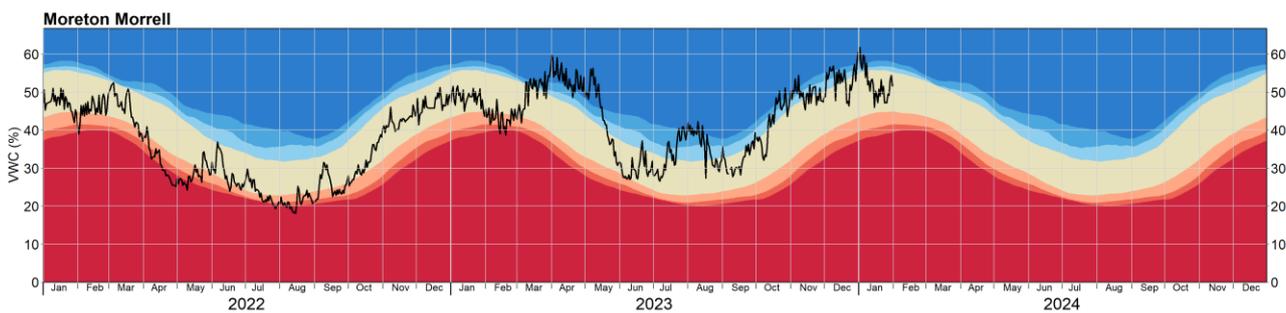
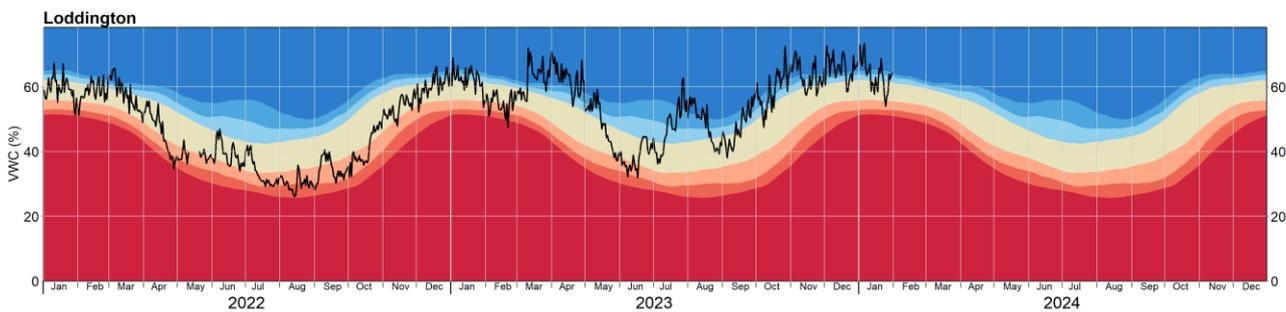
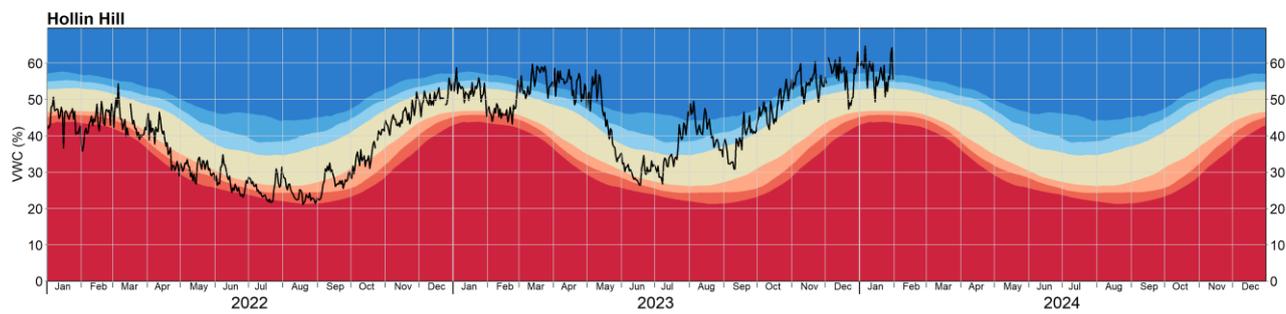
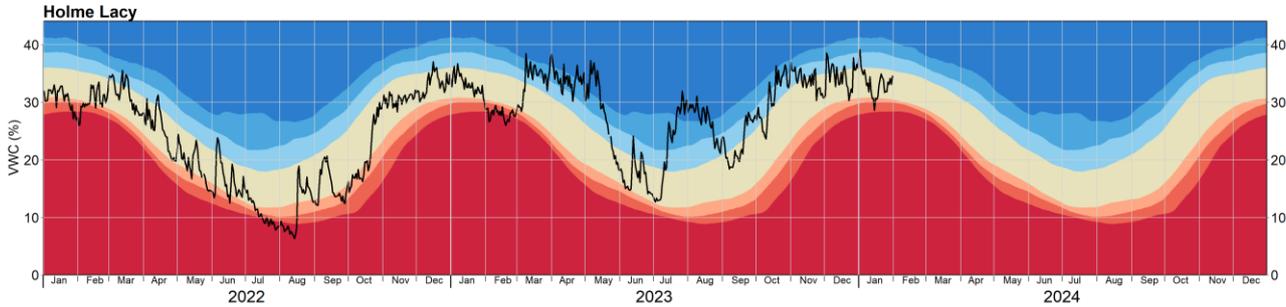


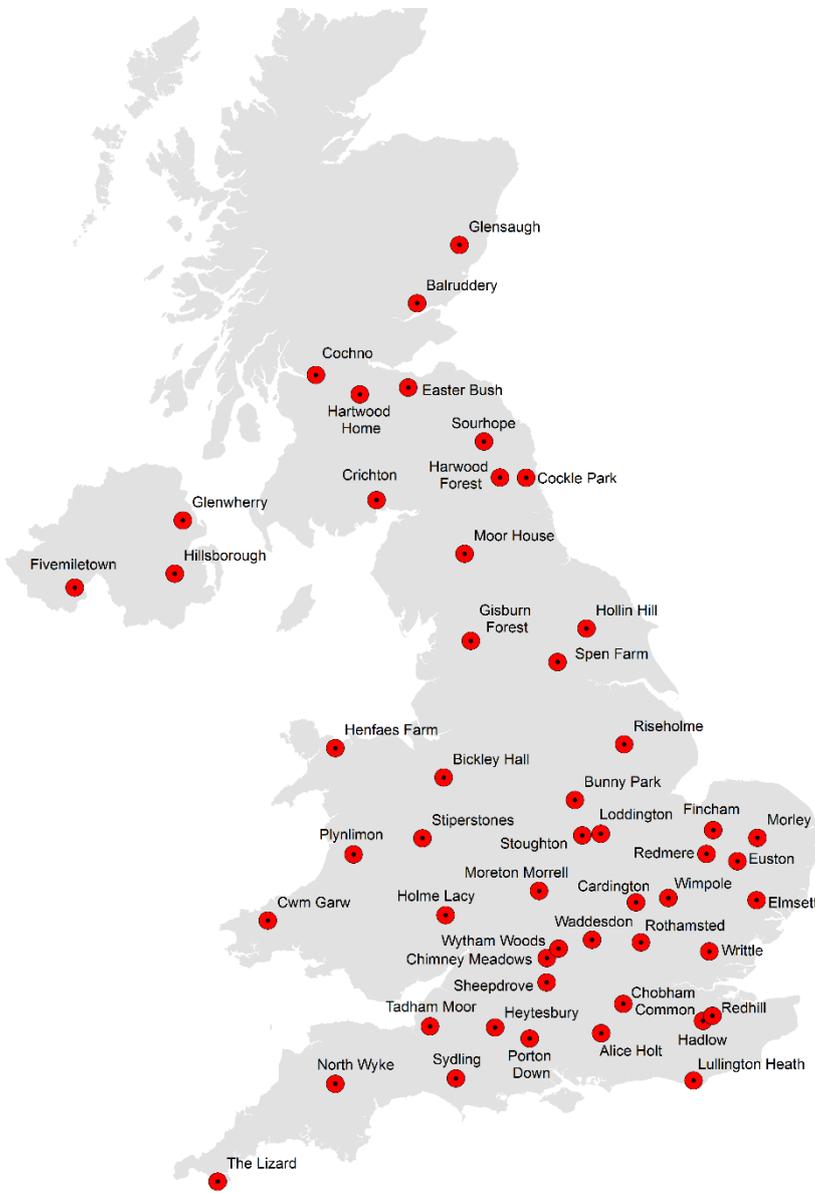
Hartwood Home



Hillsborough







**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.

