

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



July 2025
Issue 242

The Clay Research Group

CONTENTS

Issue 242, July 2025

Page 2

ChatGPT – Diagonal Cracks

Page 3

Joint Mitigation Protocol

Page 4

UK Met Office Anomaly Maps

Is 2025 going to be a surge year?

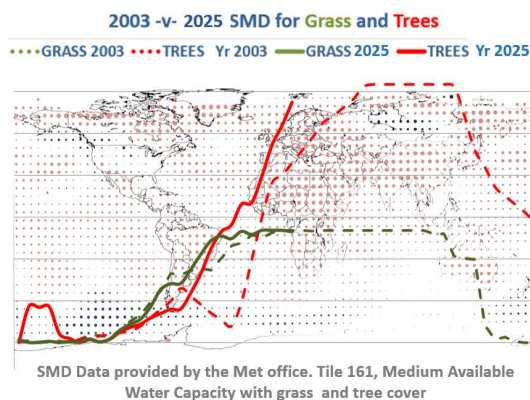
Weather Elements and Risk

Pages 5 - 11

Subsidence Risk Analysis by District

Gedling

SMD Graph



The SMD for both grass and trees exceed the 2003 values for May and June.

Contributions Welcome

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

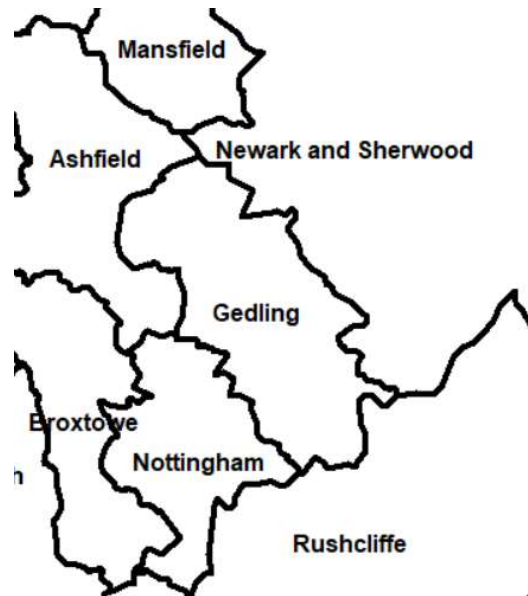
THE CLAY RESEARCH GROUP

www.theclayresearchgroup.org

clayresearchgroup@gmail.com

District and Sector Risk

Gedling is situated in Nottinghamshire, with a population of around 118,000 and an area of 120km². It is the subject of the 'Risk by District' series in this month's edition. Its geology comprises outcropping sand and mudstones – see Page 7.



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

Predicting Surge

Tony Boobier made some valid points in last month's edition when he explored the issue of trying to predict surge years, and wonders whether solutions might be proffered by technologists rather than practitioners and suggests "we'll probably just have to rely on intuition".

On page 4 we look at weather patterns, comparing current ones with those of 2003, a surge year. Time will tell – the data suggests we may be looking at a surge year. What does our intuition say?



The Clay Research Group

ChatGPT – Diagonal Cracks in House Wall



Question to ChatGPT

There are diagonal cracks in a house wall that are wider at the bottom than the top. Is this subsidence?

ChatGPT Response

Diagonal cracks in a house wall that are **wider at the bottom than the top** can be a **potential sign of subsidence**, but other possibilities exist as well. Let's break it down:

► Signs Suggesting Subsidence

- **Diagonal cracks** that **widen toward the bottom** are typical when one part of the foundation **sinks more** than the other (differential settlement).
- Cracks are often found **around doors or windows** and may be accompanied by:
 - Sticking doors or windows.
 - Gaps between walls and ceilings or skirting boards.
 - Sloping floors.

🔍 Alternative Causes (Not Subsidence)

- **Thermal expansion/contraction** or **drying shrinkage** in plaster or masonry — often cause diagonal cracks, but usually uniform in width.
- **Heave** (opposite of subsidence) — causes cracks that are **wider at the top**.
- **Structural movement** from nearby excavation, vibrations, or poor construction can also cause similar cracking patterns.

✅ What You Should Do

1. **Monitor the cracks:** Mark the ends and track if they change over weeks/months.
2. **Check the surroundings:** Are there large trees nearby (roots can dry soil)? Any drainage issues? Nearby construction?
3. **Consult a structural engineer or surveyor:** Especially if:
 1. Cracks are wider than **5mm** (a pencil can fit inside).
 2. You see multiple cracks or continued movement.

Yes, cracks that are diagonal and **wider at the bottom** can be **indicative of subsidence**, particularly if other signs of structural movement are present. It's worth having a professional assessment to confirm the cause and decide on appropriate action.



The Clay Research Group

Joint Mitigation Protocol Update

A draft update of the Joint Mitigation Protocol was issued for consideration on the 25th April and the consultation closed on the 11th July. The document can be accessed at:

<https://heyzine.com/flip-book/7c2c7b01a4.html>

Andy Tipping, Trees & Woodlands Manager at London Borough of Barnet committee member of the The London Tree Officers Association (<https://www.ltoa.org.uk/>) should be able to provide details for consultation responses:

executive.officer@ltoa.org.uk

Keiron Hart provides feedback on his LinkedIn web site at:

https://www.linkedin.com/posts/keiron-hart-a5a55b67_a-revised-version-of-the-joint-mitigation-activity-7333827195829706754-K_5H/ Keiron also drew attention to an interesting claim involving six council owned trees and an insurer handling damage resulting from their presence: <https://www.bbc.co.uk/news/articles/clym3r64n6go?app-referrer=deep-link>

Sarah Dodd, also outlines her views on LinkedIn:

https://www.linkedin.com/posts/treelaw_jmp-activity-7308028635427336192-Ug2l/

Several queries have been raised by Richard Rollit, Technical Director of Innovation Group, in the June edition of their newsletter, amongst them:

- No reference to the homeowner or ratepayer whose property is being damaged.
- The introduction of additional costs and delays, without delivering clear benefits.
- No consultation with the wider membership prior to the draft being circulated by the ABI.
- No insurers were involved in the drafting process,

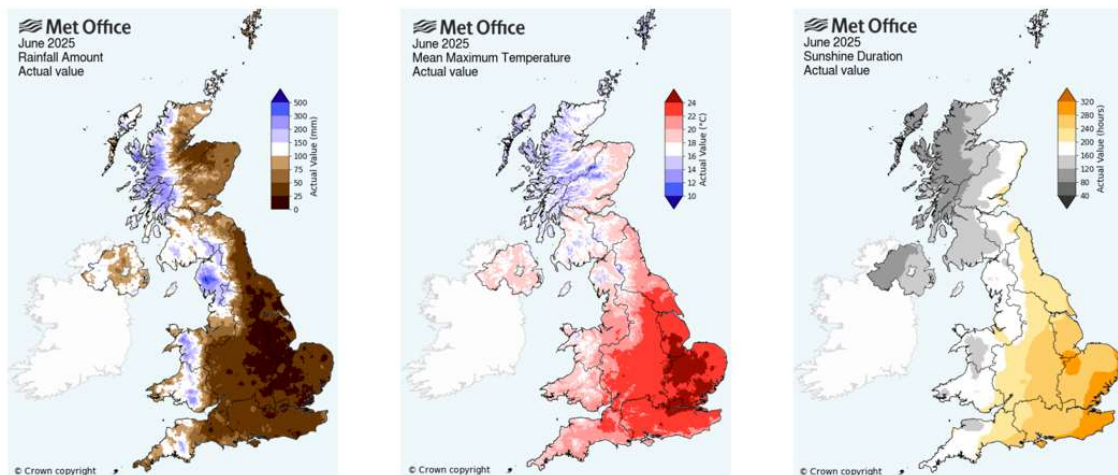
Richard makes the important point relating to the suggestion that pruning is a means of resolving root induced clay shrinkage claims. *“The protocol makes frequent reference to Hortlink 212, a 2004 report titled Controlling Water Use of Trees to Alleviate Subsidence Risk, produced by the University of Cambridge and East Malling Research. However, the JMP incorrectly cites the report as aiming to “alleviate subsidence damage.” This may seem a minor distinction, but it is a critical one. In a 2019 presentation to the Arboricultural Association, Dr. Martin Dobson reviewed the effectiveness of pruning in mitigating subsidence. His conclusion, available on the Association’s website, was clear: “Once subsidence damage has occurred, pruning is not a consistently reliable means of mitigation.”*



The Clay Research Group

Met Office Anomaly Maps for June 2025

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



The maps indicate far less rainfall, higher temperatures and longer hours of sunshine for June compared with 1991 – 2020 averages.

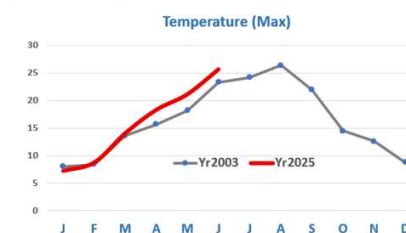
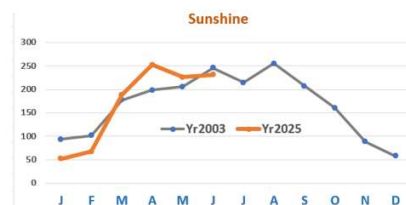
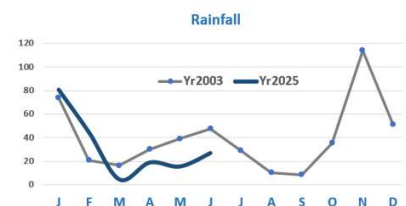
<https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-actual-and-anomaly-maps>

Is 2025 going to be a surge year?

Continuing the topic from last month's edition, plotting monthly values for rainfall, sunshine and temperature from the Heathrow weather station, monitored by the Met Office. The graphs compare weather data for 2003, a surge year, with the current year. Are there any indicators of a possible surge?

The grey line in each graph plots the values for 2003. Top, rainfall has been significantly less from March so far this year, and sunshine more, tailing off a little in June. Temperatures have been higher, and the three elements combined would suggest a significant risk of an increase in subsidence claim numbers, but does our intuition agree?

Or could it be that the risk is diminishing with time as the more vulnerable properties are dealt with? The steady decline in claim numbers since 2003 suggests this may be a factor. We shall see.

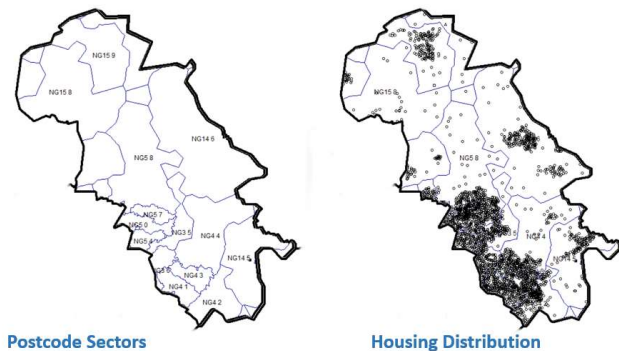


The Clay Research Group

Subsidence Risk Analysis – Gedling

Gedling is situated in Nottinghamshire and occupies an area of around 120km² with a population approaching 118,000.

Gedling



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.

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

Gedling is rated 69th out of 413 districts in the UK from the sample analysed and is around 1.56x the risk of the UK average, or 0.4 on a normalised 0 - 1 scale.

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.



Sector risk compared to UK average from the sample analysed.



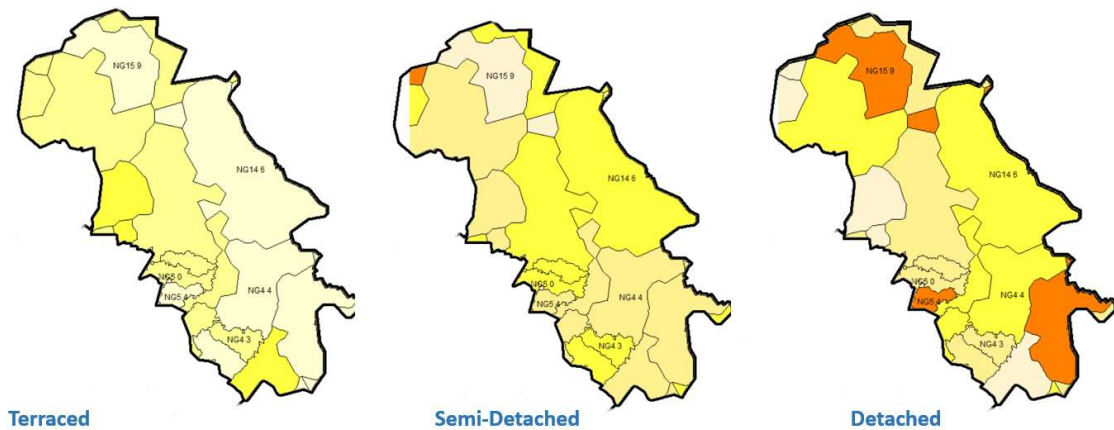
The Clay Research Group

Gedling - 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.

Gedling - Distribution by House Type



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

Gedling - Distribution by Ownership



The Clay Research Group

Subsidence Risk Analysis – Gedling

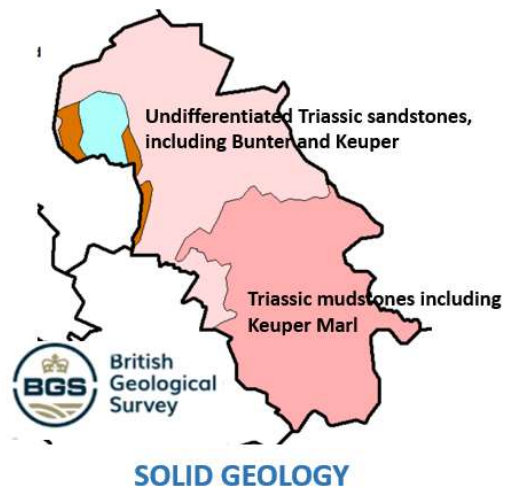
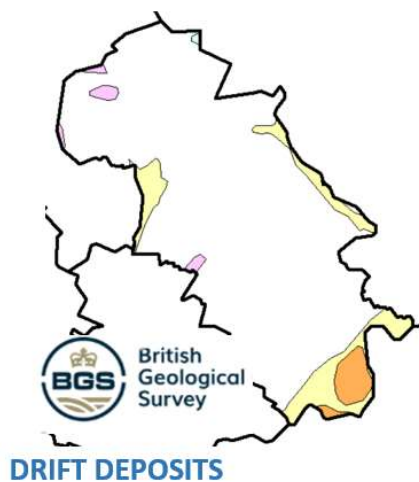
Below, extracts from the British Geological Survey low resolution 1:625,000 scale geological maps showing the solid and drift series. View at: <http://mapapps.bgs.ac.uk/geologyofbritain/home.html> for more detail.

See page 10 for a seasonal analysis of the sample which reveals that, at district level, there is around a 60% probability of a claim being valid in the summer and, of the valid claims, there is a 40% probability that the damage will have been caused by clay shrinkage.

In the winter, the likelihood of a claim being valid is around 70% and of the valid claims, escape of water is the most likely cause – around 50 - 60%.

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

Gedling: BGS Geology – 1:625,000 scale



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.

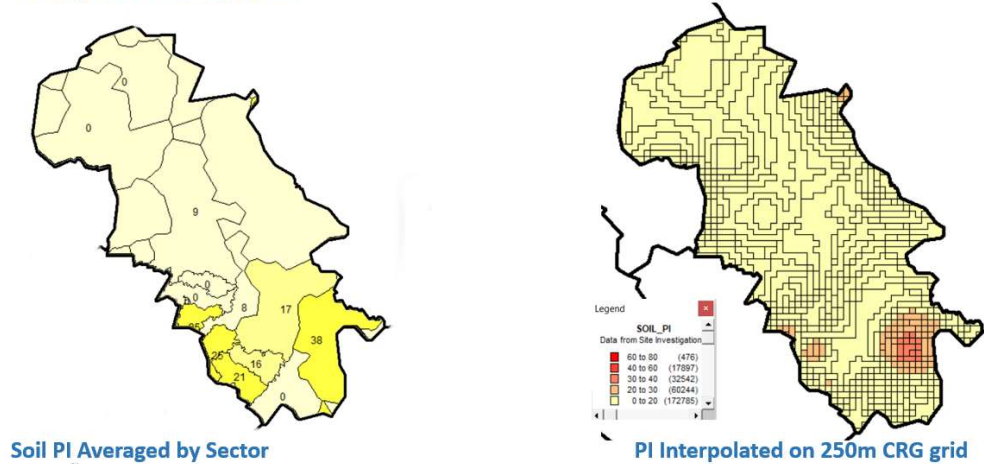


The Clay Research Group

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.

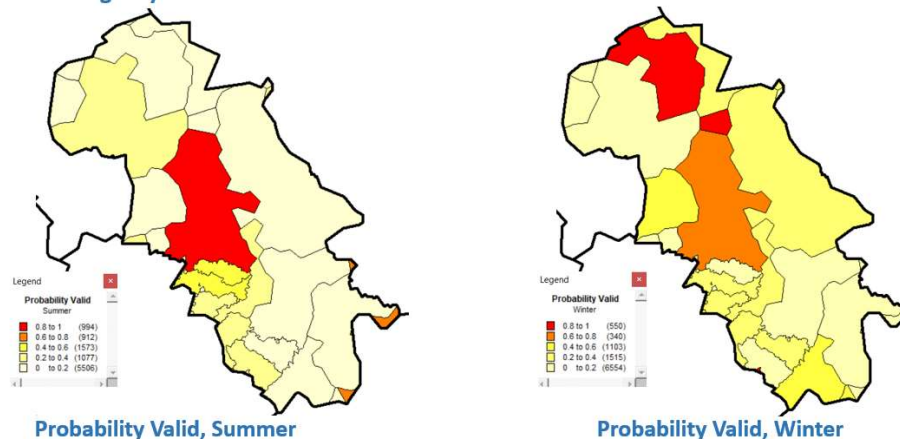
Gedling: Soil Plasticity Index



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.

Gedling – by season



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.



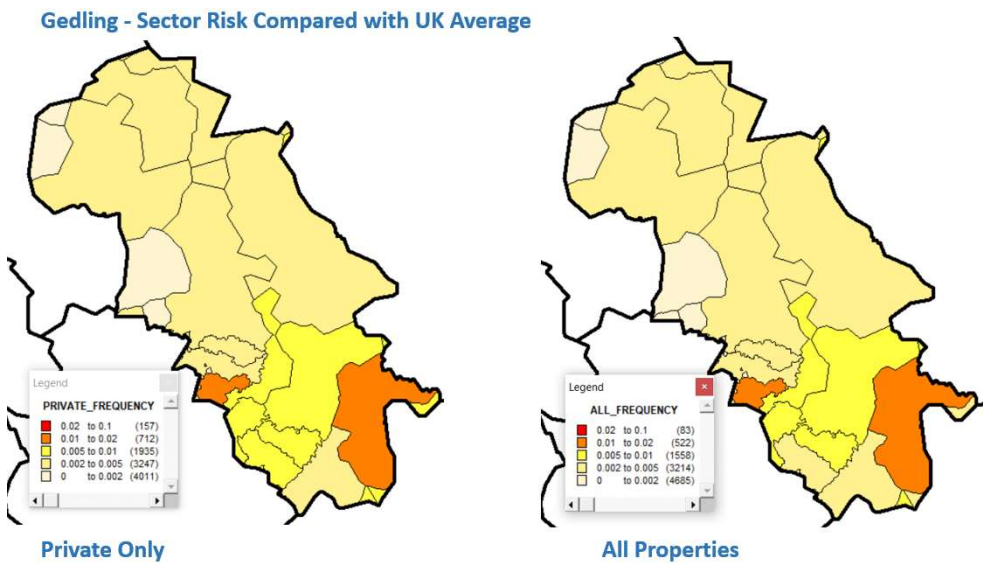
Gedling - Subsidence Risk Relative to UK



The Clay Research Group

Gedling - 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.



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 - Gedling

	valid summer clay	valid summer EoW	Repudiation Rate (summer)	valid winter clay	valid winter EoW	Repudiation Rate (winter)
District Gedling	0.260	0.339	0.401	0.30	0.39	0.302

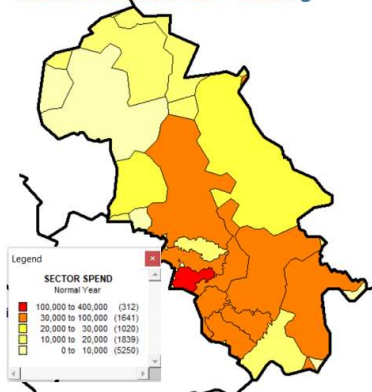


The Clay Research Group

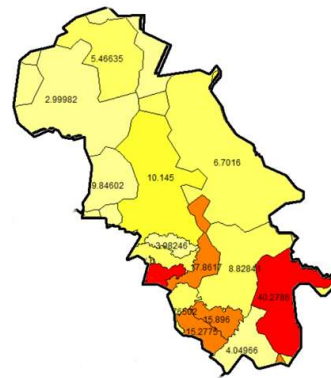
Aggregate Subsidence Claim Spend by Postcode Sector and Household in Normal & Surge Years

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 – Gedling



Spend by Sector

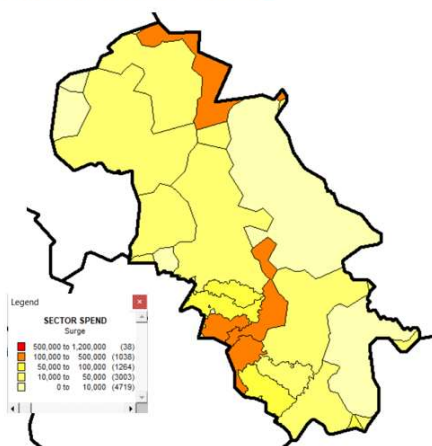


Spend Averaged Over Housing Population

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 – Gedling



Spend by Sector



Spend Averaged over Housing Population

