

# The Clay Research Group

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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



June 2011

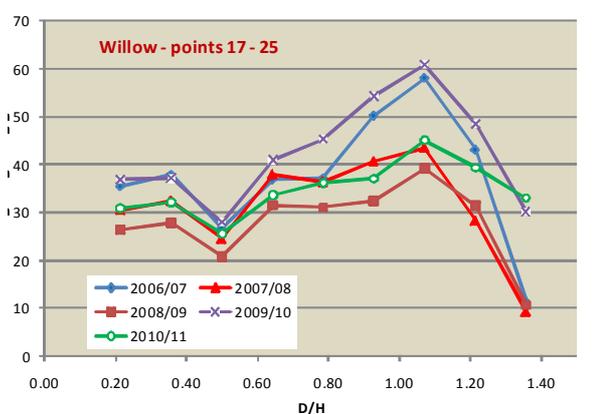
# The Clay Research Group

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## Ground Movement – D/H

Tim Freeman, MD of GeoServ Limited, has been analysing the precise levelling data from Aldenham site, and plotting the maximum movement that has taken place annually, from April to April.



*The amount of vertical ground movement in mm for increasing distances from the tree expressed as D/H – example from the Willow.*

Normalising the data using D/H, Tim has found that maximum ground movement has taken place where D/H is between 1 and 1.2, and that movement has extended beyond 1.35 x the tree height. This has been the case every year from 2006 through to 2010, inclusive.

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## NEWS UPDATE

Margaret MacQueen of OCA arranged a meeting, hosted by Dr. Neil Hippias at East Malling Research. The objective is to measure the long term benefits of crown reduction in the urban environment and also, hopefully, detect any differences between species – assuming we can achieve a sensible sample size and monitor for sufficient time to gather the information we need. For an update, visit the Aston Conference – see below. If crown reduction does work, at what intervals should it be carried out? This would be an extension of the Horticulture Link research (*“Controlling Water Use of Trees to Alleviate Subsidence Risk”*). The next stage will be submitting ideas to industry partners for consideration. The project will require the co-operation of the adjuster, Local Authority, homeowners and insurers.

## Subsidence Annual Conference



22<sup>nd</sup> June 2011

Don't forget to visit the Aston conference. The program is appended to the rear of this newsletter with details of how to book. There has been an exceptional level of interest this year. Trees are a hot topic, and the speakers reflect the views of some leading arboricultural figures as well as a leading underwriter.

## A Day at the Laboratory

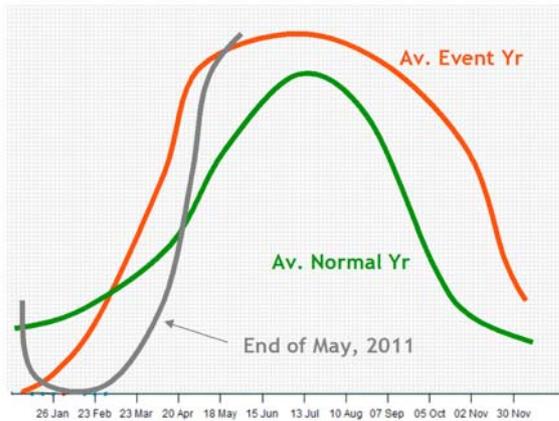
At the suggestion of Peter Osborne we are arranging a visit to MatLab's soil testing laboratory in Catherine-de -Barnes, to step through the wide range of tests that are undertaken to investigate tree root claims.

These include determining Atterberg Limits, moisture contents, soil suctions, oedometers and how they use the penetrometer to take readings on site.



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## Weather Update



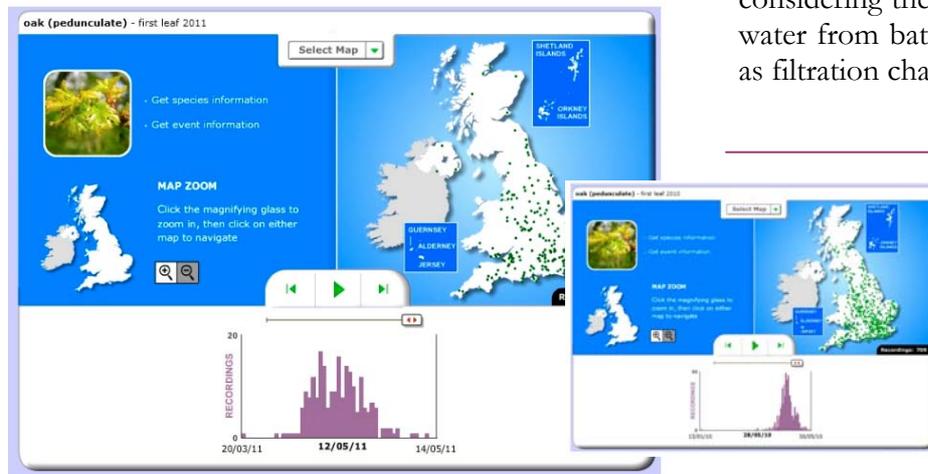
*SMD Values for Tile 161, North London*

2011 has been exceptional both in terms of the SMD at the end of May (currently standing at 130mm and matching 1990 – one of the busiest claim years) but also the steepness of the incline over the last month.

Unless we see exceptionally heavy rainfall in the next few months, there is a greater than 85% probability that we are approaching an Event Year.

## Woodland Trust Web Site

Edition 62 referred to ‘coming into leaf’ of the Pedunculate Oak and below is an updated screenshot.



## OCA Weather Update

Michael Lawson from OCA has provided weather updates for the first 20 days of May 2011 revealing the following anomalies.

Rainfall in the South East is only 45% of the Met Office averages, and sunshine is 133%. So far, May has been far dryer and warmer than usual, leading to concerns about claim numbers.

The Environment Agency have activated their drought plans and by whatever criteria we adopt, high claim numbers appear to be likely IN 2011. The only mitigation will be the amount of rainfall over the next few months.



What are the implications for InterTeQ? It was designed to increase the available rainfall by a factor of x4. Gathering rainwater run-off from the roof of the property and storing it in harvesting chambers relies on having some rain in the first place.

The record dry spell that we have seen over the last few months presents a challenge and we will be monitoring sites very closely and considering the use of ‘grey water’. Harvesting water from baths and using the sand columns as filtration chambers.

*Visit The Woodland Trust website at [www.naturescalendar.org](http://www.naturescalendar.org) to see some interesting data on trees*

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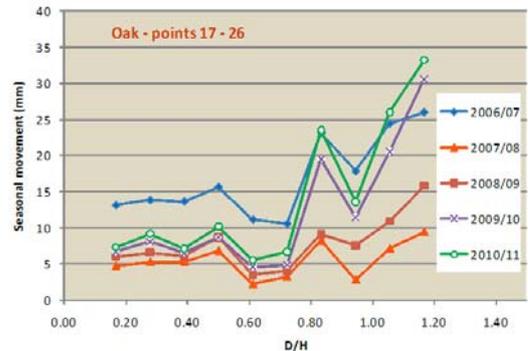
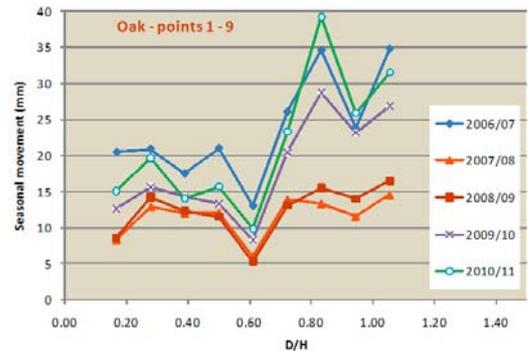
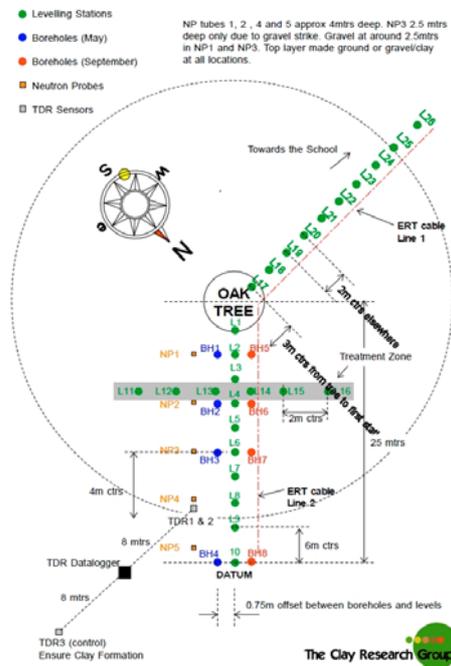


## Patterns of Ground Movement at Aldenham

~ Tim Freeman, GeoServ Limited ~

Tim Freeman has analysed the ground movement patterns from Aldenham site and provided a report for the period from 2006 through to 2011. Precise levels were taken from ground rods set in place at 2m intervals, with the first situated 3mtrs from the trunk. Plots represent readings taken from April to April. “2008/09” refers to movement recorded between April 2008 and 2009. The ‘x’ axis plots D/H.

### Oak Tree



Tim reports, “the results for the Oak are dominated by the branch fall in Spring 2007 - this (coupled with wetter summers) resulted in a dramatic (> 50%) reduction in movement both close to and away from the tree in 2007.

Since that time the movement has increased progressively year upon year and for D/H > 0.6 was practically back to 2006 levels by summer 2009. Movements closer to the tree remain significantly smaller than they were in 2006.

It is not possible to draw any conclusions about zone of influence because this is a larger tree and furthest ground rod (1.2 tree heights away) is still well within zone of influence.”

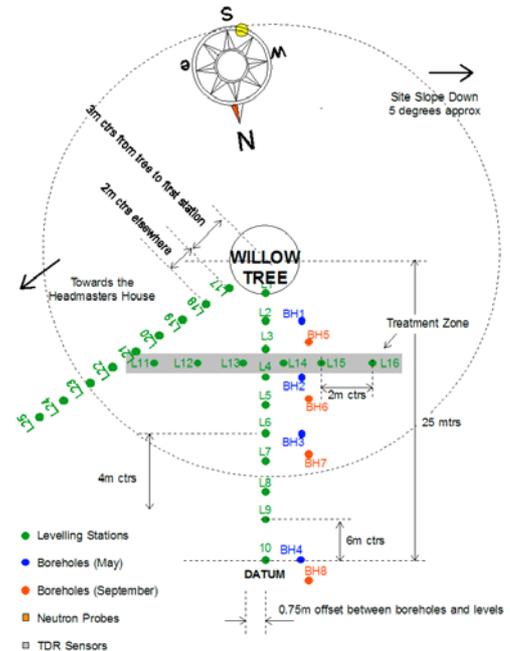
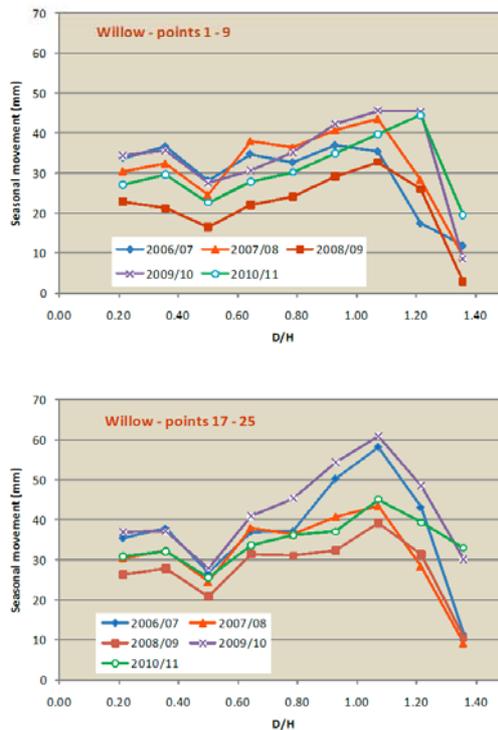
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## Willow Tree

“The 2006 results are potentially underestimates because the measurements did not start until the end of May, one month after measurements on the Oak.

Comparing May 06 levels with, say, March 09 reveals significant differences - although some of this may be lack of recovery over 05/06 winter rather than early movement in 06. Be this as it may, the results clearly reflect the influence of weather - minimum movement in wet summer of 2008, max movement in 2006 and 2009 - in fact, even allowing for missed movement in Spring 2006, movement in 2009 appears at least equal to that in 2006.



Results (prior to summer 09) clearly show zone of influence extending to 1.2 tree heights but not to remotest rod at 1.35 tree heights. However, in summer of 2009 zone of influence appears to have extended to remotest rods and has not yet receded, despite a mediocre summer last year.

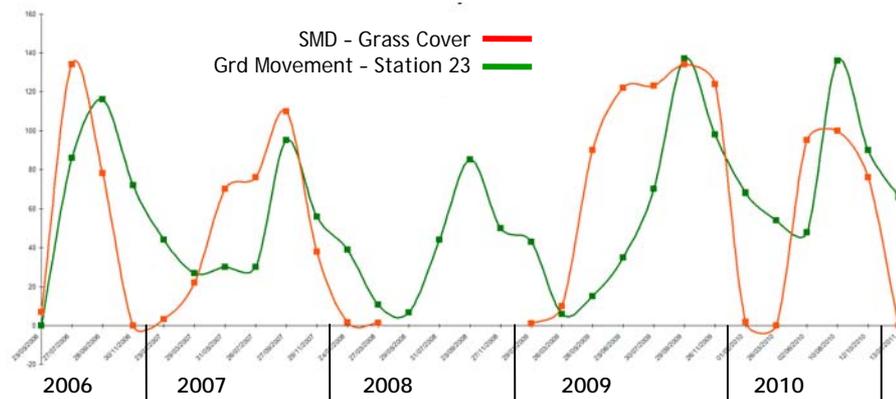
However, unless the moisture demand of the Willow has increased (which seems unlikely looking at the photos), this must be a temporary increase in the soil moisture deficit that will reverse once we get a prolonged period of wet weather.”

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## SMD Compared with Ground Movement

As an addendum to Tim’s report, ground movement for Station 23 of the Willow has been plotted against the SMD for North London (Tile 161, grass cover, medium AWC). To reconcile the two graphs and make comparisons easier, ground movement values have been multiplied by x2 – see below.

In January, 2011 Station 23 was 33mm lower than its starting point in June 2006 - suggesting perhaps the commencement of a persistent deficit. This view is reinforced by the readings through 2010 when ground movement exceeded the SMD.



Ground movement lags behind soil drying by a month or so, reflecting the increasing depth of soil drying due to tree root activity. The SMD values indicate soils at field capacity in the winter of 2009/2010 whilst ground levels suggest the establishment of a persistent deficit at depth as witnessed by the ratcheting appearance.

## Subsidence Forum

The Subsidence Forum has proposed a meeting to look at Tree Root Nuisance claims and Welwyn Hatfield Council have kindly agreed to provide accommodation.

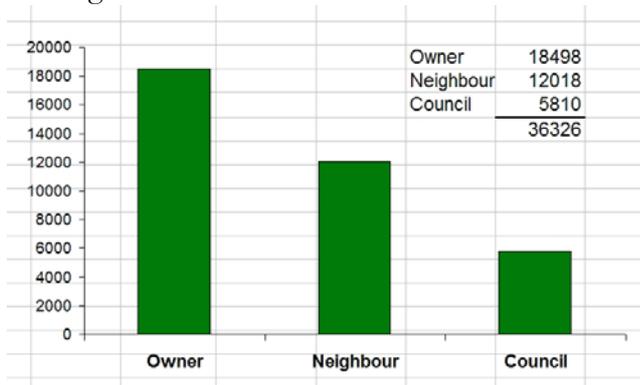
E-mail Andrea Plucknett on A.Plucknett@welhat.gov.uk to book a place.



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## Trees by Ownership

Reviewing the increased tree database (after sifting and removing shrubs and references to ‘deciduous’, or ‘broadleaf’ etc., we are left with 36,326 records) reveals the following categories of ownership of trees implicated with causing damage to domestic dwellings.



Of those, species by classes of ownership are described in the histograms, right.

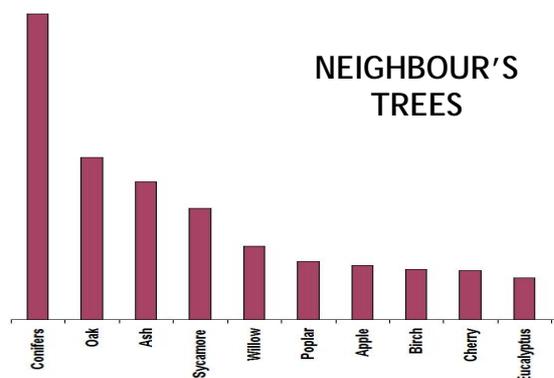
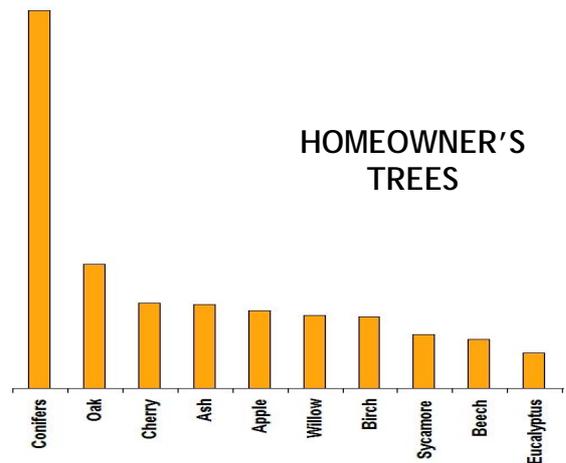
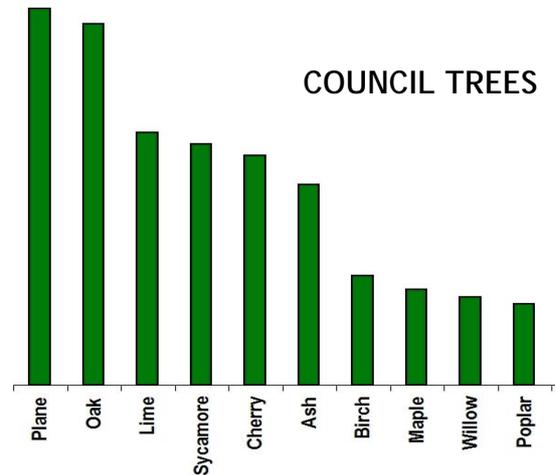
Conifers are the most frequent cause of subsidence for homeowners and neighbours. They are often planted close to houses as a border.

In contrast, and not surprisingly perhaps in terms of frequency of planting, the Plane tree comes top of Local Authority list.

Oak, Ash, Willow and Cherry all feature towards the top of the league table once we account for the ‘species by ownership’, and it is interesting to see that the smaller, perhaps lower risk trees, (Apple, Birch and Sycamore for example) planted closer to the damaged house are implicated in the ‘owners’ table whereas the taller trees with roots that extend further (Poplar, Oak and Willow) are often situated in neighbours gardens.

See following page for an extract of the tree metrics table.

## Tree Species by Ownership Graphs ~ Top 10 ~



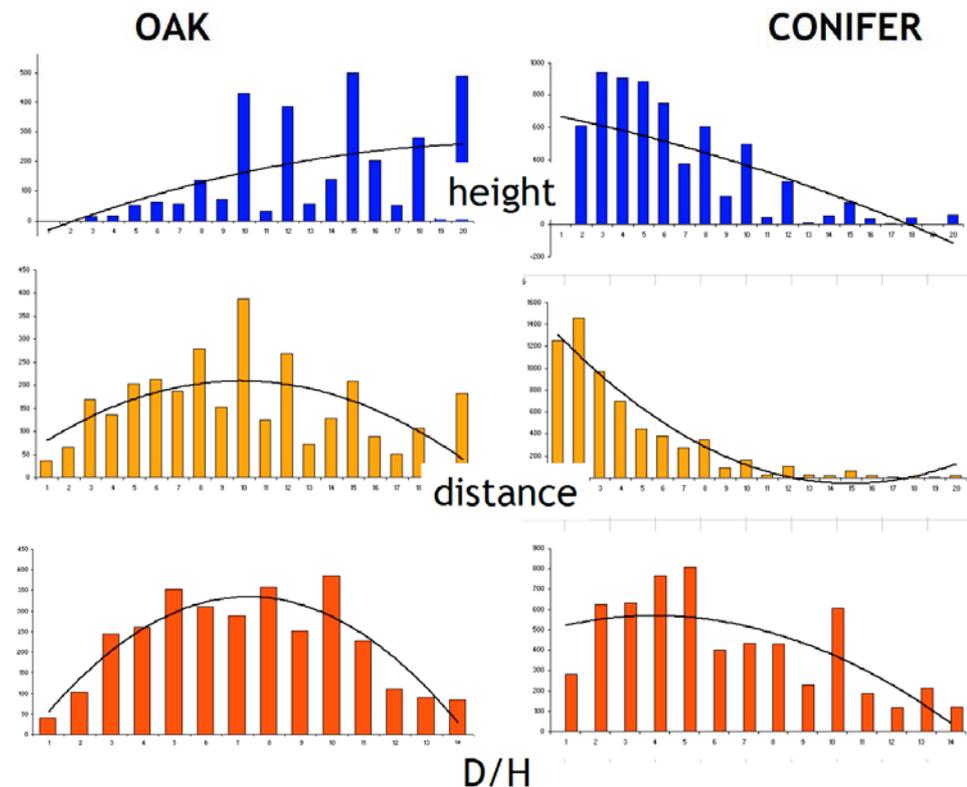
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## Trees by Species - Trendlines

Frequency distribution analysis of the sample reveals differences between species, and to illustrate this we have compared height, distance to damage and D/H of the conifer with the oak.

In cases where trees have been implicated with damage, the Oak is likely to be taller, and the conifer shorter, as we would expect.

Comparing distance, Oak trees most commonly cause damage when situated around 10mtrs from the building, whilst conifers are more likely to cause damage 2mtrs away from the building.



Combining the values (D/H) reveals the above trendlines. When an Oak tree is implicated, the D/H values peak at around 0.8, and in the case of conifer, around 0.5.

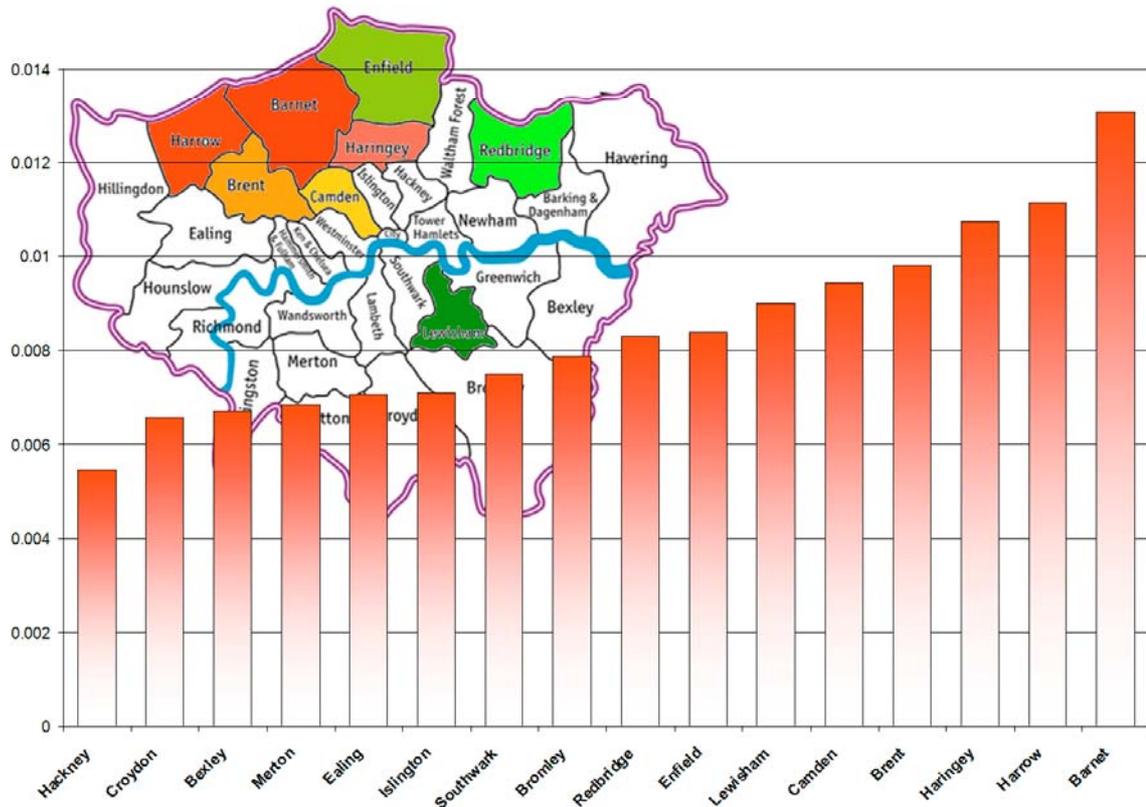
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## Rank Order of Risk of London Boroughs

It is always difficult to claim any sort of accuracy when analysing data collected from a wide variety of sources but the sample size in this instance (96,000 valid claims) provides some idea of rank order of risk of the London Boroughs. The graph below plots the count of claims divided by the number of residential dwellings to deliver a frequency rating of risk.

Barnet is at the top of the list, followed closely by Harrow, Haringey and Brent. All areas that have formed the basis of a study in previous newsletters.

No real surprises. The value lies in the fact the graph plots risk frequency from the sample, which takes account of the Borough size and any variations in population. It is also useful to quantify the relative risk of each Borough. For example, Haringey and Harrow are apparently twice as risky as Hackney.



The 'x' axis lists the top 16 London Boroughs. The 'y' axis is the claim frequency compared with housing stock from the sample of 96,000 UK claims.



# Aston CPD Centre

BIRMINGHAM

Presents a One-day Conference on Wednesday 22 June 2011  
at Aston University

## SUBSIDENCE Topical Issues 2011

- 09.00 - 10.00 Registration and coffee
- 10.00 - 10.15 Opening by Chairman: RICHARD ROLLIT, Crawford & Co
- 10.15 - 10.50 *Subsidence - the forgotten peril?*  
Malcolm Cooper, Legal & General Insurance
- 10.50 - 11.25 *Mitigating the Environmental Impacts of Building Subsidence*  
Paul Thompson, Director, Marishal Thompson
- 11.25 - 11.40 *Coffee*
- 11.40 - 12.15 *A Realistic General Protocol for Investigation of Tree-Related Subsidence*  
Dr Giles Biddle, OBE, Arboricultural Consultant
- 12.15 - 12.45 Discussion
- 12.45 - 14.00 *Lunch*
- 14.00 - 14.35 *Councils – the root of the problem?*  
Peter Osborne, Director, TreeSubs.
- 14.35 - 15.10 *Planning for City Trees – Putting Subsidence in Context*  
Michael Lawson, Director, OCA
- 15.10 - 15.25 *Tea*
- 15.25 - 16.00 *Extending the Horticulture Link Project. Crown Reduction*  
Richard Rollit, Crawford & Co
- 16.00 - 16.30 Discussion
- 16.30 - 17.00 Tea & Disperse

**(Directed by Stephen Plante, The Clay Research Group)**

For conference availability: [enquiries@astoncpdcentre.co.uk](mailto:enquiries@astoncpdcentre.co.uk) Telephone Enquiries: 0121 250 3818  
Fax: 0121 250 3817 Website & Mailing Subscription: <http://www.astoncpdcentre.co.uk>  
Our conferences are intended to contribute towards the CPD requirements of the relevant professional institutions.  
The views expressed at the conference are personal to the speakers and are not necessarily those of Aston University.  
Conference Organiser: Dr M Sadeghzadeh, 07788 947858  
Please note the programme is subject to change without prior notice

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correspondence to: Aston CPD Centre, Birmingham Science Park Aston, iBIC, Holt Court South, Jennens Road, Birmingham B7 4EJ

Please reserve .....Place(s) at the course, (subject to terms & conditions) Subsidence: Topical Issues – 22.6.11

Delegate Name(s): ..... Company: .....

Address:.....

Post Code: ..... Email Address: ..... Tel: .....

Have you any dietary, access or other requirements? YES/NO if YES please state .....

Do you wish to be invoiced? (VAT exempt) YES/NO Purchase Order No: .....

Invoice address if different from above: .....

.....  
Cost £185 per delegate, VAT exempt, covering attendance, papers, lunch and refreshments during the day.  
(Cheques should be made payable to Aston CPD)