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

September 2020
Edition 184

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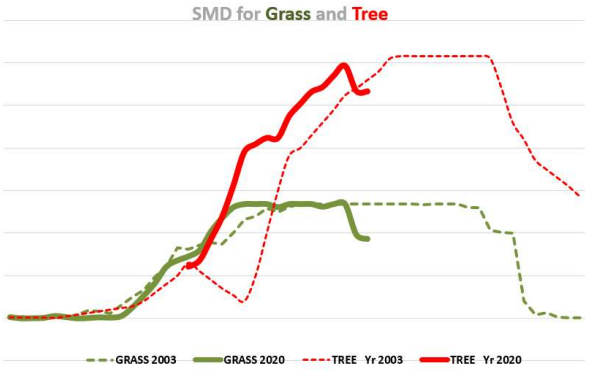
CONTENTS

SMD Update

SMD data for both grass (green) and trees (red). Dotted lines plot data for the 2003 surge year.



The initial threat of a surge has reduced following heavy rainfall and storms Ellen and Francis. It seems unlikely we shall see a surge this year based on the above.

Data supplied by the Met Office for Tile 161 situated to the SE of England.

Diary Dates – TDAG and Subsidence Forum

TDAG Midland seminar is being held on Zoom on the 7th October. To register, go to:

https://www.eventbrite.co.uk/e/tdag-seminar-series-07102020-zoom-building-with-nature-tiny-forests-tickets-119226586931

This years **Subsidence Forum** Training Day will be held in a series of online webinars. The dates for these are Friday 2 October, Friday 9 October & Friday 16 October 2020. For more details, go to:

https://www.subsidenceforum.org.uk/events_seminars.php

Weather Update

Greg Dewhurst of the Met Office is reported in The Times as saying that this summer was cooler than five of the past seven and wetter than six of the past seven summers with rainfall up by 35%. August had one of the hottest August days in the last 17 years and was 61% wetter than average in England and Wales and near the top 20 wettest months since records began in 1766.

Contributions Welcome

Tony Boobier has provided a resume of the business model both looking back and going forward in his article "The Future of Subsidence: From 1976 to 2036" – see page 3. Thanks also to Keiron Hart of Tamla Trees Ltd., for news updates that appear on page 2.

If you have a contribution please Email us at:

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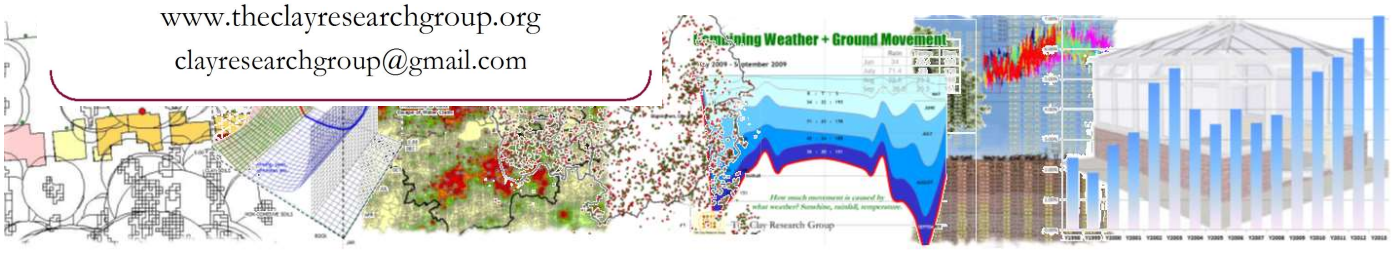

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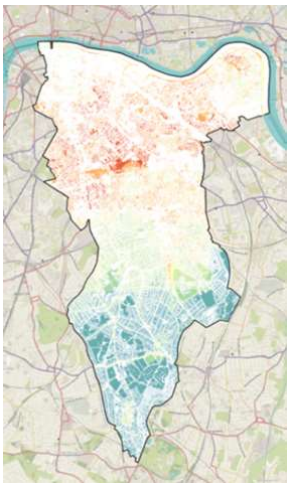
Tree News

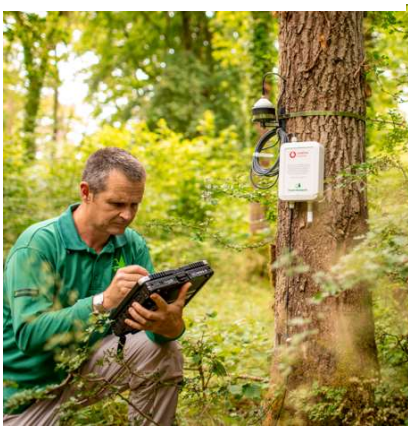
Extracts from Updates Provided by Keiron Hart of Tamla Trees Limited



SOUTHWARK TREE VALUATION

Southwark have commisioned Treeconomics (web site address https://www.treeconomics.co.uk/) to measure the canopy cover in the borough. The conclusion is, the cost of replacing the borough's trees would be £165m. Alongside the valuation, Southwark's urban forest was found to remove 21 tonnes of airborne pollutants annually, valued at £135,000, and store more than 57,000 tonnes of carbon, valued at more than £14m annually. It also diverts over 35,000 cubic metres of storm water away from the local sewers each year, saving an estimated £21,183 in stormwater treatment costs.

MONITORING TREE GROWTH



Defra have partnered with Vodaphone to establish the link between tree growth and temperature, humidity and soil moisture in forests in Surrey and Northunberland.

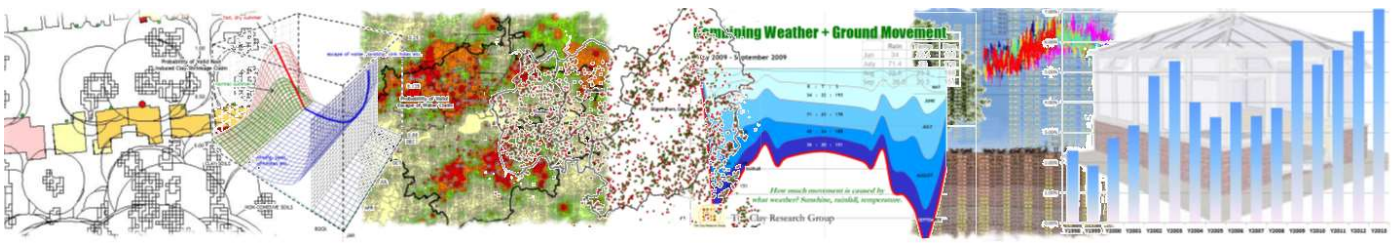
The project forms part of a plan to increase tree planting across the UK to 30,000 hectares and is to be funded by government investment of £640m as part of their Nature for Climate project.

ENGLAND TREE STRATEGY

The government has launched a new association, England Tree Strategy, with the objective of expanding tree cover, supporting woodland management and increasing public engagement with trees and woodlands.

Under the heading **Street Trees,** the document says "We need to ensure appropriate trees are incorporated in developments, in ways that they can thrive, be easy to maintain, and minimise the risk of damage or interference with buildings or infrastructure. Once planted, maintenance then needs to be appropriately funded and managed."

The consultation deadline is the 11th September.



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The Future of Subsidence: From 1976 to 2036.

Tony Boobier, (Email @ tboobier@aol.com)

The past months of blistering heat in the UK have resulted in comparison with the summer of 1976 over 40 years ago, which set off a time bomb of domestic subsidence claims and spawned a completely new industry. There's an inevitable temptation to draw parallels between then and now, and especially how the management of subsidence claims has evolved - but we should resist that and look forward!

But first - let's enjoy the guilty pleasure of a brief glimpse over our shoulder, and look at the past. Some might argue that overall there hasn't been much change other than perhaps the proactive approach by insurers to take over the management of the subsidence claim. In retrospect this was a great improvement to the earlier approach where the burden rested on the homeowner to appoint an engineer, 'prove the claim', obtain estimates and the like. It was an approach which mirrored the motor claims industry and subsequently was imitated by the management of flooding and other perils. But other than that, has there really been that much change?

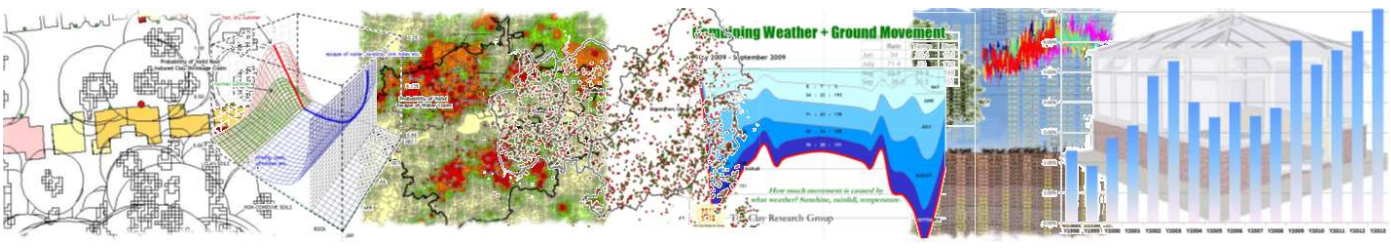
It's impossible to predict how subsidence will be managed in the next 40 years which would be mainly guesswork, but perhaps it's not unreasonable to roll the clock forward just 16 years.
We already see some key trends emerging:

1. The gradual impact of global warming, showing itself both in blistering summers and flash floods
2. Greater use of data and analytics, allowing greater understanding
3. An increased movement towards proactivity by insurers in the claims process
4. Heightened customer awareness of their entitlement under the policy, and the level of service which they might expect

We can't do too much about the first trend, that of climate change, even if some suggest that there may be some steps we can take to slow the process down. Let's focus therefore on the other three.

Analytics Drives New Practices

The science of data and application of advanced analytics is certain not only to continue to mature, but to accelerate. Better and faster tools will be used for prediction with rules-based processes increasingly being adopted.



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The Future of Subsidence: From 1976 to 2036 *... continued*

Data and analytics provide greater insight into what is happening, what will happen, and what action should be taken. Ultimately this will inevitably lead to new business models for the handling of subsidence being developed in the form of new best practices and possibly also new forms of policy wording.

These new 'data driven' best practices will open the door to more effective claims management, probably with larger numbers of claims being managed remotely by fewer specialists.

The increased use of remote devices for monitoring, image collection and diagnosis will increasingly reduce the need for human onsite intervention - a process many might see as being especially attractive in these Covid times. Human intervention between the insurer / adjuster and the policyholder will dramatically reduce as chatbots manage inbound telephone calls and respond to other forms of communication.

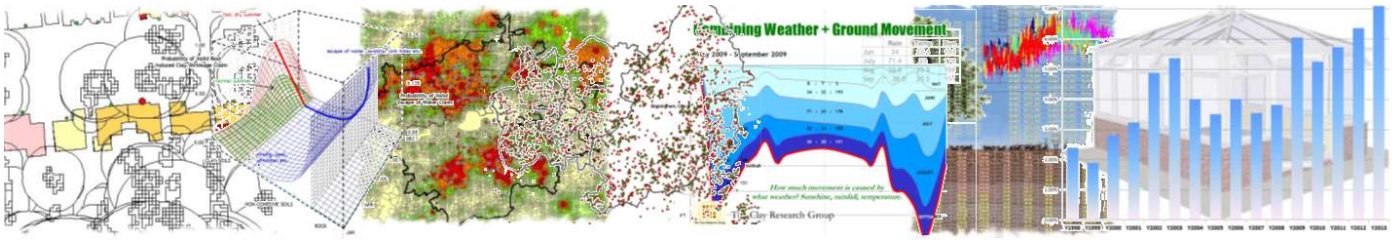
Even in a claims surge, the entire industry (excluding repairers) might only need a couple of dozen people at best. These experts would be supplied by only one or two companies who would continue to collect data and gain greater insight. With accumulated data and continually improved insight, these companies will constantly refine their process, lower their costs and become more profitable.

They are likely to become, in supply chain parlance, 'category killers'.

Onsite intervention and repair will also continue to evolve. Low-intrusion repair processes will become the normality, rapidly implemented with minimal disruption. After all, nobody really ever wanted builders working on their properties for months on end. In 16 years' time, we will consider earlier subsidence repair processes to be primitive.

Predicting and Acting on Subsidence

Perhaps a bigger step will be how the industry applies analytical insight, in the context of proactivity, by placing a greater burden on the homeowner to take preventative action to avoid damage occurring. The problem of prediction is already recognised. Variations between tree types and sizes, soils and building construction all add complication upon complication for exact prediction. But does the industry really need to pursue infallibility and absolute certainty in the prediction process?



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The Future of Subsidence: From 1976 to 2036 … *continued*

After all, when we check the weather forecast which tells us that there is a probability of 60% rainfall, it doesn't imply that rain will be 60% of 'normal' rainfall. Or even that it will rain for 60% of the day. All that it is saying is that on 60% of days with conditions like this, there was rainfall. Prediction is no more than a statistical construct. There is no certainty that rainfall (or subsidence damage) will happen, only a probability.

The creation of an industry-accepted prediction threshold to provide a likely 'future damage indicator' could open the door to a new approach to proactivity, reducing the number of new claims. This would especially focus on tree management which remains one of the key causes of damage. Tree management is not a new idea but it's a topic that needs to be revisited especially in the context of amenity value. This is especially important at a time when climate change might create a new, critical trigger where action needs to be taken.

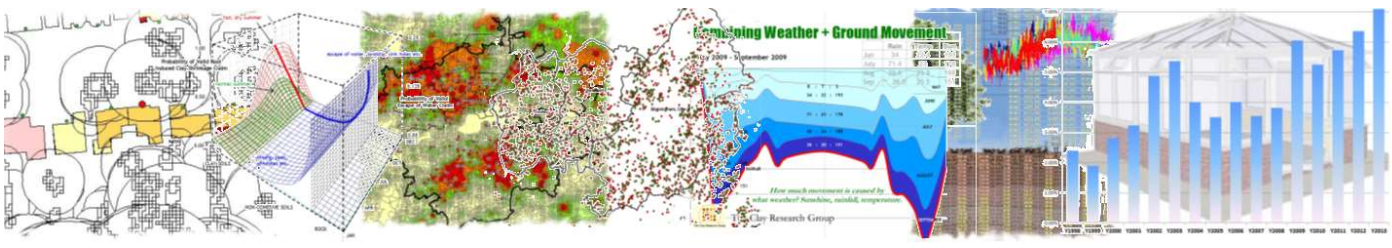
How this is operationalised will be interesting. Insurers ultimately have the option to use a carrot or a stick approach to implement change but are more likely to adopt a 'carrot' approach which is both softer and likely to be more persuasive.

The Customer Element.

The fourth and perhaps final key element is that of the customer who, even after four decades, seems in many ways to be outside the process. Customers still seem to remain a victim of the problem, a recipient of the solution, and a third party to the process. Future technology-driven claims processes will increasingly place the policyholder at the centre of the procedure, giving them back greater control.

It might feel to some that the wheel has gone all the way around again but the game has changed as technology becomes a key enabler. At some point insurers will recognise the value of 'letting go' of the process - albeit in a managed ecosystem.

In summary, the next generation of subsidence claims settlement is likely to comprise a major shakeup of the modus operandi. Last time, and with the benefit of hindsight, it felt like the subsidence industry led the way in the management of domestic property repairs, and in changes which ultimately extended to other perils. Is history about to repeat itself in the 'New Future' of claims management?



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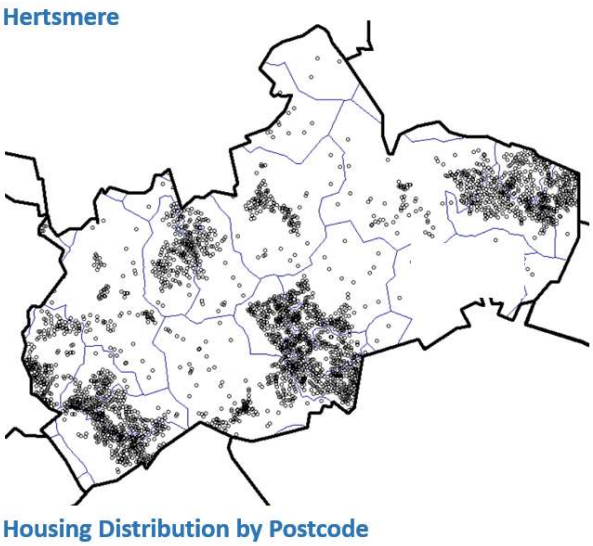
Subsidence Risk Analysis – HERTSMERE

Hertsmere is situated in Hertfordshire and occupies an area of around 101km^2 with a population of over 104,000.



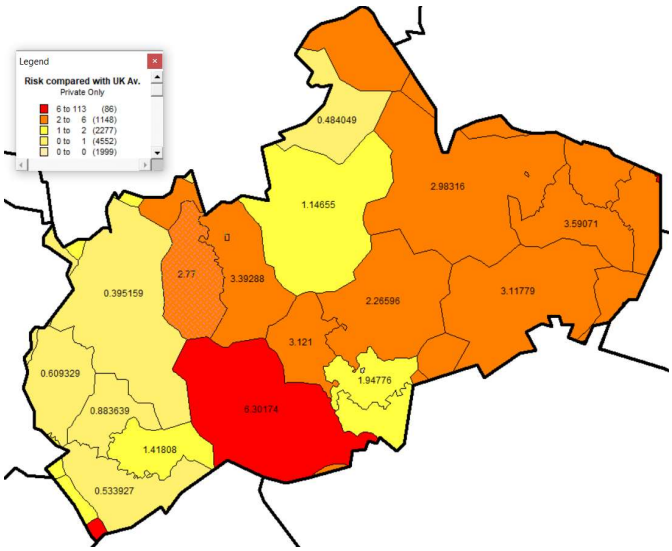
Distribution of housing stock using full postcode as a proxy. Each postcode in the UK covers on average 15 – 20 houses, although there are large variations.

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 more claims in some locations simply because there are more houses?

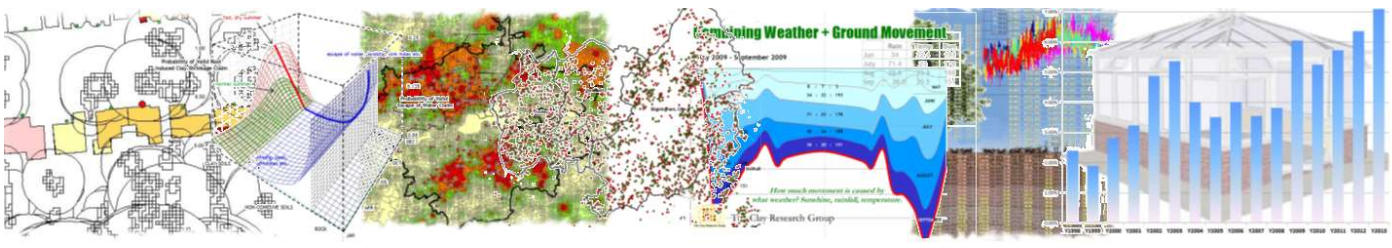
Using a frequency calculation (number of claims divided by private housing population) the relative risk across the borough at postcode sector level is revealed, rather than a 'claim count' value.

Districts are rated for the risk of domestic subsidence compared with the UK average – see map, right.

The highest risk rating is a value of 4 and Hertsmere District is rated as being 2.4 times the UK average risk, putting it in 14th place. On a normalised scale of 0 – 1, the district is rated 0.622.



Hertsmere district is ranked 14th in the UK in terms of 'risk by district' and rated 2.4 x the UK average risk for domestic subsidence claims from the sample analysed. Above, values at postcode sector level.



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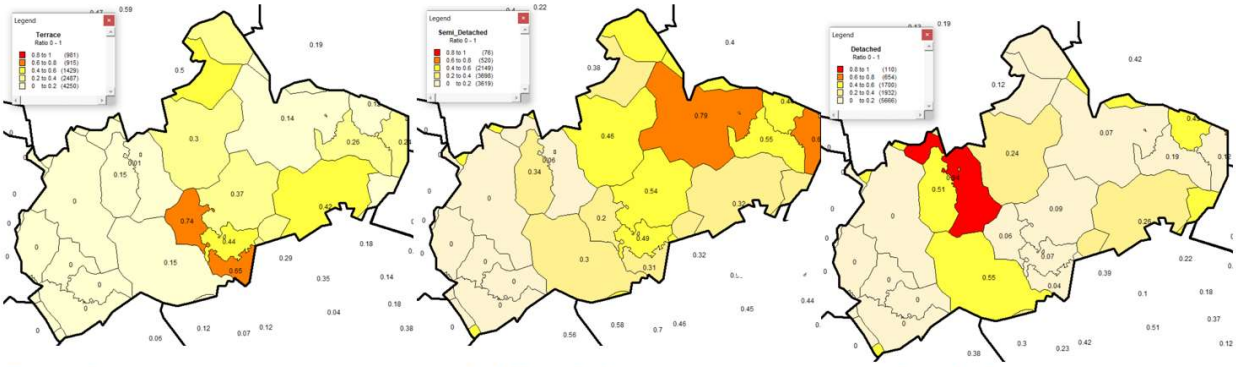
HERTSMERE - Properties by Style and Ownership

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 from a visual assessment using Google Street View, we rate Hertsmere at around 0.35 (variable across the district) on a scale of 0 – 1. Policies allow insurers to assign a rating to individual properties.

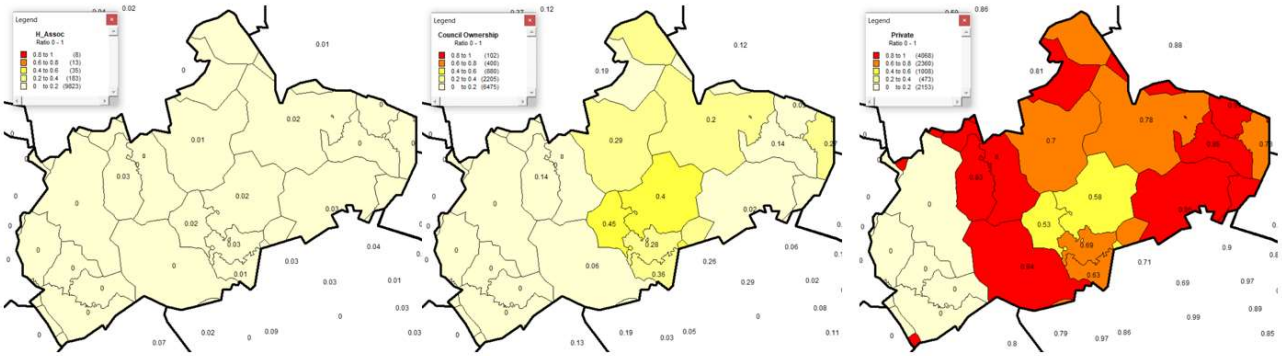
Hertsmere - Distribution by House Type



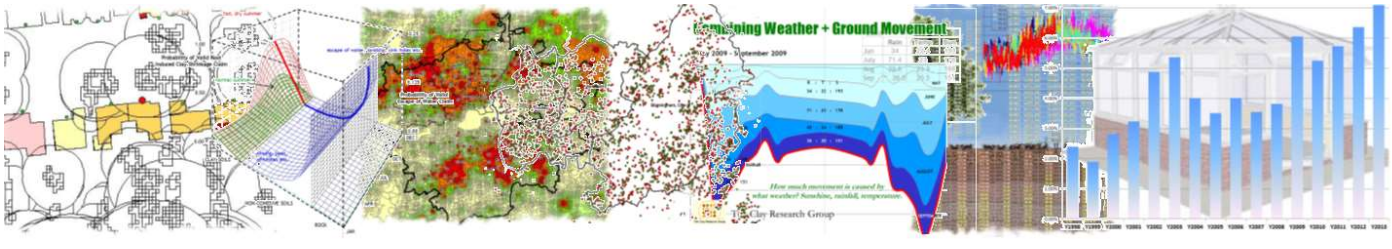
Terraced | Semi-Detached | Detached

Distribution by ownership is shown below. The maps reveal predominantly privately-owned properties across the borough.

Hertsmere - Distribution by Ownership



Housing Association | Council Ownership | Private Ownership



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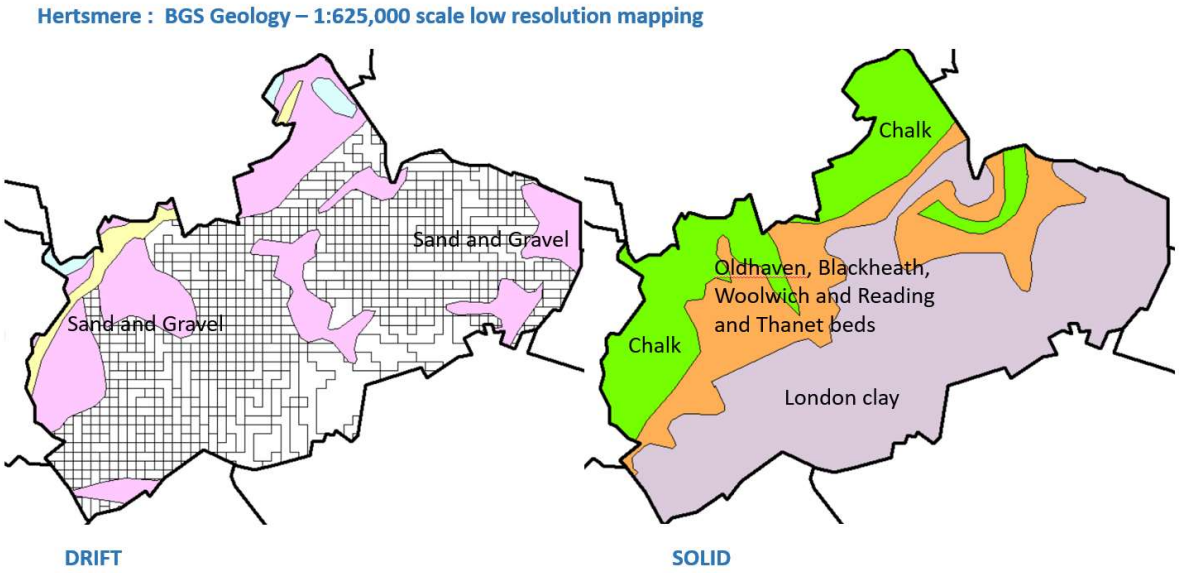
Subsidence Risk Analysis – HERTSMERE

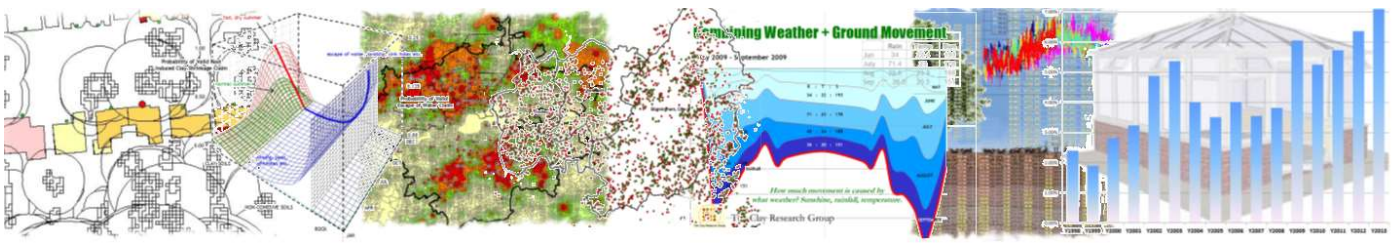
Below, extracts from the British Geological Survey low resolution 1:625,000 scale geological maps showing the solid and drift series. View at: http://mapapps.bgs.ac.uk/geologyofbritain/home.html for more detail.



See page 11 for a seasonal analysis which reveals that in the summer there is slightly more than 75% probability of a claim being valid and of the valid claims, there is a greater than 80% probability that the cause will be due to clay shrinkage.

In the winter the situation reverses. The likelihood of a claim being declined is just under 70%, and the most likely cause if the claim is valid is an escape of water – a leaking drain or water service - has a probability of around 80%.

The analysis reflects the varied geology with outcropping clay series to the south and a mixture of superficial deposits to the north.



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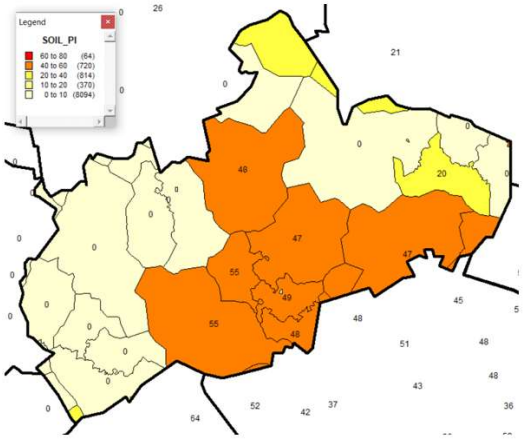
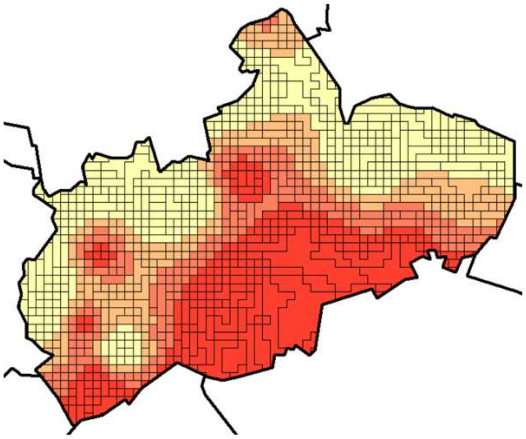
Liability by Season and Geology

Below, the average PI by postcode sector (left) derived from site investigations and interpolated to develop the CRG 250m grid (right). The presence of a shrinkable clay in the CRG model matches the BGS maps on the previous page with clay having an average PI of around 50% where it exists. The higher the PI values, the darker red the CRG grid.

Hertsmere – Soil Plasticity Index



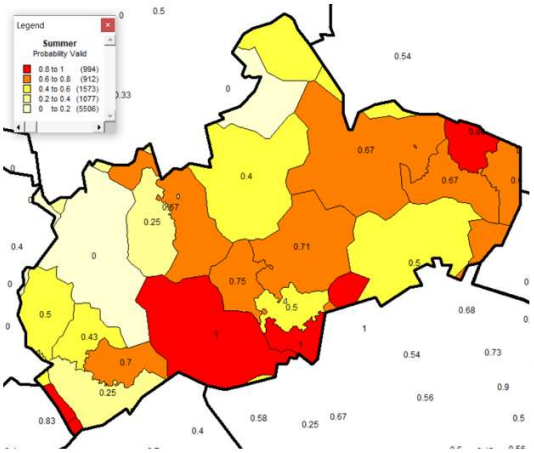
Soil PI Averaged by Sector



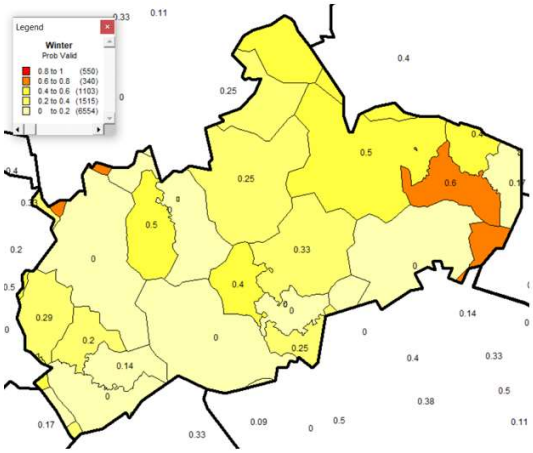
PI Interpolated on 250m CRG grid

Zero values for PI in some sectors may reflect the absence of site investigation data - not necessarily the absence of shrinkable clay. The widespread influence of the shrinkable clay plays an important role in determining whether a claim is likely to be valid or declined by season. A single claim in an area with low population can raise the risk as a result of using frequency estimates.

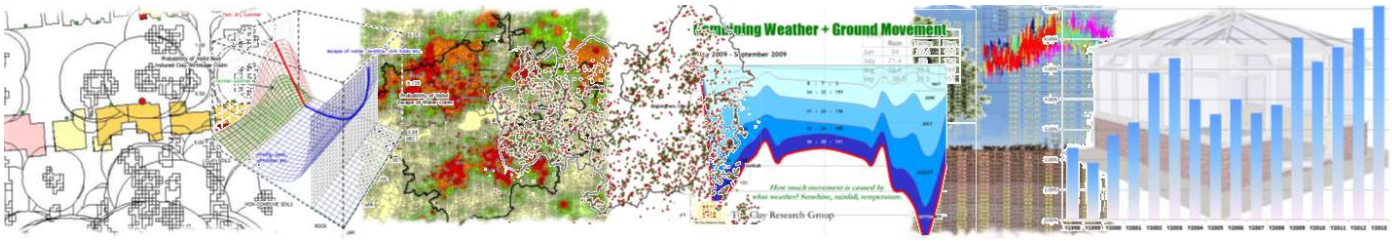
Hertsmere – probability of valid claim by season



Probability Valid, Summer



Probability Valid, Winter



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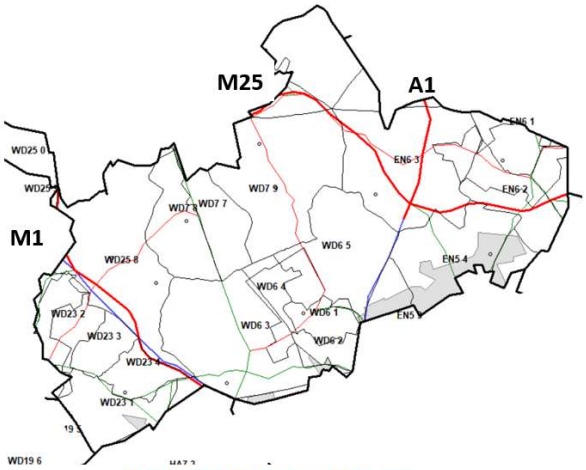
District Layout. EoW and Council Tree Risk.



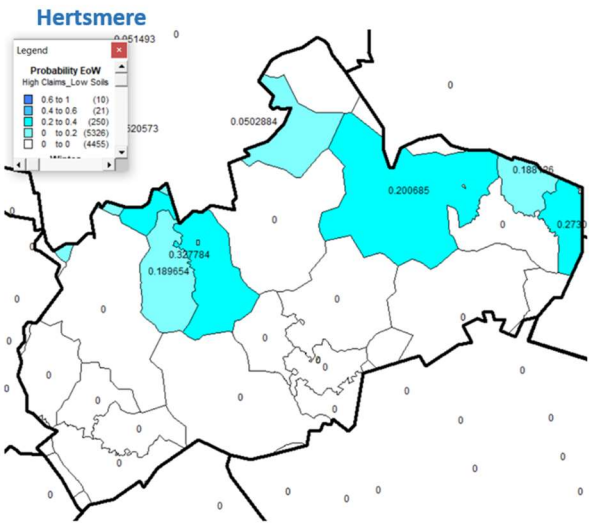
Roads and Postcode Sectors

Hertsmere covers quite a large area and consists of many small villages (see map, left) in contrast to previous studies.

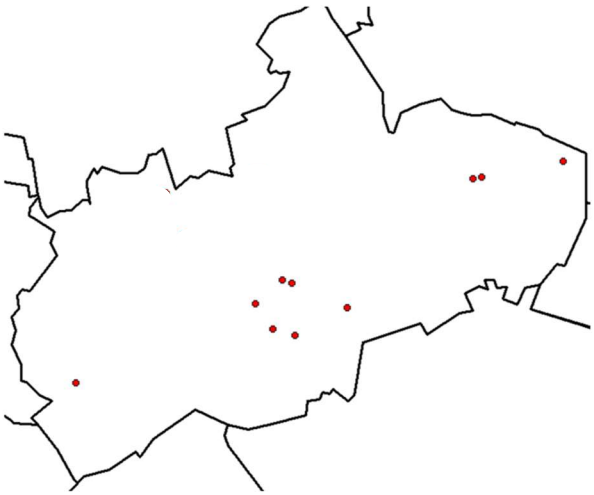
A review using Google Earth is useful in providing context and exploring the differences in property ages and styles of construction across the district.

In this study, risk values are often based on small housing population densities.

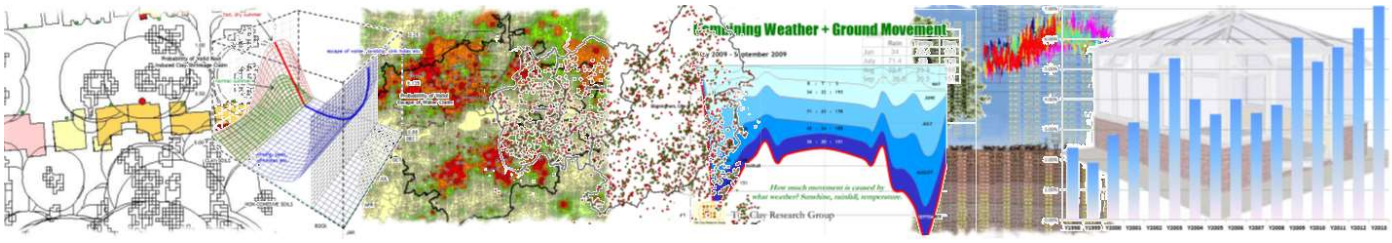
Below, left, mapping the frequency of escape of water claims from the sample reflects the presence of the non-cohesive drift deposits or shallow foundations on backfill given the age of some of the housing stock. Below, right, dots on the 'Council Tree Claims' map represent properties where damage has been attributable to vegetation in the ownership of the local authority which coincide with the London clay formation shown on the BGS maps.



Escape of Water Frequency Distribution



Local Authority Street Tree Claims



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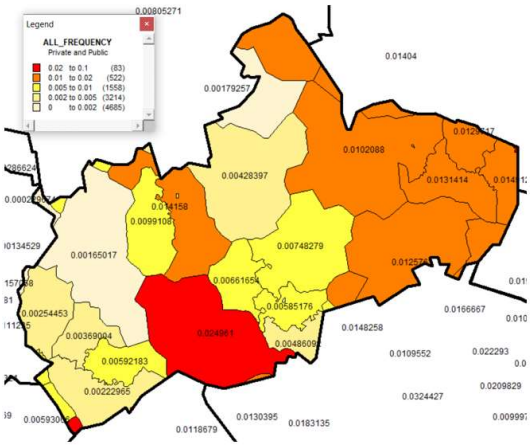
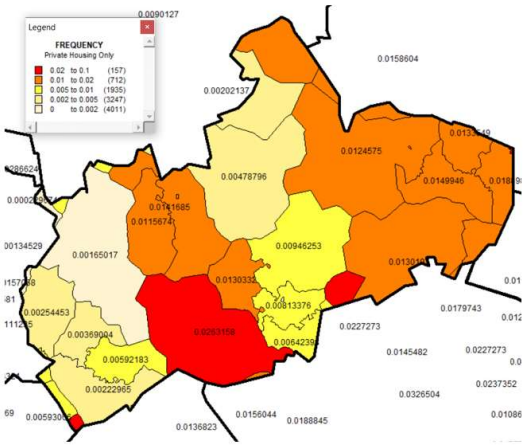
HERTSMERE - Frequencies & Probabilities

Hertsmere - Postcode Sector Subsidence Risk (frequency) by Ownership



Combined Public and Private Frequency



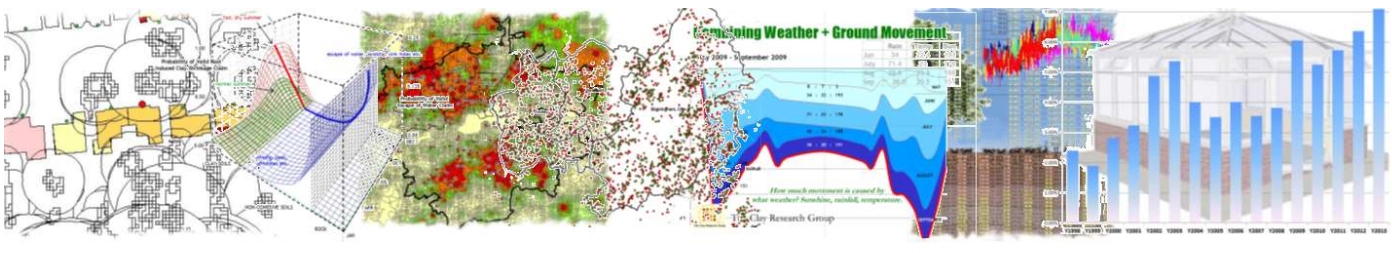
Private Only

The chances of a claim being declined in the summer are relatively low – just over 20% - and if the claim is valid, there is a high probability (greater than 80%) that the cause will be clay shrinkage.

In winter, the repudiation rate is 69% - and if the claim is valid, it is likely that the cause will be water related. The probabilities of causation reverse between the seasons.

Liability by Season - HERTSMERE

District	valid summer clay	valid summer EoW	Repudiation Rate (summer)	valid winter clay	valid winter EoW	Repudiation Rate (winter)
Hertsmere	0.654	0.113	0.233	0.05	0.26	0.69



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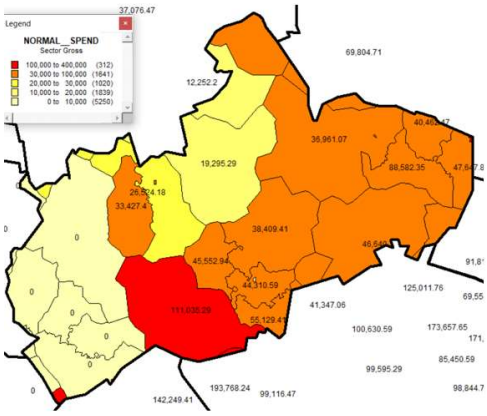
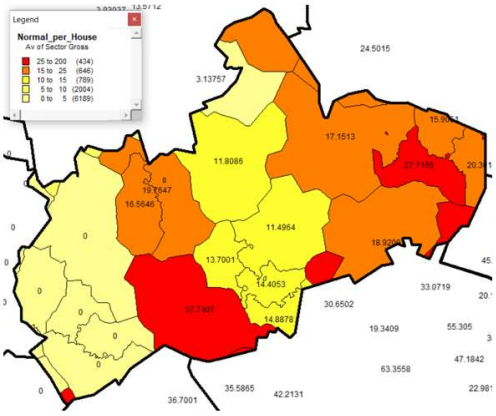
Aggregate Subsidence Claim Spend by Postcode Sector and Household in Surge & Normal Years

The maps below show the aggregated claim cost from the claim 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.

NORMAL YEAR SPEND – Hertsmere



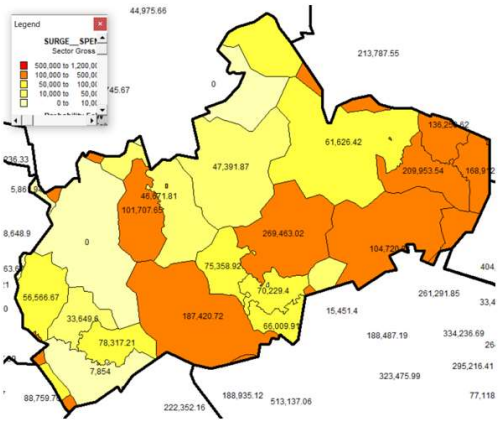
Spend by Sector



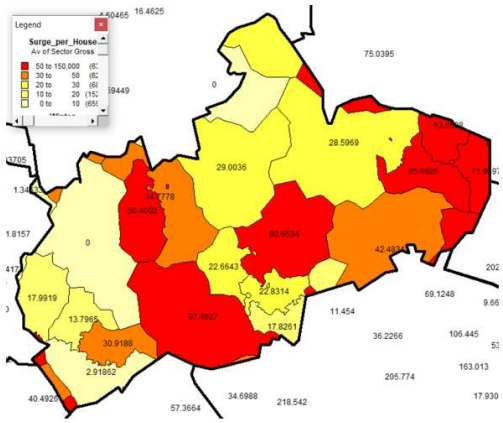
Spend Averaged over Housing Population

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 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.

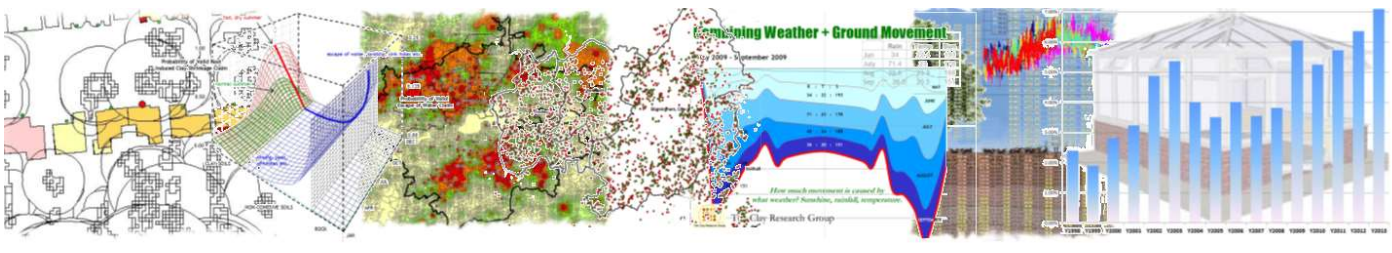
SPEND in SURGE – Hertsmere



Spend by Sector



Spend Averaged over Housing Population



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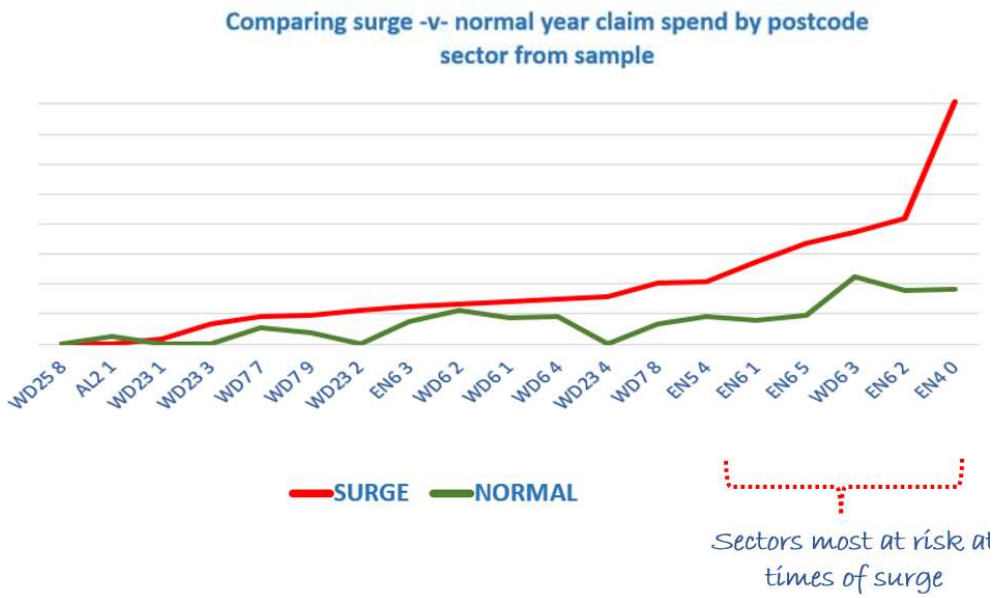

The above graph identifies the variable risk across the district distinguishing between normal and surge years by postcode sector spend for the sample analysed. Divergence between the plots indicates those sectors most at risk at times of surge (red line).

It is of course the case that a single expensive claim (a sinkhole for example) can distort the outcome using the above approach.

In making an assessment of risk, housing distribution and count by postcode sector play a significant role. One sector may appear to be a higher risk than another based on frequency, whereas basing the assessment on count can deliver a different outcome. This can also skew the assessment of risk related to the geology, making what appears to be a high-risk series less or more of a threat than it actually is.

The models comparing the cost of surge and normal years is based on losses for surge of just over £400m, and for normal years, £200m.