

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



April 2011

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Urban Tree Research Conference

CRG and OCA are delivering a joint paper “*A Review of Current Research Relating to Domestic Building Subsidence in the UK*” to the international conference of Chartered Foresters in Birmingham on the 13 & 14 April 2011 entitled “Trees, People and the Built Environment” The conference has attracted speakers from around the world, and features an introduction by H.R.H. The Prince of Wales.

The Insurance Post

The Post annual conference has been merged with other perils due to the relatively low interest over recent times, and takes place on the 26th May, 2011 under the heading “Property Claims”.

Research Project

Margaret MacQueen’s (OCA) project to explore tree maintenance regimes in collaboration with the London Boroughs and others is pending Council budgets being settled and the methodology agreed.

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Subsidence Annual Conference



22nd June 2011

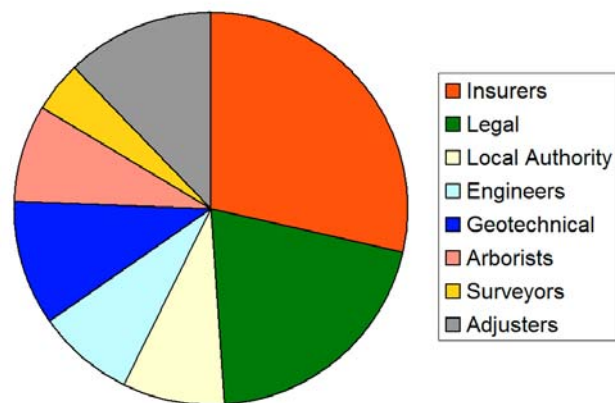
The Aston conference has attracted some excellent speakers again and this year. Malcolm Cooper from Legal & General opens the day with “Subsidence : The Forgotten Peril?”.

We will be hearing from Giles Biddle, Michael Lawson, Paul Thompson and Peter Osborne from the arboricultural community.

Giles explores “A Realistic General Protocol for the Investigation of Tree-Related Subsidence”, and Peter poses the question, “Councils : the Root of the Problem?” Paul Thompson will be talking about “Mitigating the Environmental Impacts of Building Subsidence” and Michael, “Planning for City Trees – Putting Subsidence in Context”

Richard Rollit will be hosting the conference once again and looking at the benefits of procurement. Neil Curling takes over the chair of the Subsidence Forum in May and has been invited to deliver his views.

The 2010 conference attracted an audience from the following sectors.



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STREET SCENE

Below is a fairly typical street scene from a London Borough. Estimated root zones have been superimposed onto an aerial image to reveal those houses where there might be roots growing beneath them, and the possible extent.



The Mayor of London plans to increase the tree canopy cover by around 5% (a further 2m trees) as part of the ‘Urban Greening’ program, which will have implications for insurers and subsidence practitioners.

Further work in this area is essential to reduce the conflict that arises from time to time when root induced clay shrinkage causes damage to buildings.

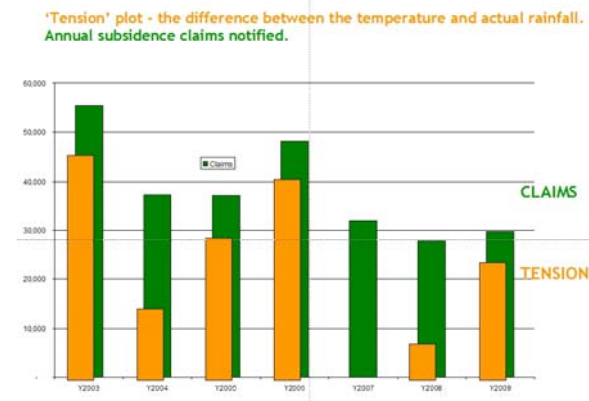
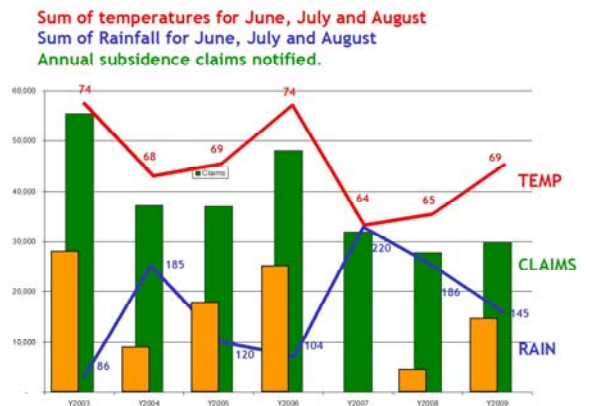
Research that helps the Boroughs plant safely by selection of species and/or planting technique is increasingly important and the Hortlink project will hopefully be referred to by those in charge of this strategy.

Neil Higgs is reviewing his work at East Malling and it is hoped – with the help of others including arborists, Local Authority Tree Officers and insurers – that further research can be undertaken to assist.

WEATHER & CLAIMS

Running the ‘tension’ method described in Edition 70 from 2003 through to 2009 (see below) reveals the link between temperature, rainfall and claims.

By normalising the temperature and rainfall data on a scale of 0 – 1 and plotting the difference (the orange bars in the graph below) the 2003 event year and 2006 (an intermediate claims year) are distinguished from the normal claim years.

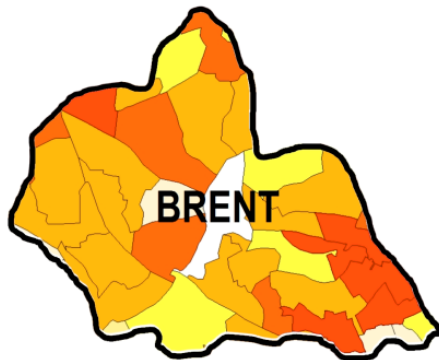


Normalisation allows two unconnected units of measure (mm of rainfall and degrees C) to be amalgamated and although it is not predictive, it does provide an insight into the relationships between the elements.

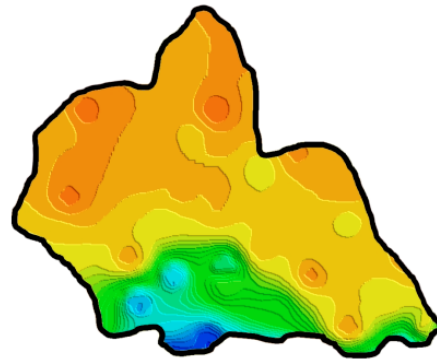
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BRENT STUDY AREA

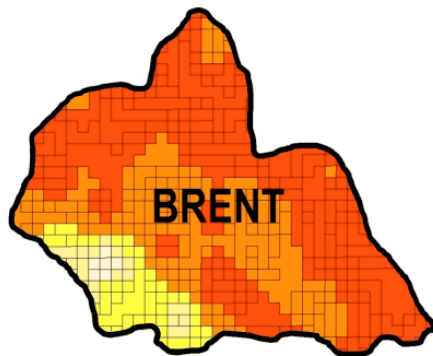
Brent has a population of around 270,000 and around 100,000 residential properties. Some of the postcode sectors lying within the Borough are high risk – predominantly those to the North and East. The various datasets are shown below.



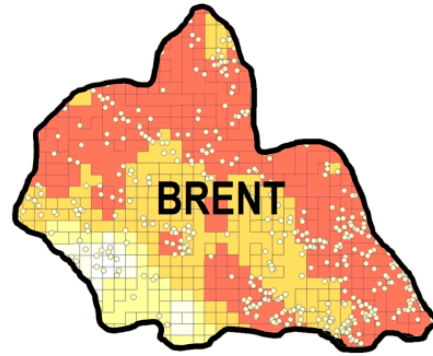
Postcode Sector Risk Map



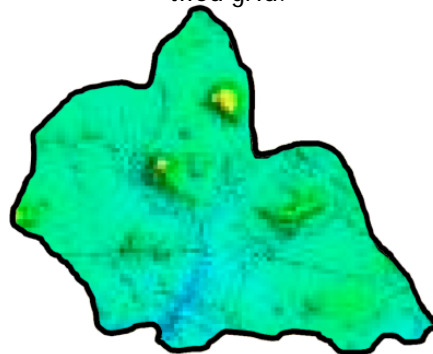
Geology and Claims Merged



Soil PI plotted on a 250m tiled grid.



A sample of claims plotted on the Geological grid



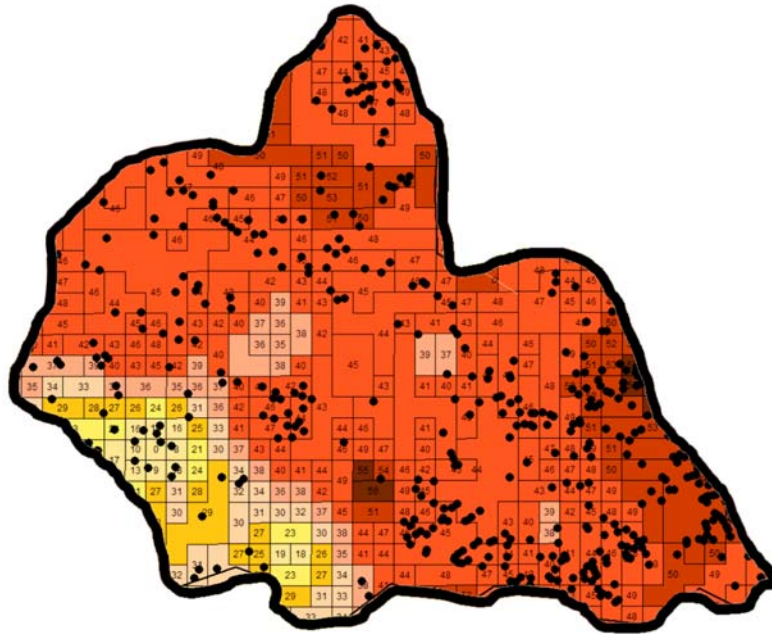
LiDAR Digital Terrain Model



Tree Distribution

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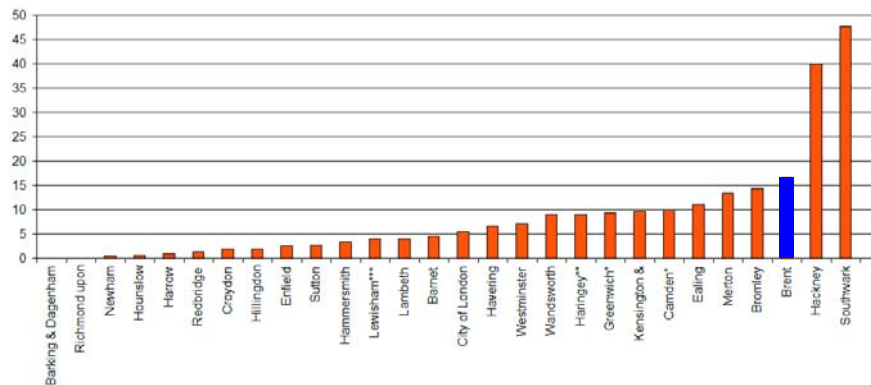
~ BOROUGH of BRENT ~ SOILS by PLASTICITY INDEX & CLAIM LOCATION FROM SAMPLE



Maximum P.I. recorded 61%. Average for the Borough 41%. Brent record (“Chainsaw Massacre”, 2007) 18,000 Council trees in the Borough with 250 trees removed over a 5 year period as a result of subsidence – 50 per annum on average. This amounts to 16.67% of the total trees removed, making it one of the highest risk Boroughs. The average of trees removed for all London Boroughs because of subsidence is 5% of all tree losses. Other reasons are Health & Safety, disease and cabling etc.

Brent is rated 3rd in the table ‘of all trees felled the percentage removed as a result of subsidence’.

Southwark is the highest, and Hackney a close second.



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SMD PROFILE 2011

Although March 2011 has been the driest for 100 years, the SMD (Tile 161, grass cover, medium AWAC) reflects the inherited moisture content from January and February. The developing profile confirms that the soil is in fact wetter than normal for this time of year.



“The Driest March in 100 yrs”

The press is making much of the fact that March is listed the driest for 50 or even 100 years. In fact, there was an inherited surplus from the previous months, when the soils were at field capacity. Any deficit will be at shallow depth.

The absence of rainfall began to register as a soil deficit half way through March, but as deciduous trees aren't in leaf for another month or so, it has little significance.

Those with longer memories will recall the stories from 2010, which recorded rainfall less than 85% of the long term average in the first 6 months of the year giving us the driest start since 1929.

Predictions of surge are becoming part of the story at the beginning of every year, which discredits their value. A predictive model has to correctly identify normal, as well as surge, years to have any real benefit. “The driest this or that” has to be taken in context and March is far too early to make any sensible prediction.

The EKO PROJECT

A meeting was held in the Civil Engineering Department at Birmingham University on the 6th April to discuss the electrokinesis project and agree a way forward. The meeting was hosted by Prof. Chris Rogers and Dr. Ian Jefferson.

Attendees included Dr Allan Tew (Innovation), Jeremy Aitchinson (Crawford), John Peterson (Foundation Piling), Dr. Jon Heuch (Duramen Consulting), Tom Clinton (PhD student) and Stephen Plante (CRG). Apologies were made by Richard Rollit (Crawford) and Mike Duckworth (Cunningham Lindsey).

The coming 12 months will involve retrieving soil and undertaking laboratory tests to establish their shrink swell potential, hydraulic conductivity and mineralogy. Trials will then be undertaken in the laboratories at Birmingham University to develop an understanding of which treatment delivers the best results.

If successful, it is hoped that Aldenham will allow us to use the site of the Willow on the basis that there is levelling data extending back to 2006. This will be useful to measure any change following soil treatment.

The soil around the stations that have moved the most (Station 23 for example) will be treated, and any change recorded.

The objective is to ‘fix’ the soils permanently and remove their shrink/swell potential using electrokinesis. If successful we will have a treatment that can be applied quickly and with minimal disruption that allows the tree to be retained.

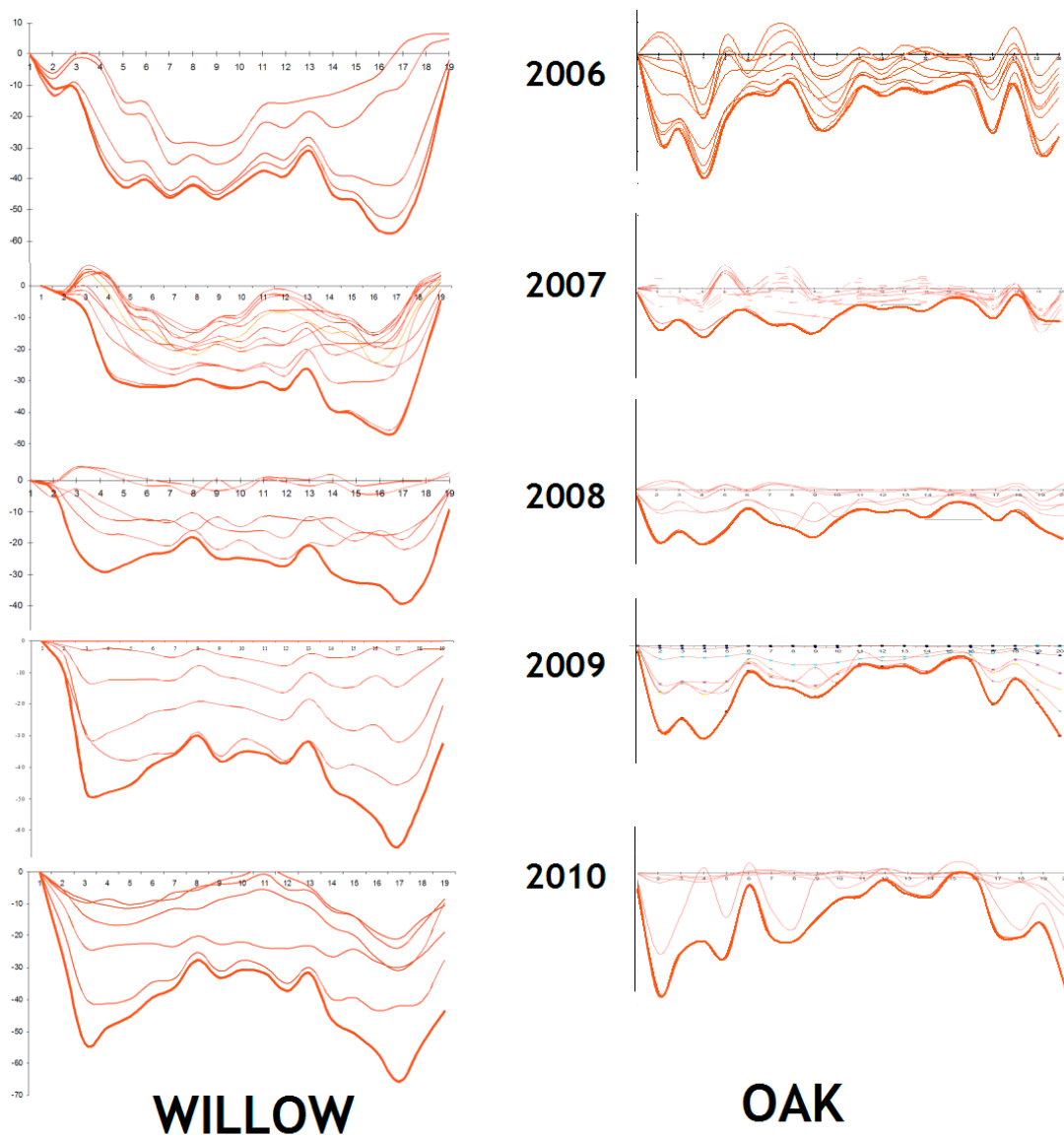
Dr. Jon Heuch has kindly agreed to assess the condition of the Willow both pre and post treatment by measuring transpiration and reporting on general health. Jon will build a characteristic signature for the Willow throughout 2010, and make comparisons with data post-treatment, adjusted for climate. As any added minerals will be bound to the clay molecules, there should be no environmental/contamination issues.

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TREES & SOILS

Precise levels across the root zones of the Aldenham Oak and Willow reveal very different ground movement profiles. The Willow is situated on a predominantly London clay soil, and the Oak, variable deposits at the junction of the outcropping London clay series and the adjoining Bracklesham beds.

This illustrates just one of the complexities associated with understanding and modelling the interaction of trees and soils. The inference may be drawn from this data that the moisture uptake of the Oak tree is less than that of the Willow. In fact, the difference more likely lies in the reduced shrink/swell potential of the variable soils beneath the Oak tree.



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ALDENHAM

The latest levelling data confirmed movement of between 3 – 5 mm at stations 9, 10 and 11 in the summer of 2010 and 10mm at the opposite (as yet, undamaged) end of the rear wall, at Stations 12 and 13.

This suggests that roots from the remaining shrubs (and possibly the “other” willow see below - marked as ‘a’) are exerting an influence. Monitoring is ongoing but if continued movement is recorded through a dry year, this may provide the first site for our proposed EKO ground treatment.

Cyril Nazareth has provided the data below showing where the rehydration bores were sunk and where shrubs have been removed.

