The Clay Research Group

RESEARCH AREAS

Climate Change ◆ Data Analysis ◆ Electrical Resistivity Tomography
Time Domain Reflectometry ◆ BioSciences ◆ Ground Movement
Soil Testing Techniques ◆ Telemetry ◆ Numerical Modelling
Ground Remediation Techniques ◆ Risk Analysis
Mapping ◆ Software Analysis Tools
Artificial Intelligence

August 2025
Issue 243

The Clay Research Group

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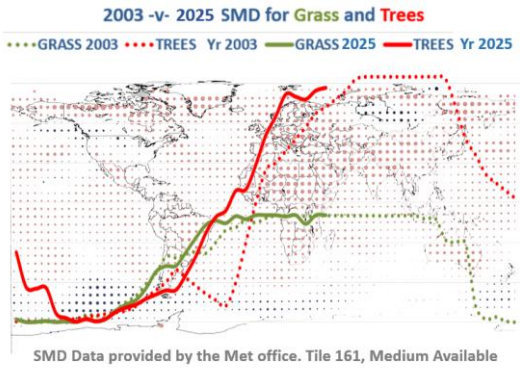
Issue 243, August 2025

SMD Graph



SMD Data provided by the Met office. Tile 161, Medium Available Water Capacity with grass and tree cover

The 2025 SMD for grass exceeded the 2003 values from May and for trees, from the end of March.

Contributions Welcome

We welcome articles and comments from readers. If you have a contribution, please Email us at: *clayresearchgroup@gmail.com*

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District and Sector Risk

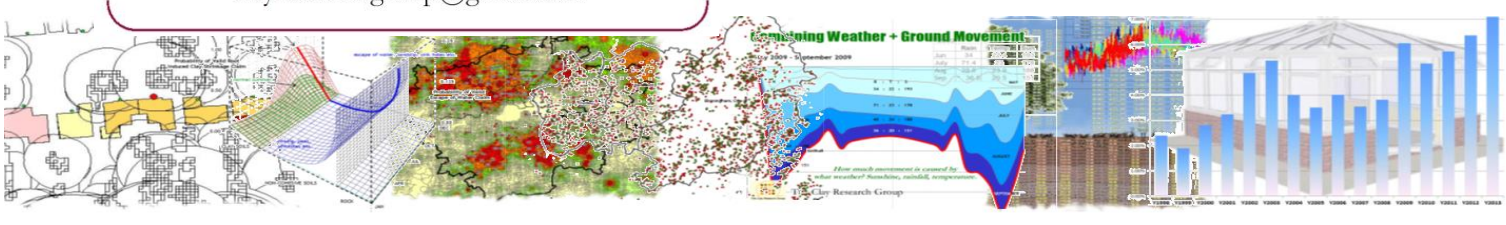
Wychavon is situated in Worcestershire, with a population of around 133,000 and an area of 664km2. It is the subject of the 'Risk by District' series in this month's edition. Its geology comprises outcropping Triassic sandstone and Mercia Mudstone to the north and Lower Lias to the south – see Page 7.

The risk maps are built from a data sample covering four claim years, including one surge and three 'normal' years.

2025 Claim Surge

Subsidence-related insurance claims totalled £153m in the first half of 2025 according to data from the Association of British Insurers. Over the first six months of the year, insurers dealt with subsidence claims from almost 9,000 households, with the average pay-out per claim standing at £17,264.

The ABI make the following note on their web site: *"The ABI's H1 2025 property claims data collection has improved market coverage compared to 2024. As a result, comparisons with previous periods should be treated carefully. Comparisons year on year of relative metrics such as average cost of claim and claims frequency should still be representative, but comparisons for absolute metrics such as total claims settled should be used with care."*



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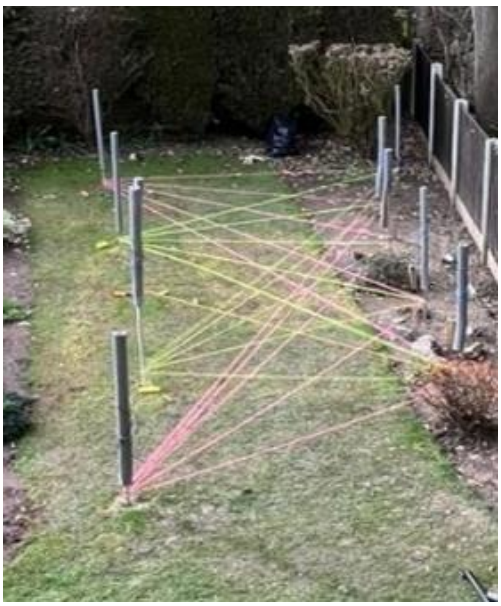
Stabilising Clay Soils

The work of Allan Tew, Senior Engineer at Innovation Group, relating to the use of electro-kinesis to stabilise clay soils was recognised at the British Insurance Awards.

Allan's research, supported by Professor Ian Jefferson at the University of Birmingham, uses a method known as electro-kinesis to stabilise clay soils affected by subsidence by reducing the shrink/swell properties. Following treatment, a soil with a Plasticity Index of 40% reduced to 8%.



Richard Rollit, Technical Director of the subsidence unit, explains: *"The process involves installing hollow metal electrodes externally and passing a low-voltage electrical current, powered by solar energy, between them. The current drives an electrolyte into the soil, altering its structure. The treatment typically takes around two weeks, causes minimal disruption to the customer, and poses no risk to pets or wildlife. The electrolyte plays a crucial role; as it moves through clay soil, it displaces pore water and modifies the soil's internal structure. This results in a permanent transformation of the clay, reducing its shrink-swell potential."*

Tree Topics

Our thanks to Keiron Hart of Tamla Trees Limited for sending through a list of interesting topics:

The Arboricultural Association are holding a conference at the University of Warwick on the 15-17th September. The full program can be accessed at:

https://www.trees.org.uk/Training-And-Events/Amenity-Conference

Trees outside woodlands mapped on aerial imagery, providing details of height and canopy spread :

Trees Outside Woodland Public Map

Defining what are regarded as important trees, as 'trees of high social, cultural, and environmental value' :

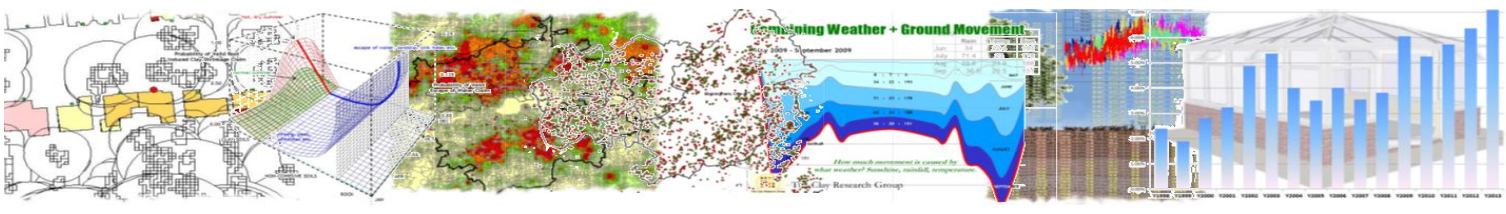
https://treecouncil.org.uk/science-and-research/valuing-and-protecting-important-trees-outside-woodlands/

Saving the oak tree:

https://www.bbc.co.uk/news/articles/ckgdx7vz7y2o.amp

Saving several oak and lime trees following residents' protests:

https://www.bbc.co.uk/news/articles/clym3r64n6go?app-referrer=deep-link



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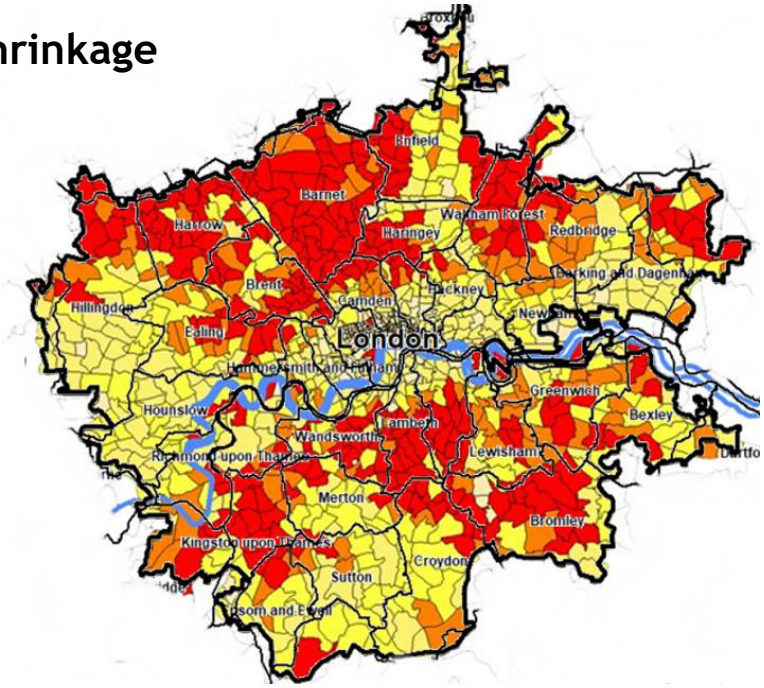
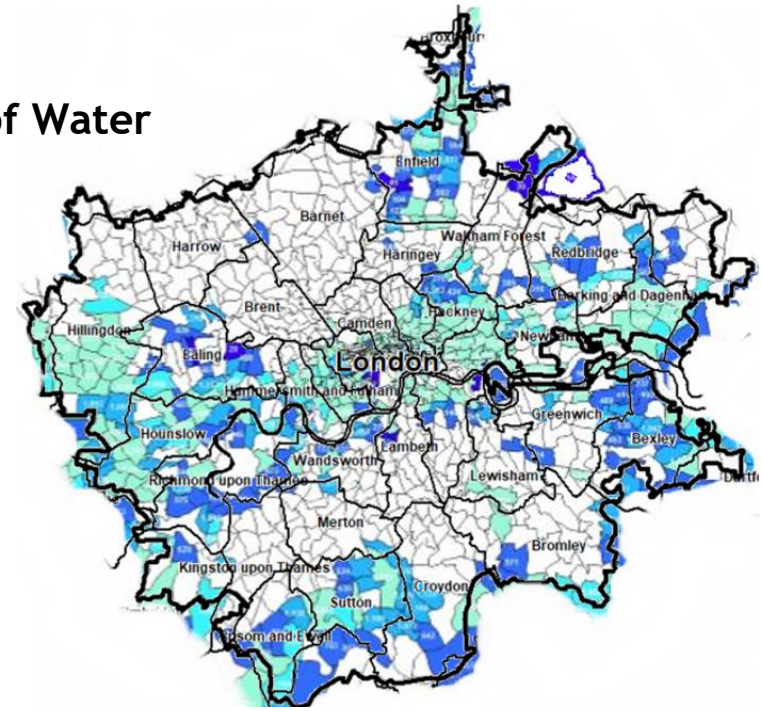
Claim Distribution - London

Clay Shrinkage



Postcode sector maps plotting the frequency distribution of the dominant subsidence peril from a UK sample of around 18,000 claims. Above, clay shrinkage and below, escape of water claim distribution. The escape of water distribution is a little conservative due to frequency scale used.

Escape of Water



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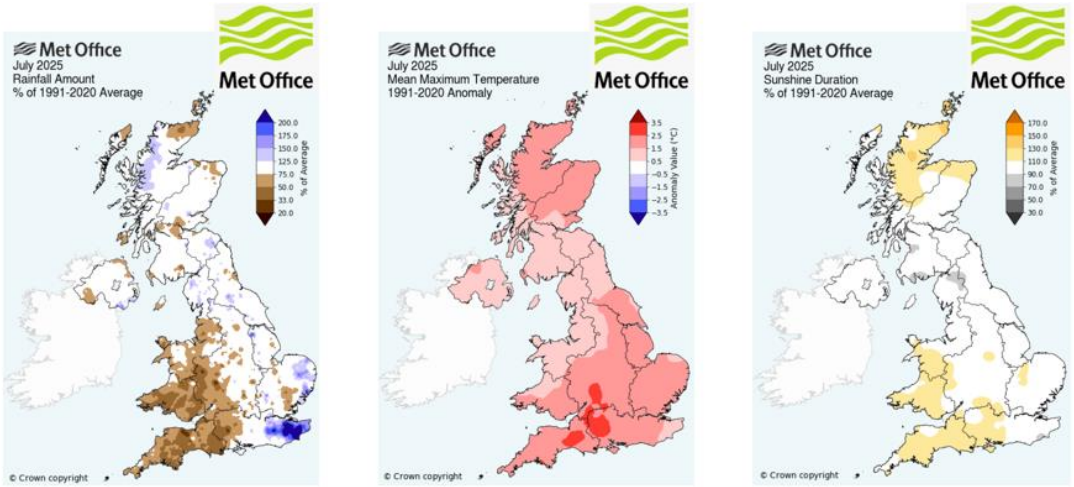
Met Office Anomaly Maps for July 2025

Anomaly maps from the Met Office web site for the month of July 2025 comparing data with the 1991 – 2020 average, reproduced below.

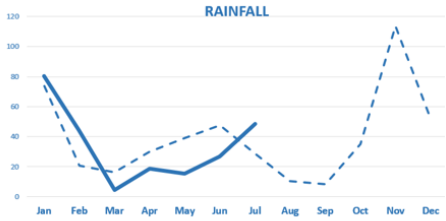


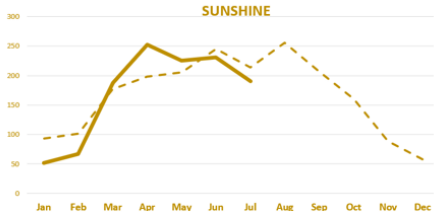
The maps indicate less rainfall and longer sunshine duration to the south west and significantly higher temperatures for July compared with 1991 – 2020 averages.

htts://www.metoffice.gov.uk/research/climate/maps-and-data/uk-actual-and-anomaly-maps

Is 2025 going to be a surge year?

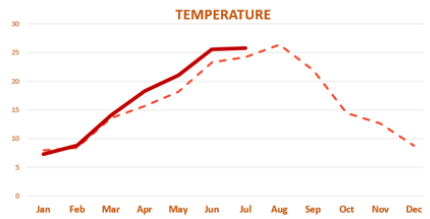
Continuing the topic from last month's edition, plotting monthly data supplied by the Met Office from the Heathrow weather station for rainfall, sunshine and temperature. The graphs compare weather data for 2003, a surge year, with the current year. Do the indicators of surge – lower rainfall, longer hours of sunshine and higher temperatures - suggest the possibility of a surge?



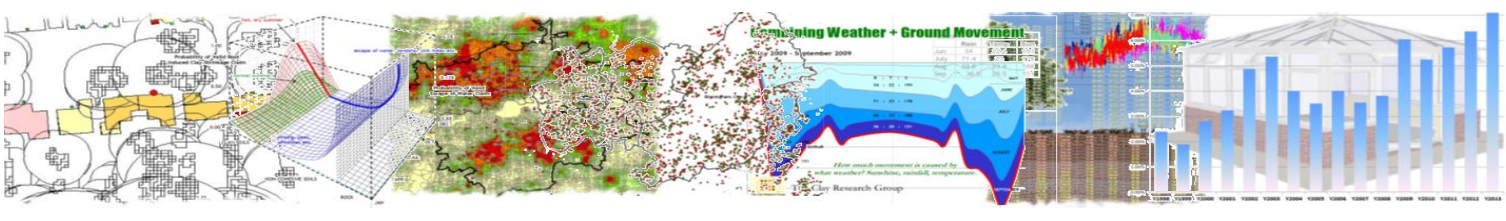


The dotted line in each graph plots the values for 2003.Top, rainfall was significantly less from March through to June, but increased in July, with a similar story for sunshine – longer hours from March to June, declining in July.

Temperatures have fallen slightly, but remain higher than 2003.



It is going to be an interesting year - is weather data a useful predictor and if so, which months are critical?



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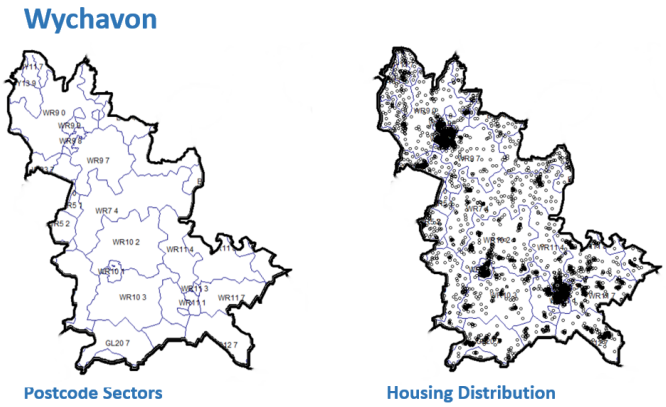
Subsidence Risk Analysis – Wychavon

Wychavon is situated in Worcestershire and occupies an area of around 664km2 with a population approaching 133,000.



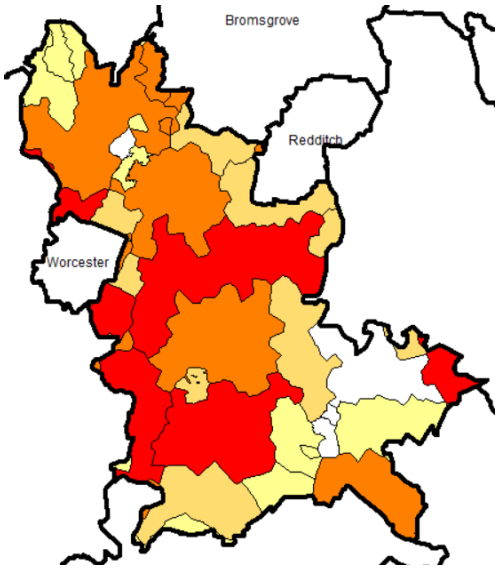
Distribution of housing stock using full postcode as a proxy. Each sector covers around 3,000 houses on average across the UK and full postcodes include around 15 – 20 houses on average, although there are large variations.

Sector and housing distribution across the district (left, using full postcode as a proxy) helps to clarify the significance of the risk maps on the following pages. Are there simply more claims in a sector because there are more houses?

Using a frequency calculation (number of claims divided by private housing population) the relative risk across the borough at postcode sector level is revealed, rather than a 'claim count' value.

From the sample we hold, sectors are rated for the risk of domestic subsidence compared with the UK average – see map, right.

Wychavon is rated 75th out of 413 districts in the UK from the sample analysed and is around 1.51x the risk of the UK average, or 0.392 on a normalised 0 - 1 scale.



Sector risk compared to UK average from the sample analysed.

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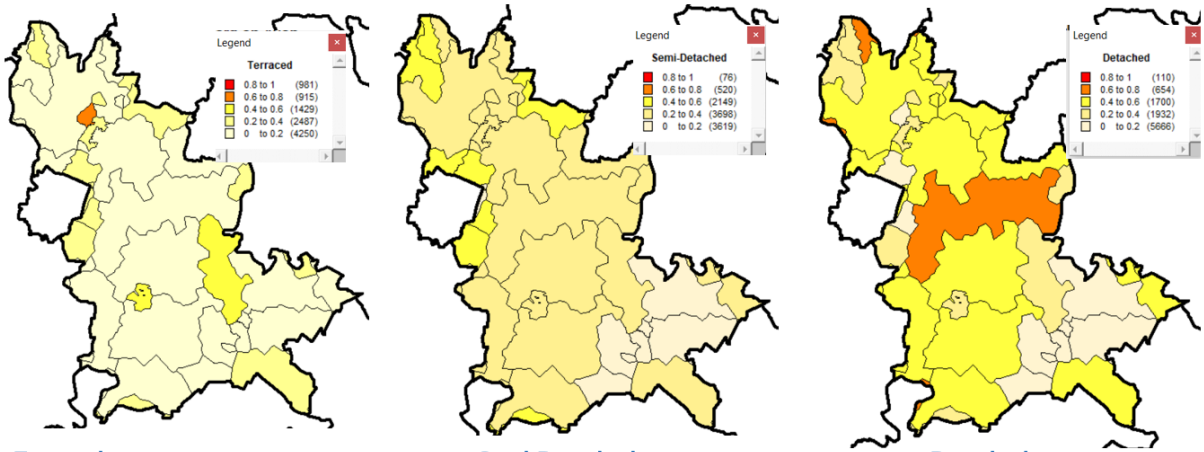
Wychavon - Properties by Style and Ownership

Below, the general distribution of properties by style of construction, distinguishing between terraced, semi-detached and detached. Unfortunately, the more useful data is missing at sector level – property age.

Risk increases with age of property and the model can be further refined if this information is provided by the homeowner at the time of taking out the policy.

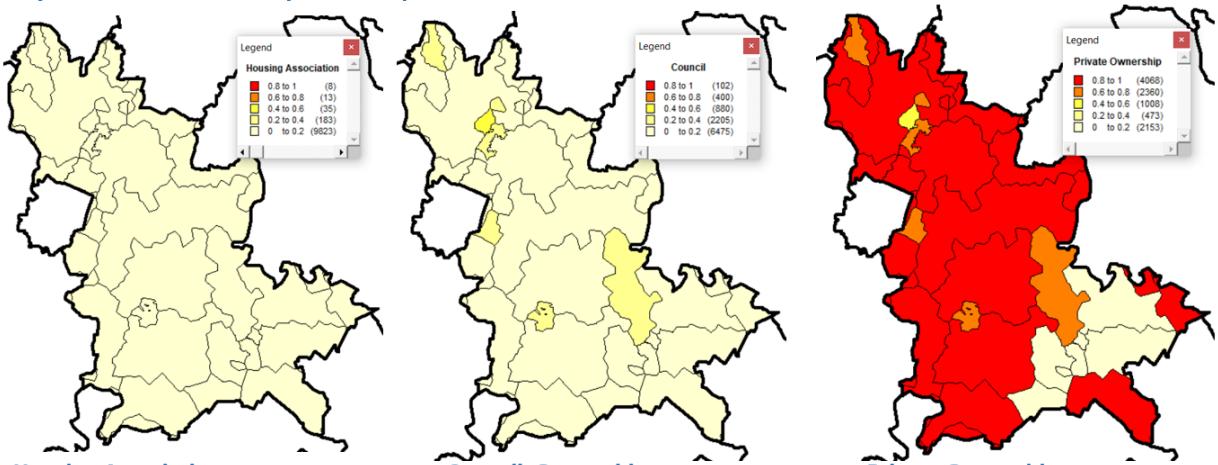
Wychavon - Distribution by House Type



Terraced **Semi-Detached** **Detached**

Distribution by ownership is shown below. Detached, private properties are the dominant class across the district.

Wychavon - Distribution by Ownership



Housing Association **Council Ownership** **Private Ownership**

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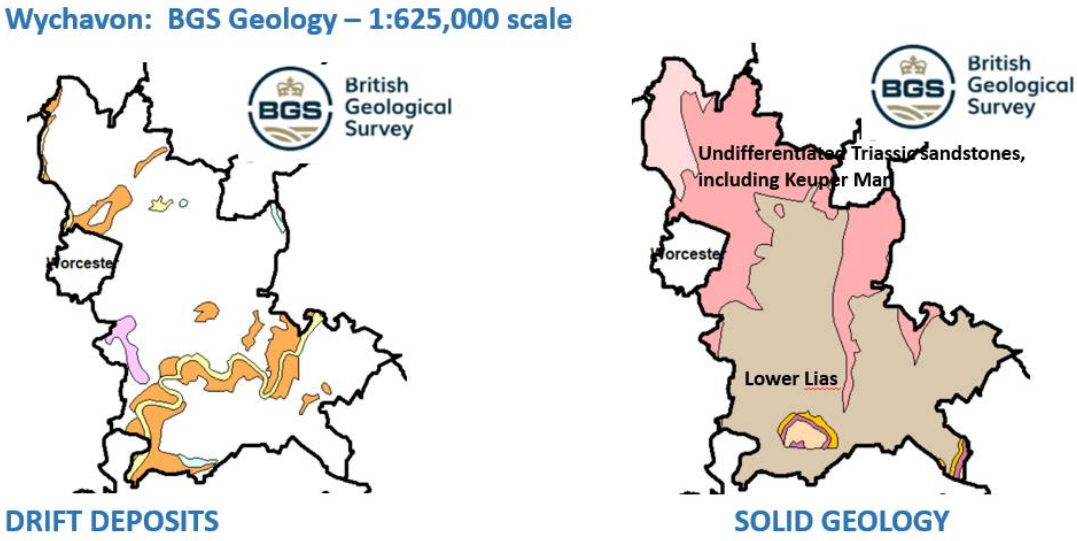
Subsidence Risk Analysis – Wychavon

Below, extracts from the British Geological Survey low resolution 1:625,000 scale geological maps showing the solid and drift series. View at: http://mapapps.bgs.ac.uk/geologyofbritain/home.html for more detail.

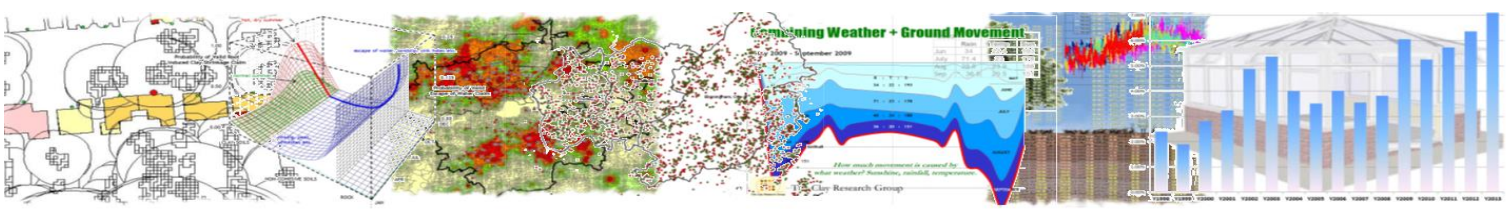
See page 10 for a seasonal analysis of the sample which reveals that, at district level, there is around a 80% probability of a claim being valid in the summer and, of the valid claims, there is a 90% probability that the damage will have been caused by clay shrinkage.

In the winter, the situation reverses. The likelihood of a claim being valid is around 17% and of the valid claims, escape of water is the most likely cause – around 90%.

A postcode sector map on the following page records the PI of soils retrieved following site investigations from actual claims.



Above, extracts from the 1:625,000 series British Geological Survey maps. Working at postcode sector level and referring to the 1:50,000 series delivers far greater benefit when assessing risk.



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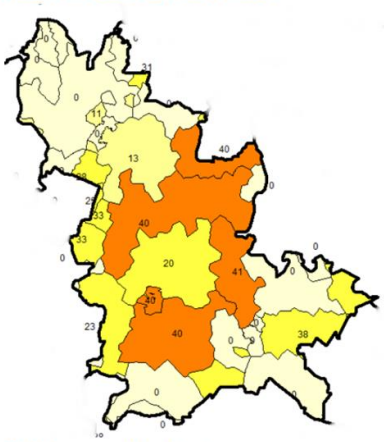
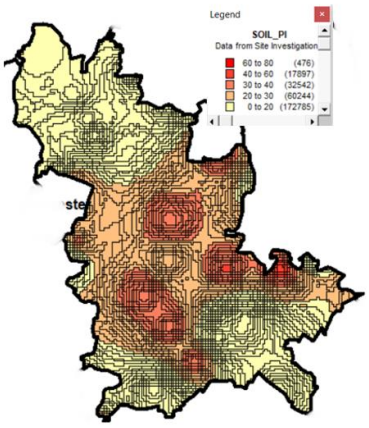
Liability by Geology and Season

Below, the average PI by postcode sector (left) derived from site investigations and interpolated to develop the CRG 250m grid (right). The higher the PI values, the darker red the CRG grid.

Wychavon: Soil Plasticity Index



Soil PI Averaged by Sector

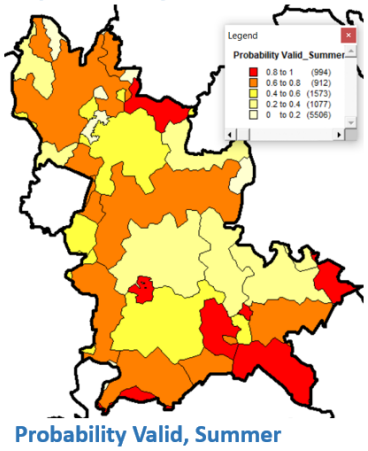


PI Interpolated on 250m CRG grid

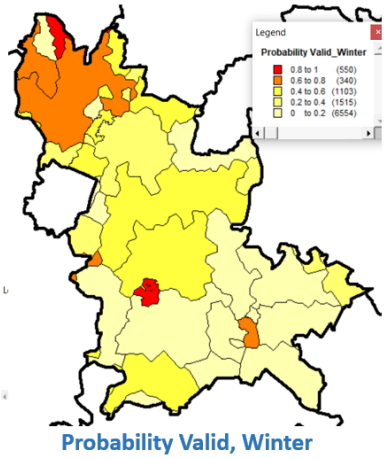
Zero values for PI in some sectors may reflect the absence of site investigation data - not necessarily the absence of shrinkable clay. A single claim in an area with low population can raise the risk as a result of using frequency estimates.

The maps below show the seasonal difference from the sample used. Combining the risk maps by season and reviewing the table on page 10 is perhaps the most useful way of assessing the potential liability, likely cause and geology using the values listed.

Wychavon – by season

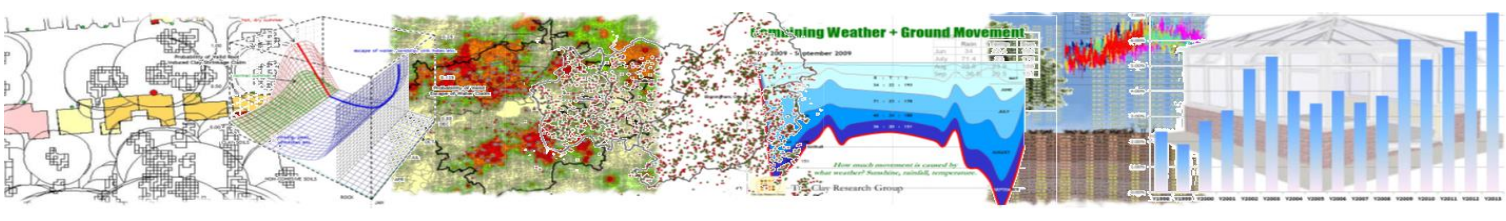


Probability Valid, Summer



Probability Valid, Winter

The 'claim by cause' distribution and the risk posed by the soil types is illustrated at the foot of the following page. A high frequency risk can be the product of just a few claims in an area with a low housing density of course and claim count should be used to identify such anomalies.



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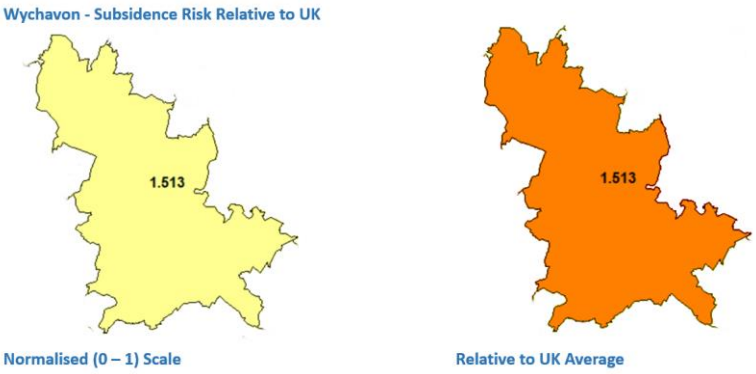
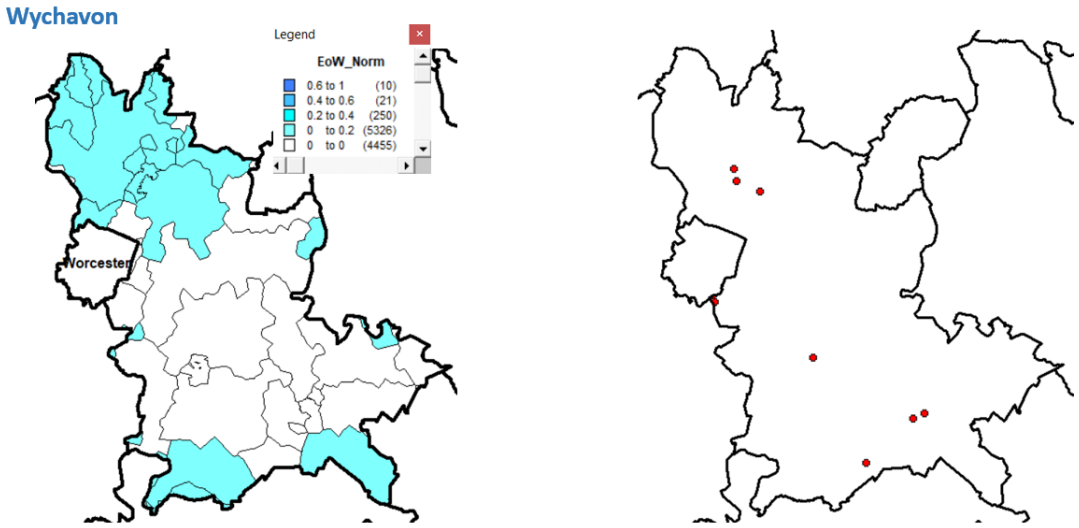
District Risk. EoW and Council Tree Risk.

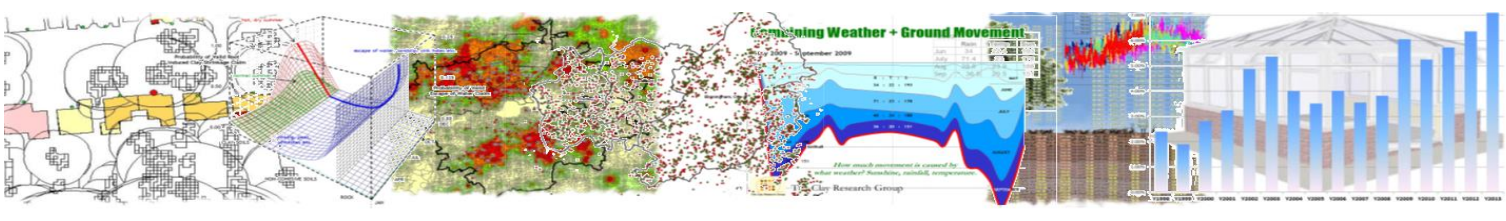


Below, left, mapping the frequency of escape of water claims suggests the presence of shallow deposits of non-cohesive soils to the north of the district, or perhaps older properties.

As we would expect, the 50,000 scale BGS map provides a more detailed picture. The CRG 1:250 grid reflects claims experience.

Below right, map plotting claims where damage has been attributable to vegetation in the ownership of the local authority from a sample of around 2,858 UK claims. The claims usually coincide with the presence of shrinkable soils.





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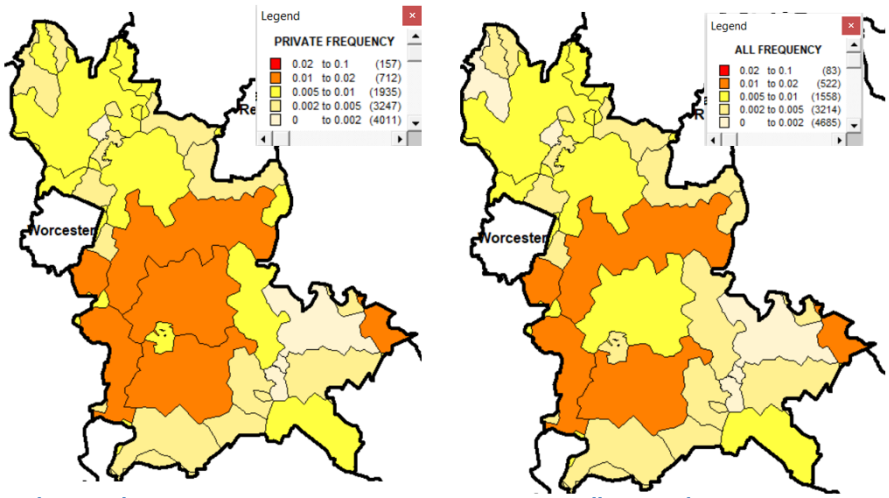
Wychavon - Frequencies & Probabilities

Below, mapping the risk of subsidence by ownership. Claims frequency that includes council and housing association properties delivers a misleading value of risk as they tend to self-insure. The following show the normalised risk, taking account of the private housing population – that is, the rating compared with the average value for each category.

Wychavon - Sector Risk Compared with UK Average



Private Only All Properties

On a general note, a reversal of rates for valid-v-declined by season is a characteristic of the underlying geology. For clay soils, the probability of a claim being declined in the summer is usually low, and in the winter, it is high.

Valid claims in the summer have a higher probability of being due to clay shrinkage, and in the winter, escape of water. For non-cohesive soils, sands, gravels etc., the numbers tend to be fairly steady throughout the year.

Liability by Season - Wychavon

District	valid summer clay	valid summer EoW	Repudiation Rate (summer)	valid winter clay	valid winter EoW	Repudiation Rate (winter)
Wychavon	0.697	0.082	0.221	0.02	0.15	0.83

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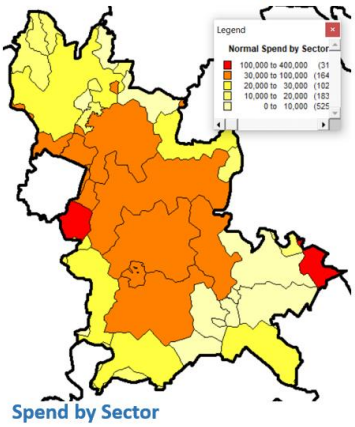
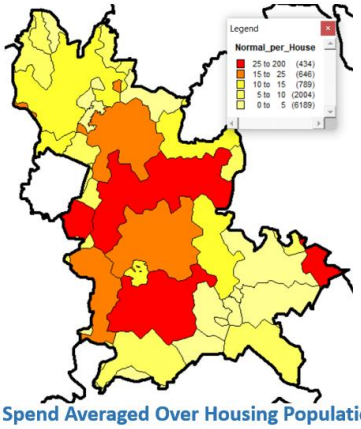
Aggregate Subsidence Claim Spend by Postcode Sector and Household in Normal & Surge Years

The maps below show the aggregated claim cost from the sample per postcode sector for both normal (top) and surge (bottom) years. The figures will vary by the insurer's exposure, claim sample and distribution of course.

NORMAL YEAR SPEND – Wychavon



Spend by Sector

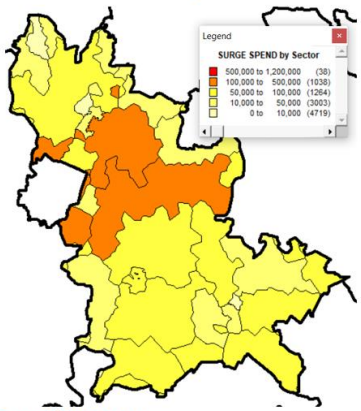


Spend Averaged Over Housing Population

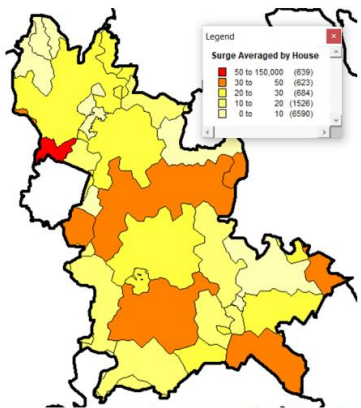
It will also be a function of the distribution of vegetation and age and style of construction of the housing stock. The images to the left in both examples (above and below) represent gross sector spend and those to the right, sector spend averaged across private housing population to derive a notional premium per house for the subsidence peril.

The figures can be distorted by a small number of high value claims. The absence of any distinct difference between surge and normal years reflects the geology.

SPEND in SURGE – Wychavon



Spend by Sector



Spend Averaged over Housing Population