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

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March 2013

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Issue 94, March, 2013

Count of Trees

In next month's edition we look at the number of trees in London, and analyse the real risk posed by trees - those on clay soil, within influencing distance of domestic properties.

A detailed study of Barnet reveals some interesting facts, as does comparison with the UK data on the number of claims related to public trees.

Hortlink II

Richard Rollit attended the meeting in London and reports on the agreed approach as being twofold.

First to review some case studies – e.g. perhaps select 10 claims where the tree has been pruned and level monitoring has continued for about a year. So far two claims have been identified and the group are looking for more.

Second, to review the effectiveness of pruning regimes – i.e. take data from 3 London Boroughs and compare their claims experience following their pruning regime (e.g. no pruning, 2 yearly 3 yearly cycles).

Dr. Hipps proposes to use OCA's database to verify the claims experience and compare with MORECs data from the Met Office as a proxy measure for weather.

This Edition

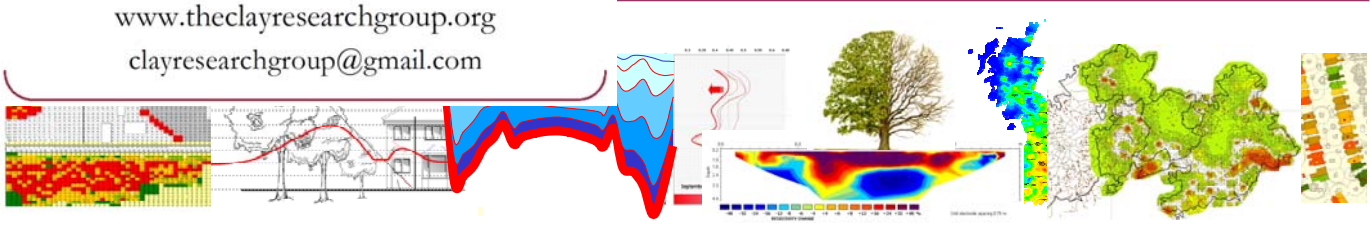
We look at the influence on risk modelling of Local Authority Housing distribution at Postcode Sector level.

As many Councils self-insure, a good percentage of the housing stock could effectively be omitted from the frequency calculations often used.

This has the effect of making some areas riskier than previously thought.

This is also relevant in cases of commercial buildings. If say half of the buildings are Local Authority houses or commercial buildings, the risk rating is effectively doubled.

THE CLAY RESEARCH GROUP
www.theclayresearchgroup.org
clayresearchgroup@gmail.com



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The Burning Issue

An Improved Understanding of how Local Authority Housing Densities influences Risk Models

The 'burning cost' of a peril is the total cost of claims divided by the total number of policies.

For an insurer with 1m policies, and a subsidence claims frequency of say 0.15%, and assuming for the purposes of the exercise (and a quick look at the ABI data) that the average claim cost is £5k, the insurer might expect to receive 1m x 0.15% = 1,500 claims, the cost of which would amount to 1,500 x £5k = £7.5m.

To find the burning rate we divide the total spend by the policies: £7.5m/1,000,000 = £7.5.

So, for every policy sold, and again on average, the insurer has to add something like £7.5 to cover subsidence. In addition, they will have to cover operating overheads (around 45%) and profit (say 5%) bringing the total to £11 - 12.

Of course, subsidence is not the only peril.

Others will be far more costly, and particularly flood, escape of water and weather claims in general, to which we have to add fire, Accidental Damage etc.

Subsidence is towards the bottom of the list.

It might be worth looking at frequencies and understanding how they are calculated.

There are around 1,75m postcodes ("HA5 5SN") and, on average, 15 houses to a postcode which equates to a housing stock of around 26m. The 2011 Census counts just over 23m.

Of these, Local Authorities (or their agents – Housing Associations etc.) own something like 40%, leaving the balance in private ownership, split almost equally between outright owners and those in the process of purchasing.

According to the ABI there are around 16m domestic policies with buildings cover.

A claims frequency of 0.15% produces 16m x 0.15% = 24,000 claims p.a., so the frequency may be a little higher. To deliver 33,000 claims in a normal year, the frequency would be closer to 0.2%.

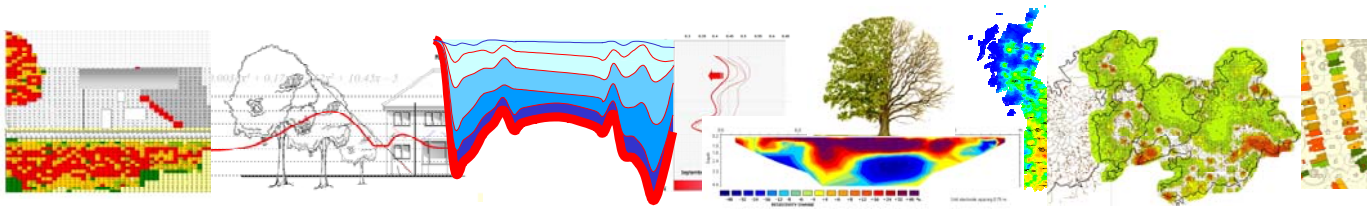
In surge, 50,000 claims deliver a frequency of 0.3%.

Risk models rarely take account of Local Authority housing population, and yet many self-insure and with concentrations of 50% and more in some area, we can see how this might influence ratings.

A postcode sector typically includes around 2,000 houses on average, and in a high risk sector, the claim frequency might be say 0.4%. Traditional risk models would build a rate based on all of the houses being in private ownership, delivering 8 claims.

If 50% of the houses are in Council ownership, the risk doubles. The insurer would receive half of the premiums – very simplistically of course - allocated for this peril based on a claim frequency model.

We recommend that going forward models would better reflect the risk of subsidence by taking this into account.



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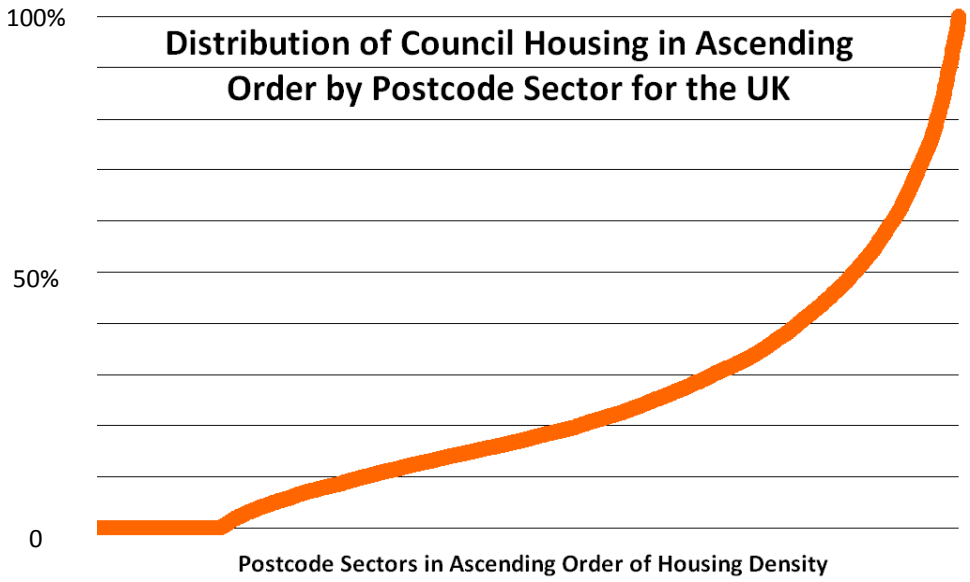
Claim Frequencies and Council Houses

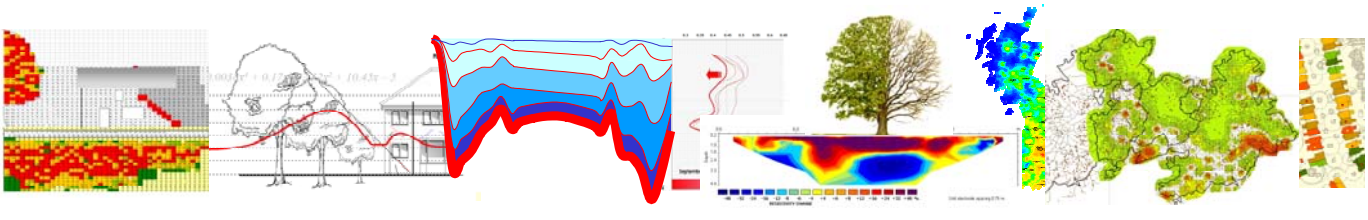
The need to take account of demographics in assessing risk

The analysis on the previous page suggests that underwriter's perception of risk may be skewed when they don't take account of ownership, and not just for subsidence. This approach applies to all perils.

How do we take this into account? The Census data for England & Wales categorises houses by class of ownership. They appear as 'owned', 'purchasing' and 'Council' with 'Housing Association' also listed.



The 'y' axis is the percentage of houses in Council ownership in the range 0 – 100%. The 'x' axis plots postcode sectors. Data taken from the Census.



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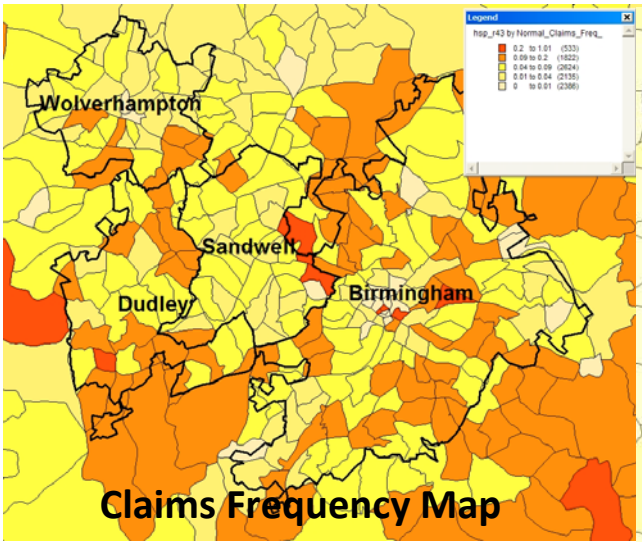
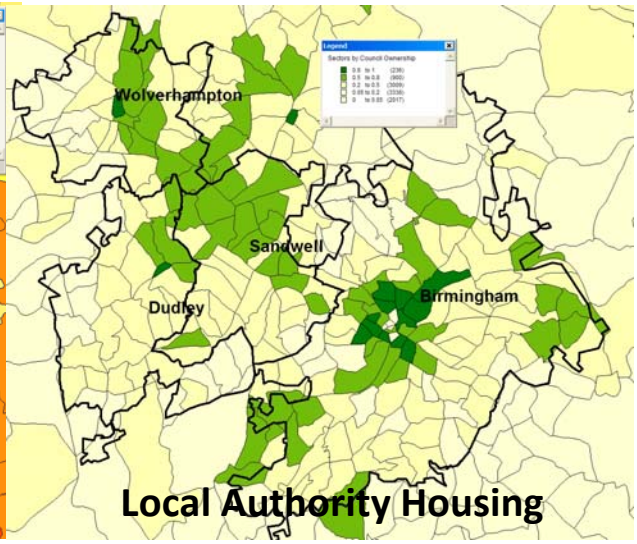
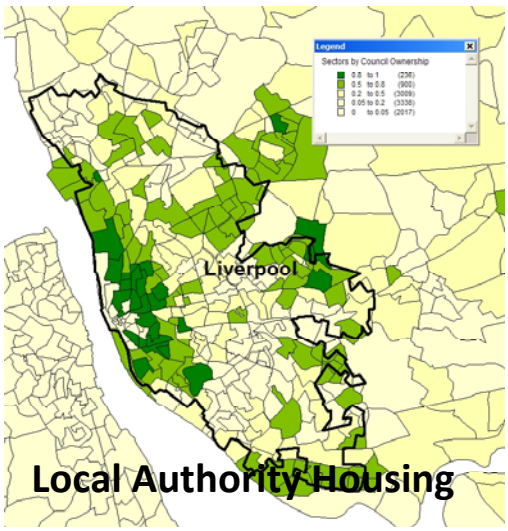
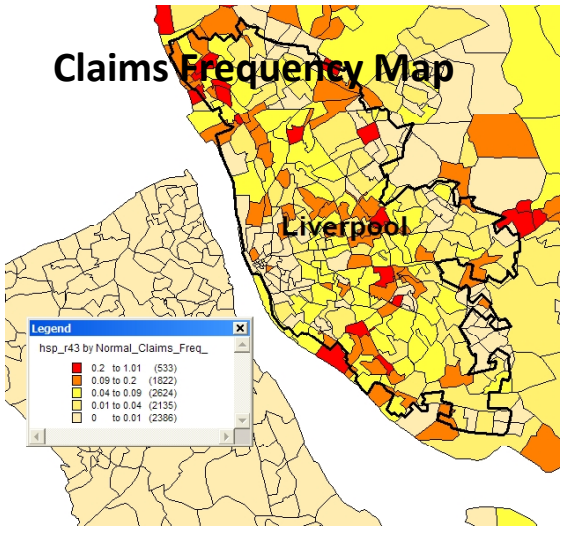
Analysis of Birmingham & Liverpool by Postcode Sector Comparing Claims Frequency and Density of Council Housing.

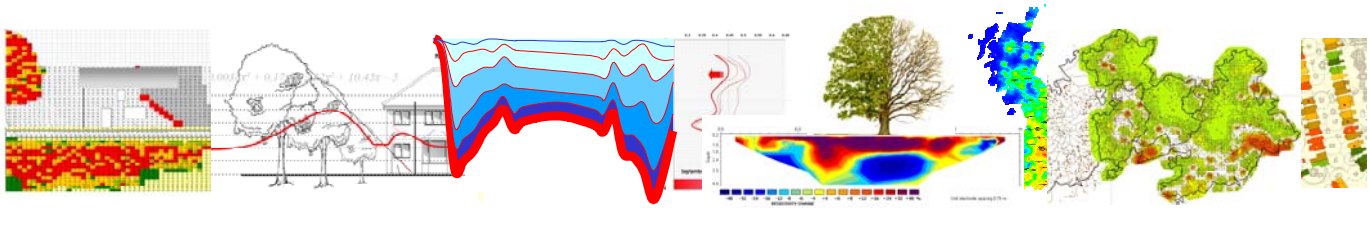




Above, Birmingham. In general terms, the risk is lower where there is a higher concentration of Council houses not necessarily due to any particular geological change, but due to classes of ownership. Sandwell appears quite a safe area in terms of subsidence (left), but the reason isn't due to the geology, but the fact many of the houses are owned by the Local Authority (right) who self-insure. Green shading is indicative of high concentrations (greater than 50%) of Local Authority Housing. Below, Liverpool – Council house distribution by percentage, left, and, claim frequency, right, all by postcode sector. There is a concentration of Council houses towards the City, and higher claims frequency in the surrounding suburbs, not because one is necessarily geologically riskier than the other, but due to the policies in place. See claim plot on Page 6.







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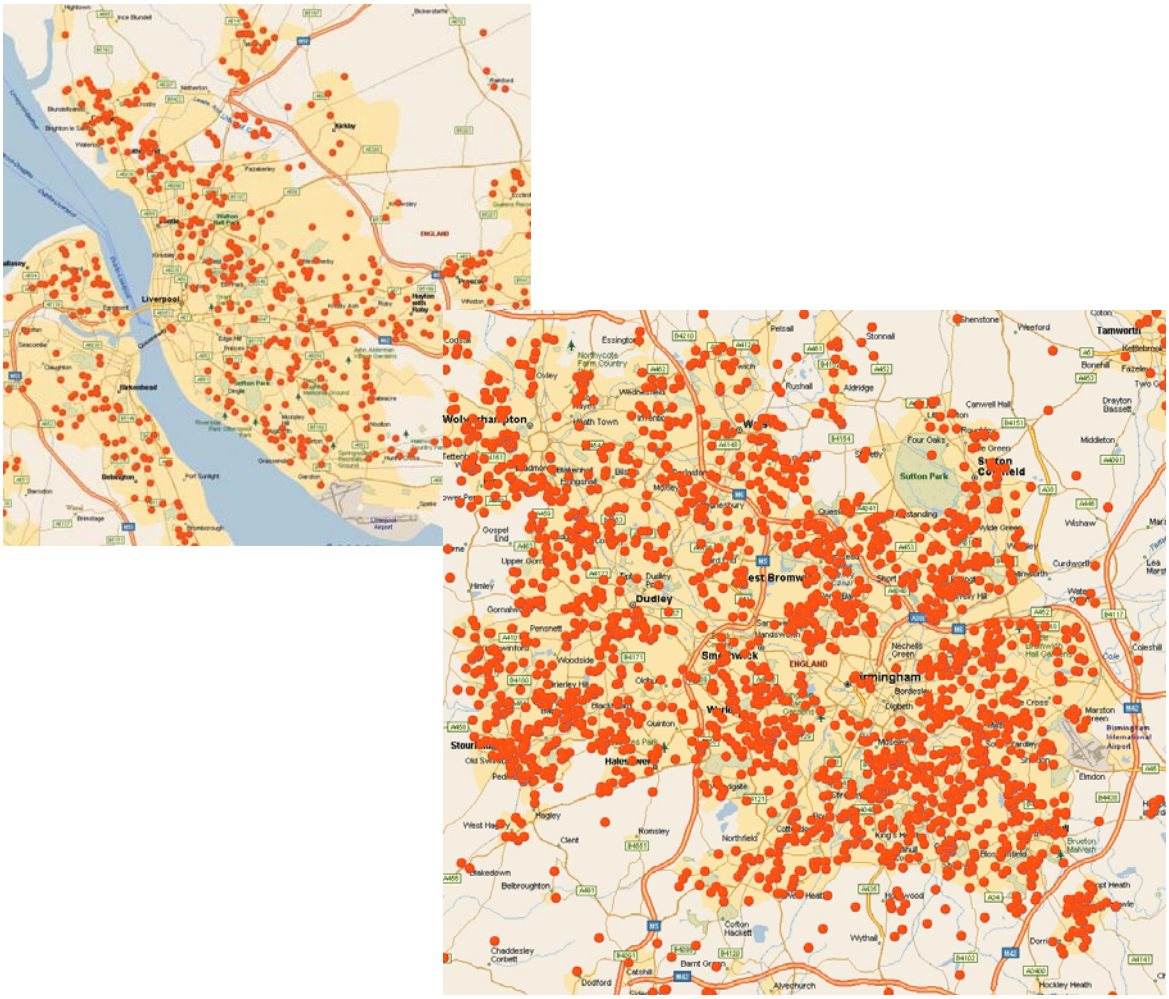
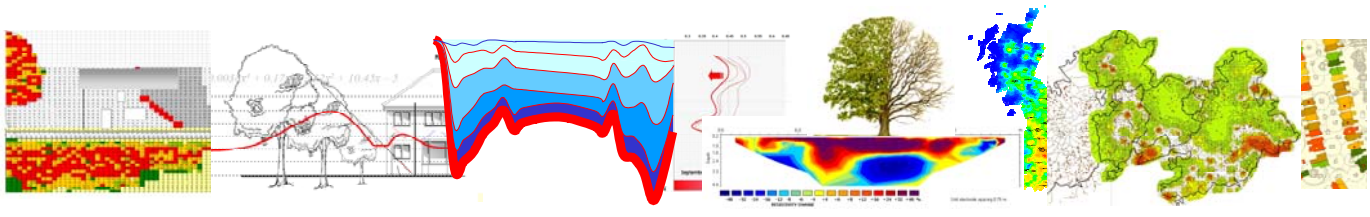
Plotting Claim Data to Compare with Sector Analysis
Liverpool and Birmingham

To conclude the exercise, below are plots of claims from our database showing the distributions for Birmingham and Liverpool. London has far too many claims to be able to deliver a useful picture.

Liverpool (top) has a band of claims running from the North West, diagonally down to the South East of the City. By referring back to Page 2, the claims fit between the postcode sectors with high percentage (greater than 50%) of Council houses.



In conclusion, the findings are that Local Authority housing is an important factor when building risk models to ensure that rating correctly reflects potential losses. The sectors shaded green will, be definition, only present half or less the notional risk and understanding this when writing business is important to insurers.



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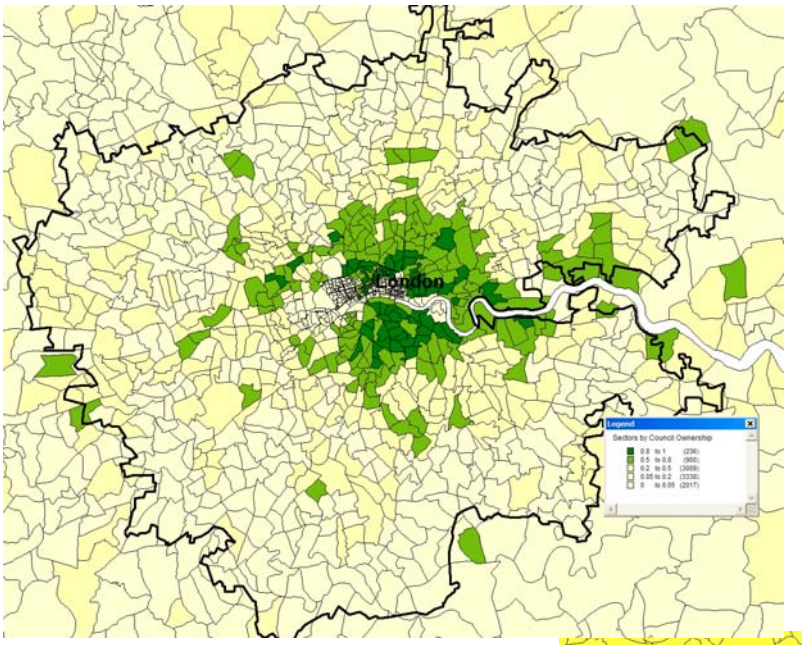


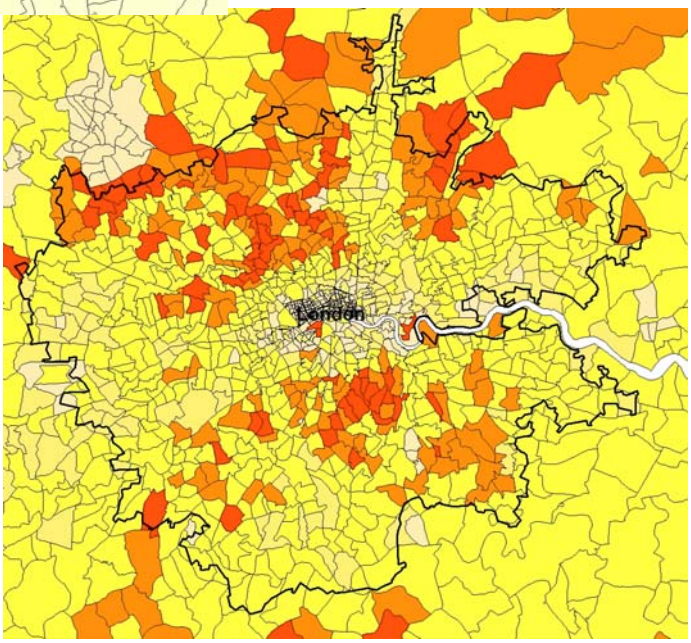
London has a similar profile. Left we have plotted postcode sectors in green where the concentration of Council houses is 50% or greater.

Compare this with the claims frequency sector map below.

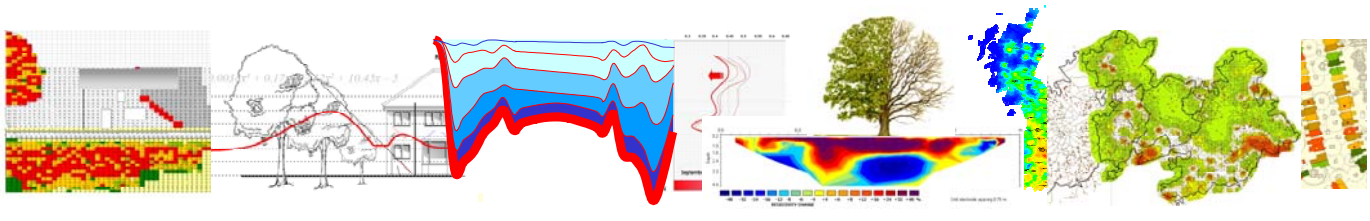
Is it the case that the sectors shaded green are actually safer, or that there are simply fewer houses in private ownership?

No doubt the answer is a function of the two elements, but what is clear from this limited study is the fact that when building a risk model, it is important to derive frequencies from meaningful data going forward.

Two very similar sectors with identical profiles in terms of claims experience, geology and so forth can have very different risk profiles depending on demographics and as shown here, taking account of the proportion of properties not in private ownership is important.



NOTE: In sectors shaded green to show high count of Council houses (50% or more) there will still be claims from the private housing stock within those sectors. The two maps are not therefore mutually exclusive and some overlap is inevitable.



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NOAA NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
UNITED STATES DEPARTMENT OF COMMERCE

An Extract from Data provided by **National Oceanic and Atmospheric Administration**

The 2012 temperature across the United Kingdom was 0.1°C (0.2°F) below the 1981-2010 average. This is in part attributed to the UK's coolest summer since 1998 and coolest autumn since 1993.

The globally-averaged temperature for 2012 marked the 10th warmest year since record keeping began in 1880. It also marked the 36th consecutive year with a global temperature above the 20th century average.

The last below-average annual temperature was 1976. Including 2012, all 12 years to date in the 21st century (2001-2012) rank among the 14 warmest in the 133-year period of record.

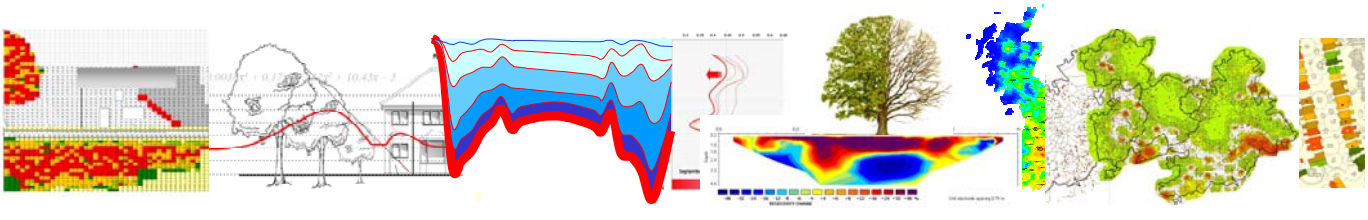
Only one year during the 20st century - 1998 - was warmer than 2012.

The global annual temperature has increased at an average rate of 0.06°C (0.11°F) per decade since 1880 and at an average rate of 0.16°C (0.28°F) per decade since 1970.

The 2012 worldwide land surface temperature was 0.90°C (1.62°F) above the 20th century average, making it the seventh warmest such period on record. The margin of error is ± 0.18°C (0.32°F).

2012 also marked the 36thconsecutive year with a global temperature above the 20th century average. The last colder-than-average year was 1976.

2012 was the 10th warmest year since records began in 1880. The globally-averaged annual combined land and ocean surface temperature was 0.57°C (1.03°F) above the 20thcentury average of 13.9°C (57.0°F). The margin of error is ± 0.08°C (0.14°F).



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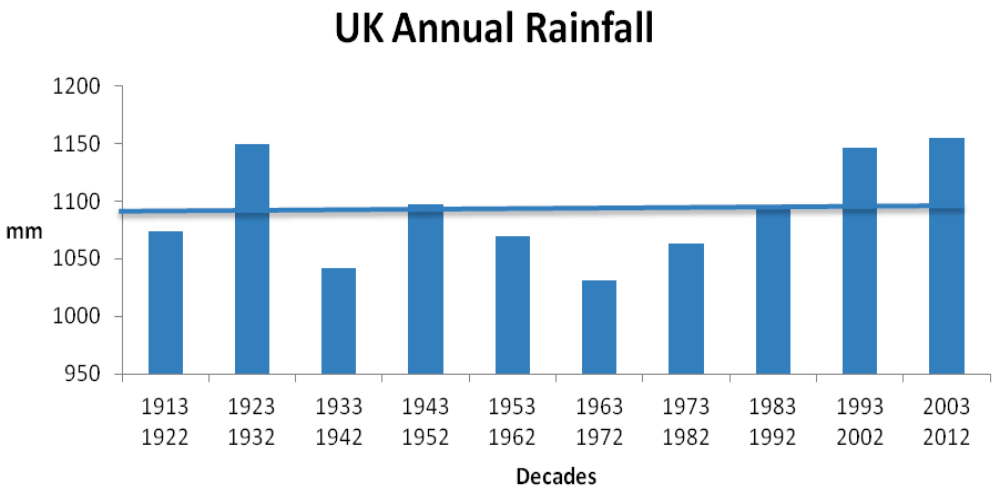
Are we heading into another decade of higher than average annual rainfall?

Cyril Nazareth

Data published by the Met Office of UK Annual Rainfall over the last 100yrs (1912 – 2012) confirms that the last decade has been the wettest on record.

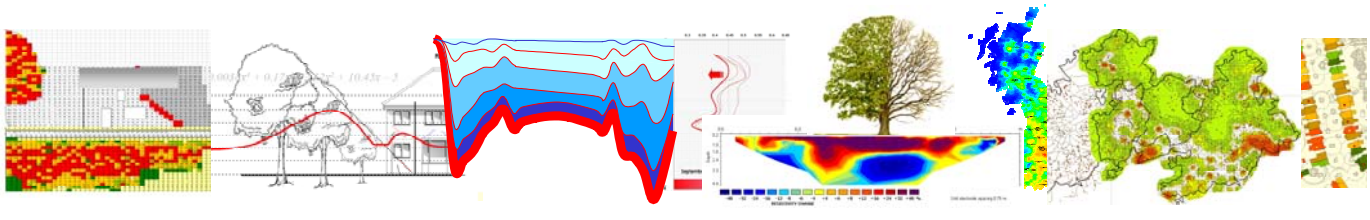


Analysis of the data set by averaging 10yrs of rainfall results in the graphic above. The solid line represents the average (mean) over the period 1912 to 2012. The last decade and the decade before that have been some of the wettest years on record. In fact the only other comparable decade was the period 1923 to 1932.

The graphic further confirms that over the last 50yrs, the UK as a whole has been experiencing wetter weather, on average. There are of course regional variations, but the overall trend has been an increase in wet weather.

Interspaced within the decades, there have been years of average dry weather. One such year was 2003, interestingly within the wettest decade. Another relatively dry year was 1996.

How likely is it that the next 10yrs will be wetter than the last? Will this year see the trend continue or will it be a random dry year?



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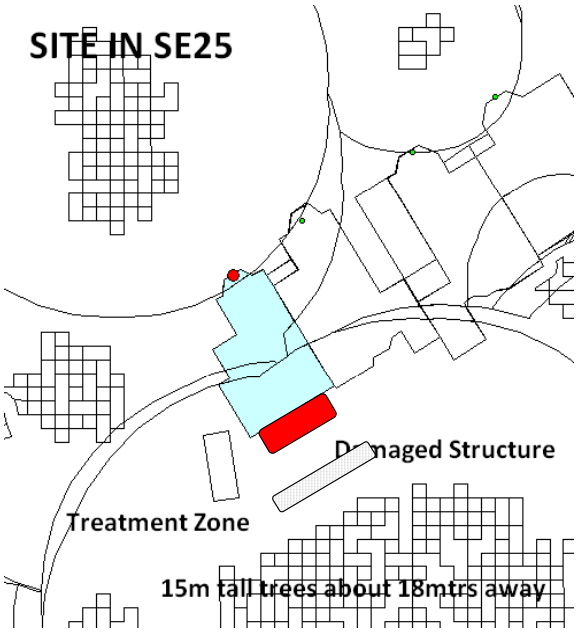
This is the latest site to receive the InterTeQ treatment. Situated in SE25, there is damage to a conservatory to the rear of the property caused by root induced clay shrinkage.

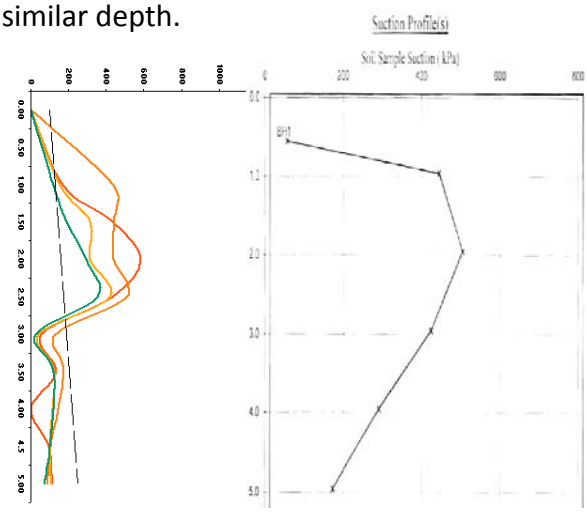
The tree, a 18m tall Turkey Oak, 18mtrs from the rear house wall, is situated in a neighbours garden and proving difficult to remove.

The technique has been adopted to allow repairs to commence without undue delay.



Our Disorder Model suggested a soil PI of 47%, with with the PI of 54% confirmed from actual investigations. The Disorder Model predicted that the conservatory fell within the zone of influence of tree roots – see output, right.

At virtual BH3 (beneath the conservatory), the modelled suctions (below, left) reached 400kPa at 2.5mtrs bGL. This compares with the actual suctions (right) of 500kPa at a similar depth.



The ground rehydrated very quickly on introduction of InterTeQ, and survived the admittedly wet summer of 2012. Monitoring is continuing. The position of the virtual boreholes used to produce the above modelled suctions is shown below.