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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



November 2026
Issue 258

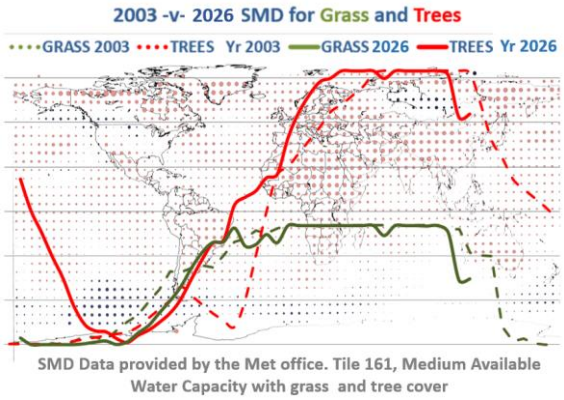
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Subsidence Risk Analysis by District
Crawley

SMD Graph



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

SMD graph for Met Office tile 161 plotting the correlation between the SMD for a surge year (2003) and the current year in soils with medium water capacity.

Contributions Welcome

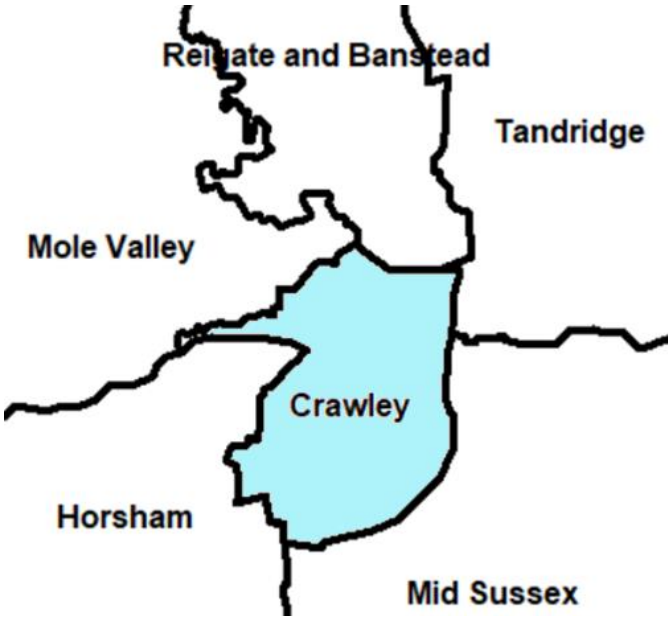
We welcome articles and comments from readers. If you have a contribution, please Email us at: *clayresearchgroup@gmail.com*

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District and Sector Risk

Crawley is situated in West Sussex. It has an area of 25.61km^2 and a population of around 128,000.

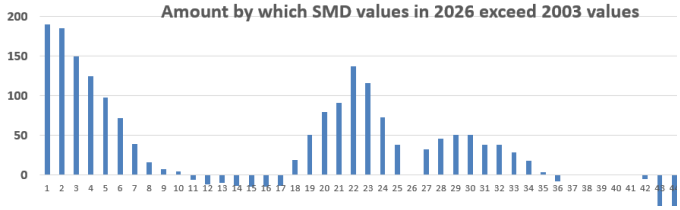
It is the subject of the 'Risk by District' series in this month's edition. Its geology comprises areas of Till overlying Weald clay and Hasting beds - see Page 10.

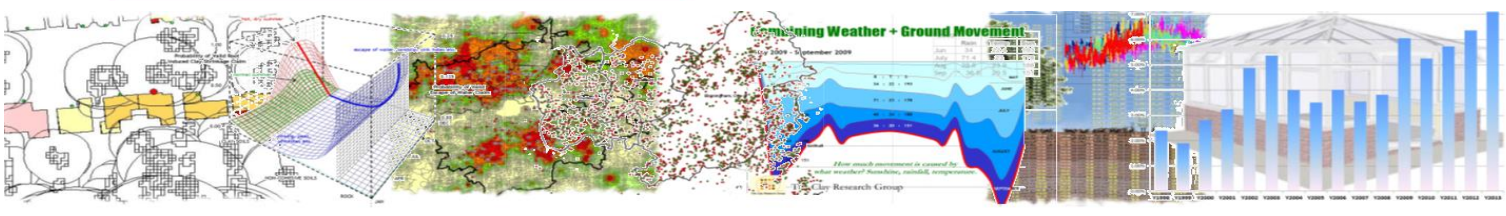


The risk maps are built from a data sample covering four claim years, including one surge and three 'normal' years.

Soil Moisture Deficit

The 2026 SMD tree profile is significantly higher than 2003 for the weeks shown in the graph below and extends for nearly half the year to the end of October.





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Predicting Subsidence Claim Risk

Question to ChatGPT

Is it possible to predict the risk of subsidence claims in the Spring?

Response:

Yes. **The risk of subsidence insurance claims in spring can be predicted to a useful degree**, particularly for property insurers, loss adjusters and claims teams in the UK. The most effective approach combines weather forecasts, soil moisture, ground conditions, property characteristics and historical claims data.

The important distinction is between predicting **the likelihood of subsidence occurring** and predicting **whether it will result in an insurance claim**. The latter also depends on property exposure, policy cover, excesses, reporting behaviour and the time lag between damage appearing and a claim being notified.

How spring subsidence risk can be predicted
Spring is a particularly interesting period because the ground is emerging from winter, when soils may be saturated, and entering a period of increasing temperatures, plant growth and potentially declining soil moisture.

1. Soil moisture deficit
Track rainfall against evaporation and water loss from the soil. A large accumulated deficit can signal elevated risk, particularly in clay soils. Spring rainfall should be assessed alongside the preceding months, rather than in isolation.

British Geological Survey
+1

2. Vegetation and tree exposure
Tree growth and increasing water uptake can dry out shrinkable clay. Tree proximity, species, size and the property's foundation depth help identify vulnerable buildings.

British Geological Survey
+1



... continued

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3. Geology and property characteristics
Map clay susceptibility against property age, foundation type, drainage, previous subsidence claims and local ground conditions. The British Geological Survey's Property Subsidence Assessment dataset provides property-level susceptibility scores for England and Wales.

National Data Library
+1

4. Weather forecasts and seasonal outlooks
Use forecast temperature, rainfall and evapotranspiration to estimate how quickly soil moisture may decline over the coming weeks. These variables can provide early warning, although seasonal forecasts cannot reliably predict every localised subsidence event.
v

A practical model for predicting spring claims
For an insurer, I would build a model that estimates the probability of at least one subsidence claim per property, or the expected number and cost of claims across a portfolio, over a defined spring period.

Model input	What it helps predict
Soil moisture deficit and its rate of change	Emerging seasonal hazard
Rainfall and temperature anomalies	Whether conditions are unusually dry or warm
Clay shrink–swell susceptibility	Underlying ground vulnerability
Trees, foundations and drainage	Property-level exposure
Historical claims and previous incidents	Repeat claims and local claim propensity
Policy, excess and property value	Claim frequency and financial severity

A statistical model or machine-learning approach could combine these variables to produce a **property-level risk score and a portfolio-level forecast**. It should be trained on several years of historical claims, with validation on later spring seasons to test whether it genuinely predicts future claims rather than merely fitting past patterns.



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One useful distinction is between three forecast horizons:

- **4–12 weeks ahead:** seasonal risk outlook, based on soil moisture and weather scenarios.
- **1–4 weeks ahead:** updated regional and postcode-level risk estimates as weather forecasts improve.
- **Throughout spring:** ongoing monitoring to identify emerging hotspots and adjust expected claim volumes.

These are proposed operational horizons, not guarantees of predictive accuracy.

Is spring actually a good time to predict subsidence claims?
Yes, but it is important to account for the delayed effect of weather. Subsidence damage can emerge during spring and summer as clay soils dry and shrink, while the claim may be reported weeks or months later. The British Geological Survey describes shrink–swell movement as particularly relevant during the spring and summer growing season.

British Geological Survey
+1

Recent experience also illustrates the importance of this approach: the BGS reported that the UK experienced its warmest spring on record in 2025, with domestic subsidence-related claims reaching £307 million over the year, according to Milliman UK figures cited by the BGS. This illustrates the potential impact of extreme conditions, but one season alone is not sufficient to establish a reliable predictive relationship.

British Geological Survey

What I would recommend

For a UK insurer, I would start by combining the BGS Property Subsidence Assessment data with historical claims records and daily weather and soil-moisture data. The first deliverable would be a weekly spring risk dashboard showing:

- Expected claims versus the normal seasonal baseline.
- High-risk postcodes and concentrations of insured properties.
- The probability of claim volumes exceeding a defined threshold.
- Estimated claim costs and the uncertainty around those estimates.

The critical test is whether the model improves on a simple seasonal baseline and provides enough lead time for claims resourcing, underwriting or preventative customer communications.



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Can I clarify one thing? Are you looking to predict spring subsidence claims for an **insurance company's portfolio**, to help with claims staffing and financial forecasting, or to predict **which individual properties are most likely to generate a claim**? The modelling approach differs significantly between those two objectives.

Clarifying Heave

"Heave: not all it is cracked up to be" which "challenges the myths around heave – and exposes the nonsense of phased tree removal" is an article in the Arboricultural Journal's ARB MAGAZINE, Issue 214 Autumn 2026 by Dr Martin Dobson and looks at the risk of heave and why it may be overstated.

The article uses data from research undertaken at the Aldenham research site and why the idea of phased tree removal is misguided.

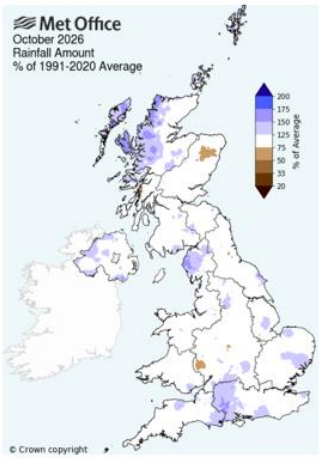
The article can be accessed via Martin's Linkedin profile –

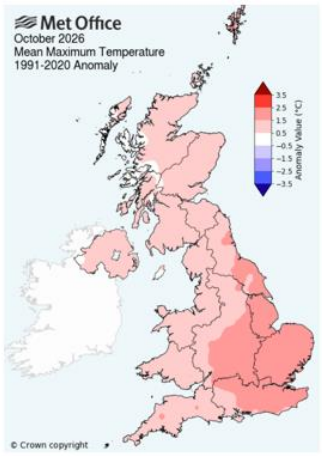
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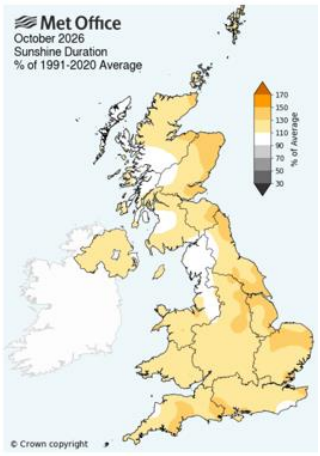
Or the CRG web site at https://www.clayresearchgroup.co.uk/ - select '*Monthly Newsletter*'.

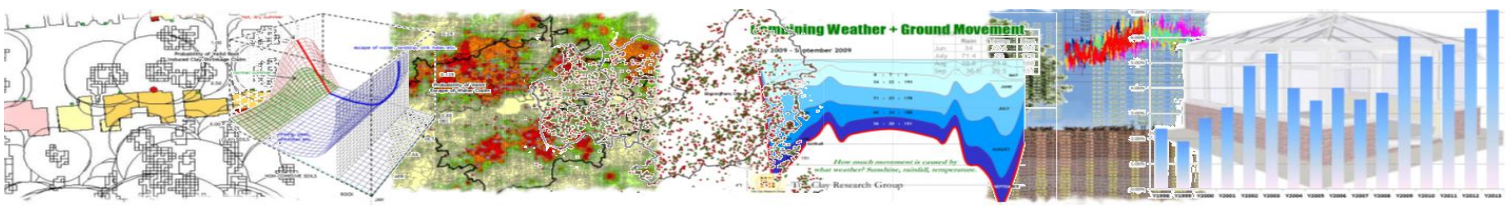
Met Office Anomaly Maps for October 2026

Anomaly maps from the Met Office web site for the month of October 2026 comparing data with the 1991 – 2020 average reproduced below. The absence of rainfall in many parts of the country, high temperatures and sunshine duration continue to reinforce the risk of high claim numbers and an increase in claim costs.







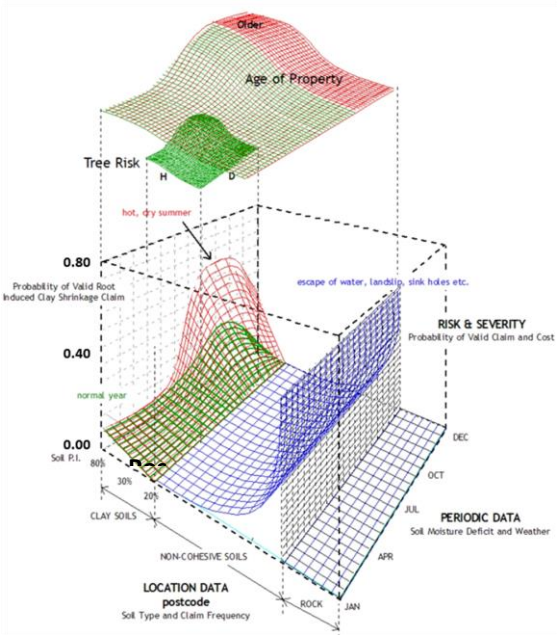


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Artificial Intelligence and Subsidence

The following re-visits articles from past newsletters exploring the data required and how they can be integrated to build an AI application. The chart below provides a composite image of the subsidence risk, taking into account location, geology, season, weather and time of damage occurring and statistically, the most likely cause.

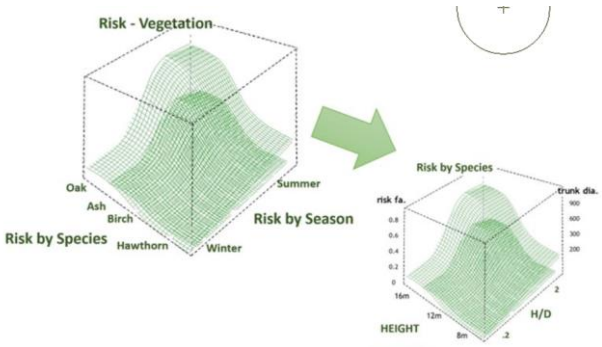
The outcome is seen as a tool for claim handlers, integrating the various datasets that are already available, and not a replacement for them.



The postcode locates the geology and ascribes a potential risk of causation should the claim be valid.

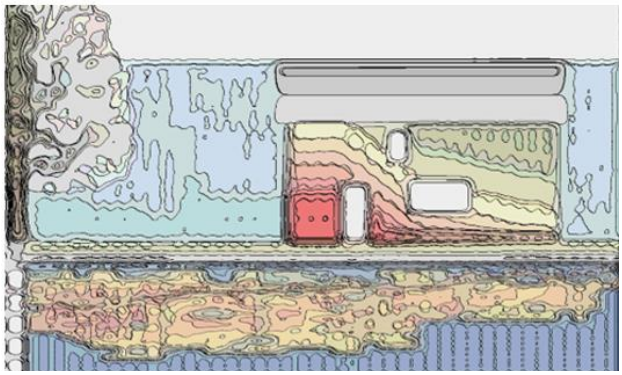
The probability of the claim being clay shrinkage increases with the plasticity index of the soil combined with the location of any nearby vegetation and a dry, warm summer.

The graph below takes into account tree species, height and distance from the building, combined with the time of year the damage was first noticed and likely root spread,



Modelling clay shrinkage claims doesn't produce a clearly defined picture of course – more likely along the lines of the image below.

If crack damage occurs within with modelled stress zones, then the probability of the damage being the results of root activity increases.



Escape of water probabilities are linked to the presence of a non-cohesive soil, the age of the property and relationship between damage and known drainage locations. Past claims data is a strong indicator.



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If, for example, the 'claims by season' table delivers the figures in the example below, then damage is most likely associated with an escape of water (EoW) and non-cohesive soils.

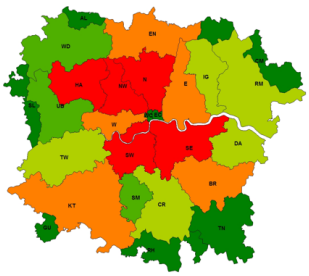
This example records significantly higher rates of EoW claims in both summer and winter with a higher declinature rate in the summer.

valid summer clay	valid summer EoW	Declinature Rate (summer)	valid winter clay	valid winter EoW	Declinature Rate (winter)
6%	25%	69%	15%	61%	23%

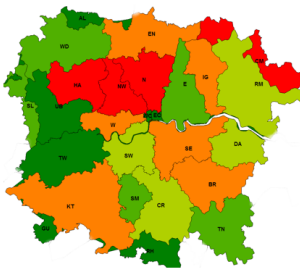
Claim Count -v- Frequency

Below, maps comparing claim count with claim frequency revealing the variation in risk classification depending on the method used.

Significant differences can be seen across some London districts and the method of determining risk will influence insurance premiums. Frequency is the preferred method.



Claim Count

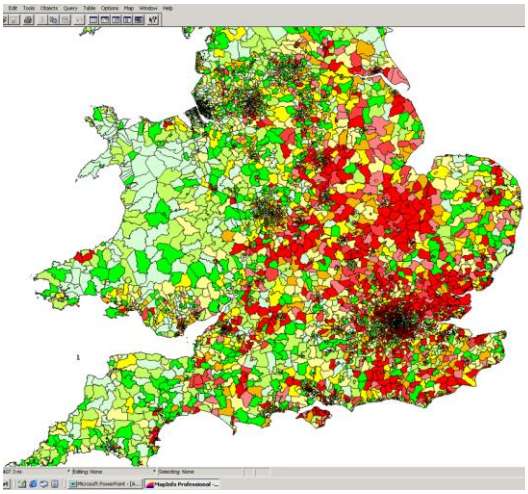


Claim Frequency

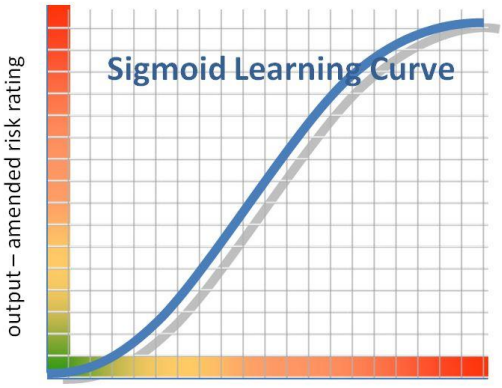
Variation in Risk across the UK

The AI system needs to have access to all datasets, including an understanding of risk distribution across the UK.

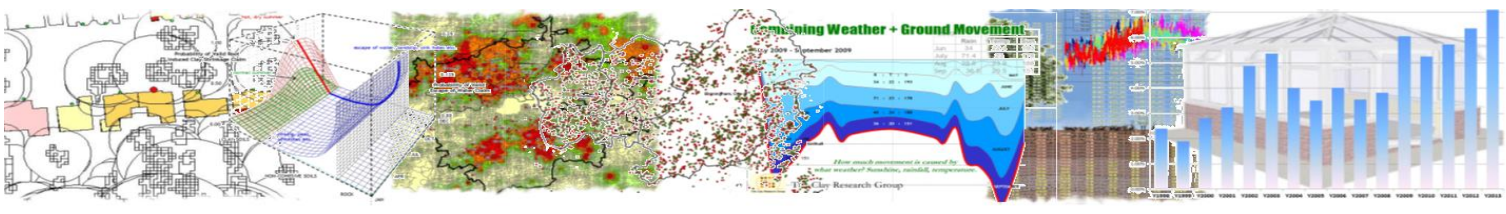
Below, a map of the risk of subsidence in terms of claim frequency across the UK.



The system has to cope with change. For example, the risk in areas with mature trees close to buildings on clay soils may reduce if, following a long dry summer, a number of trees are removed following a high incidence of claims. Conversely, risk may increase due to tree growth.



In next month's edition we re-visit how the system deals with change and individual datasets assessing the risk of the various components etc.

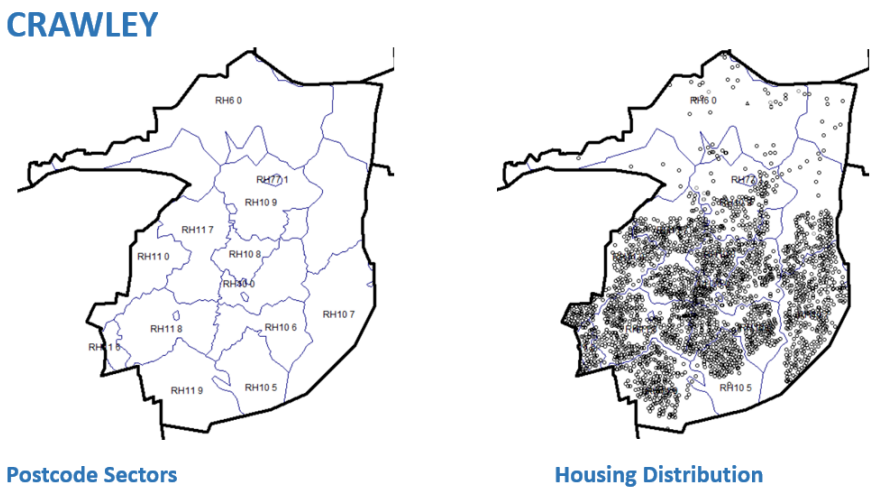


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Subsidence Risk Analysis – Crawley

Crawley is situated in West Sussex. It has an area of 25.61km^2 and a population of around 128,000.

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?

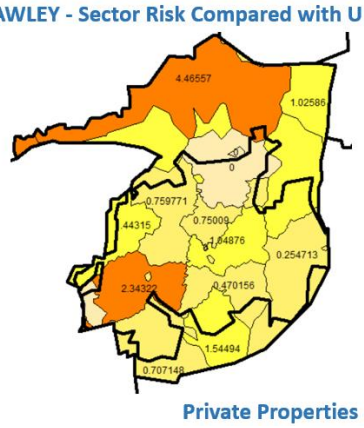


Distribution of postcode sectors and housing stock using full postcode as a proxy. Across the UK each sector covers around 3,000 houses on average and full postcodes include around 15 – 20 houses on average, although there are large variations.

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

In terms of risk, Crawley is rated 245th out of 413 districts in the UK from the sample analysed and is around 0.752x the risk of the UK average, or 0.195 on a normalised 0 - 1 scale.

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



Sector risk compared to UK average from the sample analysed.



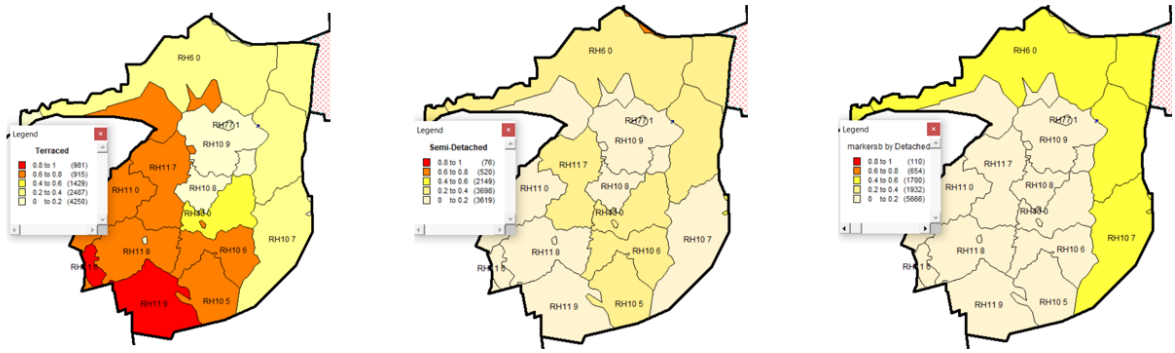
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Crawley - Properties by Style and Ownership

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

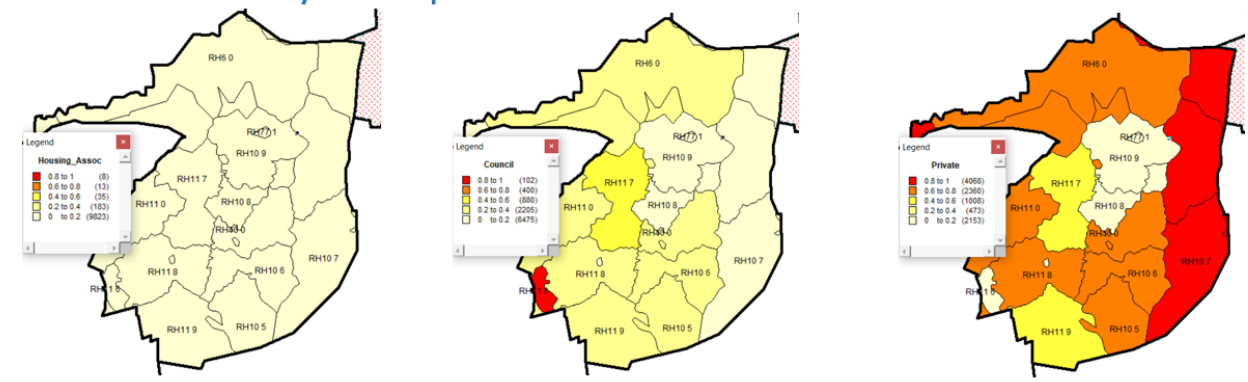
Risk increases with age of property and the model can be further refined if this information is provided by the homeowner at the time of taking out the policy.

CRAWLEY - Distribution by House Type



The maps suggest a mixture of property types with a higher concentration of terraced to the SW and predominantly private ownership.

CRAWLEY - Distribution by Ownership





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Subsidence Risk Analysis – Crawley

Below, extracts from the British Geological Survey low resolution 1:625,000 scale geological maps showing the solid and drift series. View at:

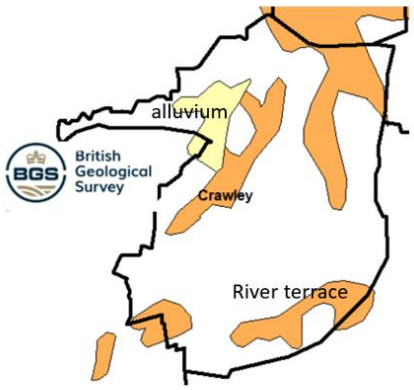
http://mapapps.bgs.ac.uk/geologyofbritain/home.html

See page 13 for a seasonal analysis of the sample which reveals that, at district level, from the sample held, there is around a 79% probability of a claim being valid in the summer and, of the valid claims, there is a 91% probability that the damage will have been caused by clay shrinkage.

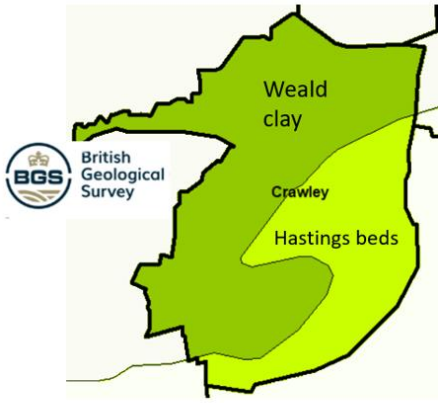
In the winter, the likelihood of a claim being valid falls to around 17%, and of the valid claims, more than 90% were attributable to an escape of water.

The geology comprises areas of alluvium and River Terrace drift deposits overlying Weald clay to the north west and Hastings beds to the south east.

CRAWLEY : BGS Geology – 1:625,000 scale



DRIFT DEPOSITS



SOLID GEOLOGY

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.

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

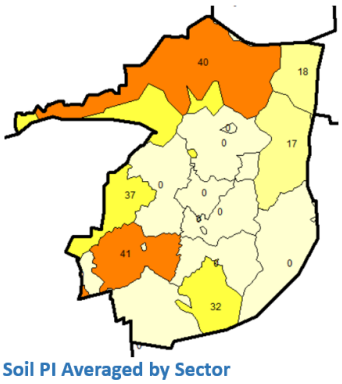


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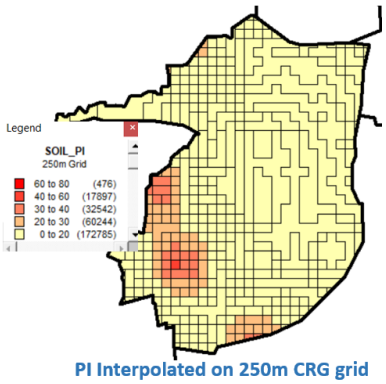
Liability by Geology and Season

Below, the average PI by postcode sector (left) derived from site investigations undertaken associated with claims and interpolated to develop the CRG 250m grid (right).

CRAWLEY – Soil Plasticity Index



Soil PI Averaged by Sector

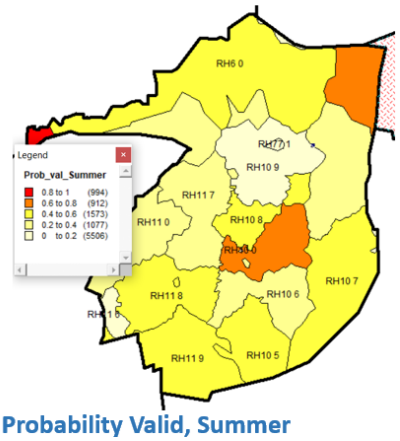


PI Interpolated on 250m CRG grid

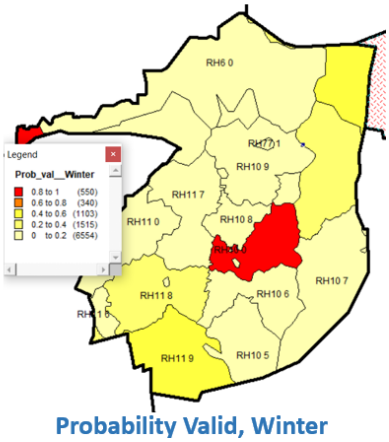
Zero values for PI in some sectors may reflect the absence of site investigation data - not necessarily the absence of shrinkable clay. A single claim in an area with low population can raise the risk as a result of using frequency estimates.

The maps below show the seasonal difference from the sample used. Combining the risk maps by season and reviewing the table on page 13 is perhaps the most useful way of assessing the potential liability, likely cause and geology using the values listed.

CRAWLEY – by season

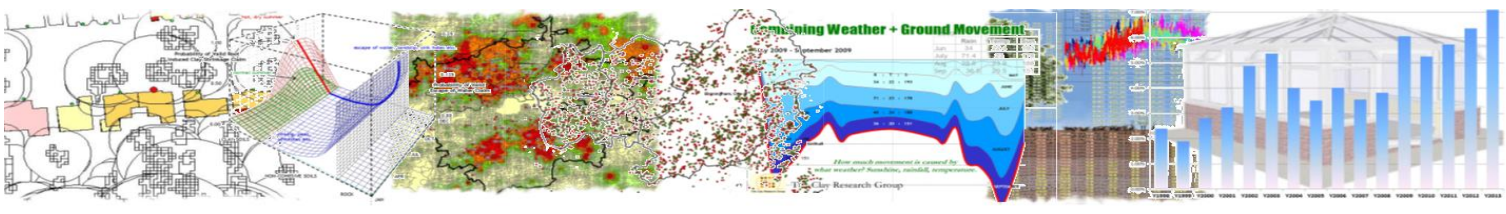


Probability Valid, Summer



Probability Valid, Winter

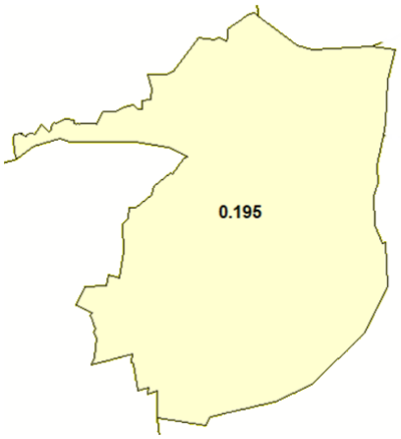
A high frequency risk can be the product of just a few claims in an area with a low housing density of course and claim count should be used to identify such anomalies.



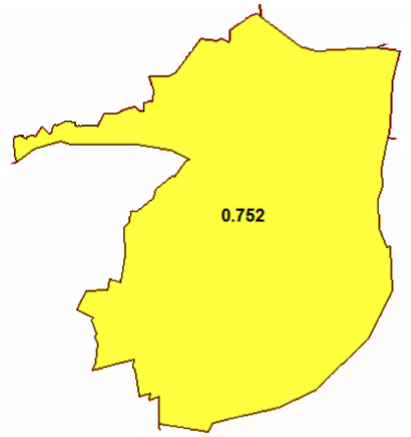
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District Risk

CRAWLEY - Subsidence Risk Relative to UK



Normalised (0 – 1) Scale

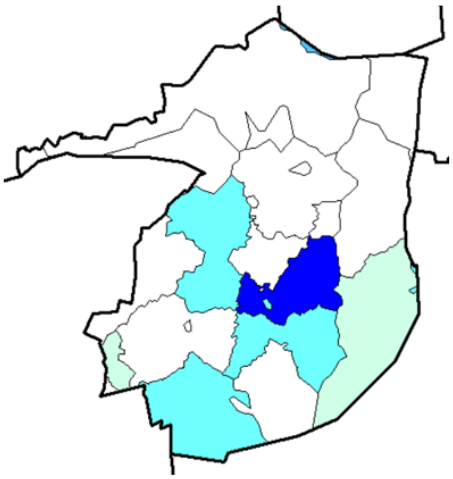


Relative to UK Average

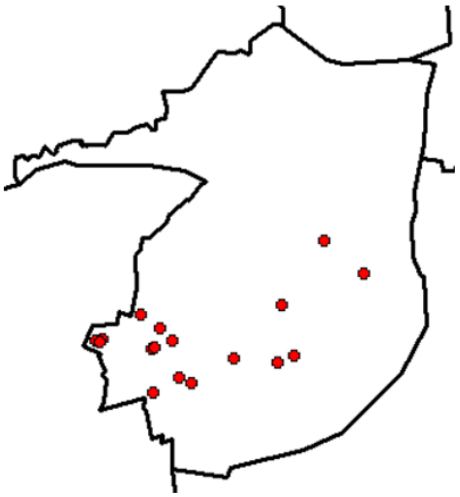
EoW and Council Tree Risk

Below, left, mapping the frequency of escape of water claims reflecting the nature of the underlying soil. 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.

CRAWLEY

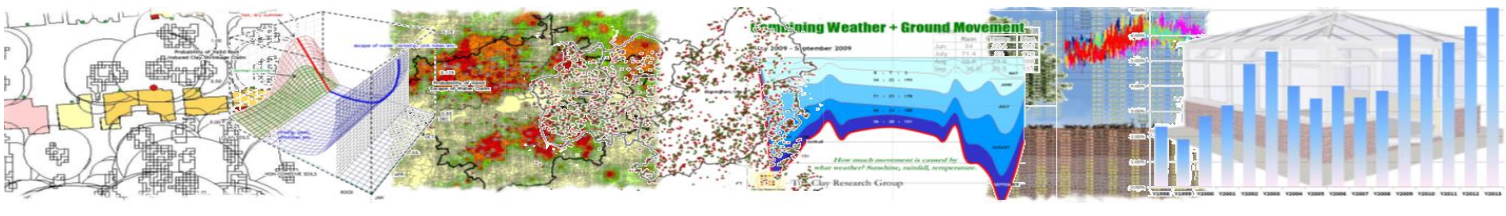


Escape of Water



Claims Involving Council Tree

(2,858 UK claim sample)

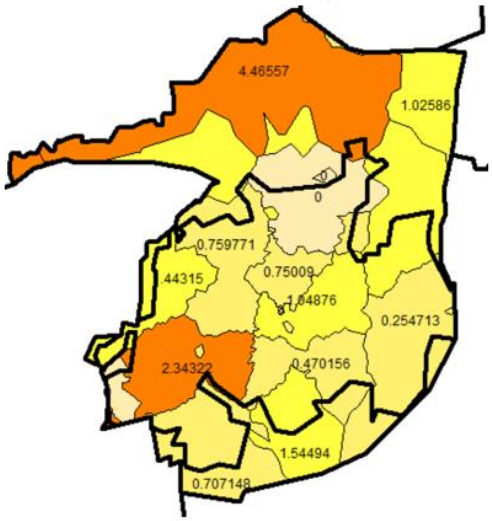


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Crawley - Frequencies & Probabilities

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 self-insure. The following show the normalised risk for the private housing population.

CRAWLEY - Sector Risk Compared with UK Average

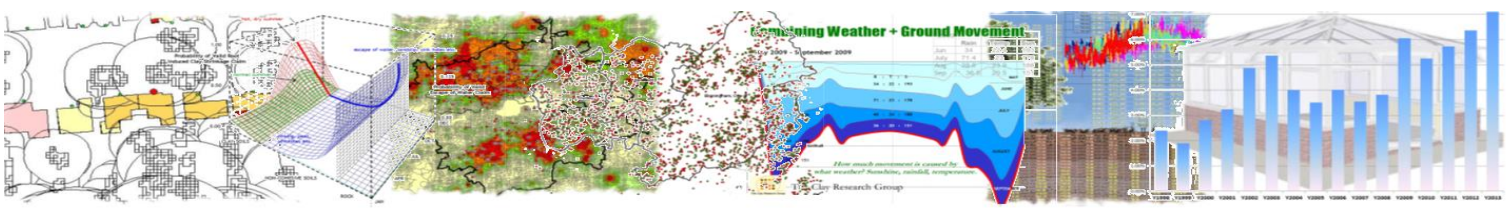


To reiterate, a reversal of rates for valid-v-declined by season is a characteristic of the underlying geology. For clay soils, the probability of a claim being declined in the summer is usually low, and in the winter, it is high.

In this case, the values reflect the presence and influence of the underlying geology with non-shrinkable soils accounting for a higher proportion of Escape of Water claims throughout the year.

Liability by Season - CRAWLEY

District	valid summer clay	valid summer EoW	Declinature Rate (summer)	valid winter clay	valid winter EoW	Declinature Rate (winter)
Crawley	79%	0%	21%	0%	17%	83%

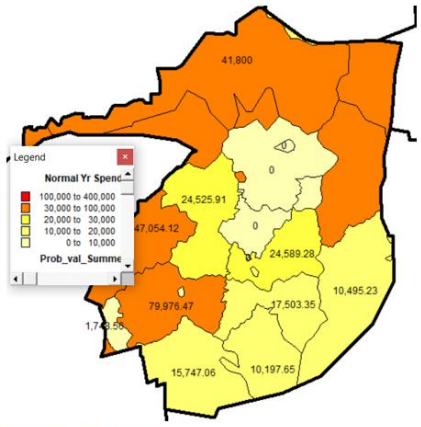


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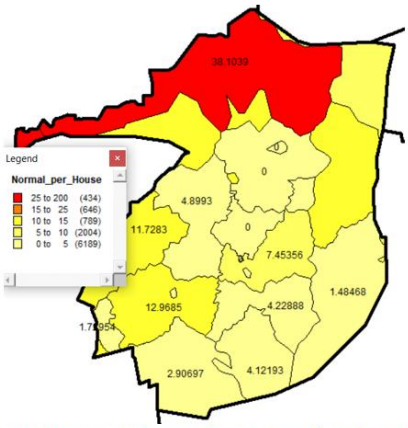
Aggregate Subsidence Claim Spend by Postcode Sector and Household in Normal & Surge Years

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 – CRAWLEY



Spend by Sector

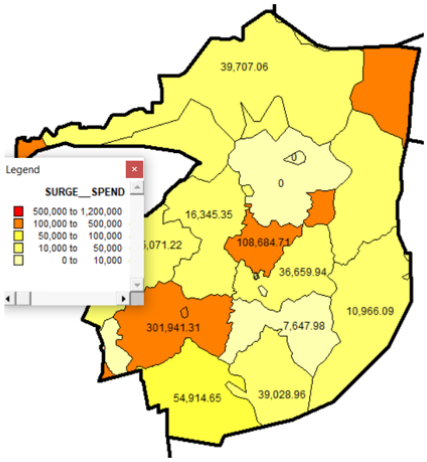


Spend Averaged Over Private Housing Population

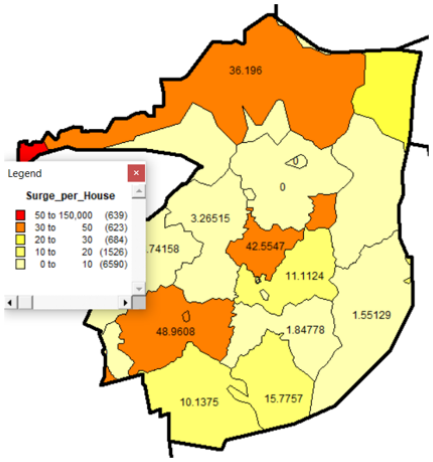
The images to the left in both examples (above and below) represent gross sector spend and those to the right, sector spend averaged across private housing population to derive a notional premium per house for the subsidence peril.

In this case, the absence of any distinct difference between surge and normal years reflects the geology.

SPEND in SURGE – CRAWLEY



Spend by Sector



Spend Averaged over Private Housing Population

