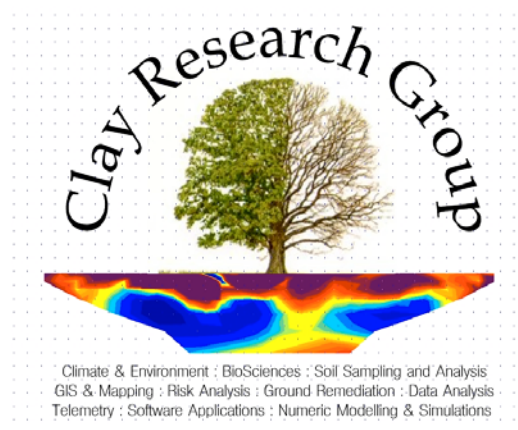


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RESEARCH AREAS

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



November 2011

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CONTENTS

- ⊕ SMD, UPDATES AND WALTHAM FOREST
- ⊕ THE CLIMATE DEBATE
- ⊕ RISK DISTRIBUTION
- ⊕ HIGH RISK POSTCODES + RISK MODEL
- ⊕ SOIL TESTS COMPARED
- ⊕ ALDENHAM WILLOW GROUND MOVEMENT
- ⊕ THE HEADMASTER'S HOUSE

UPDATE

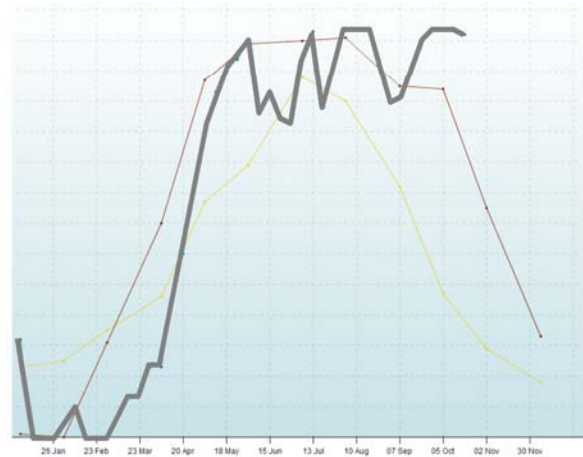
In this months edition we report on climate news from various research projects around the world. The Met Office are changing their delivery to reinforce the idea that their predictions are based on probabilities, rather than certainty, and are seeking to put their estimates into context.

Other groups are gathering temperature data from stations around the world, and using complex statistical techniques to deliver averages and trendlines from what can be wide fluctuations. One is reminded of the saying 'I have my head in the fridge, and feet in the oven, and on average feel about right'.

We reveal the riskiest postcodes in the UK, and interpret some soils data before catching up with the Aldenham site – the periodic signature of ground movement beneath the Willow and levels at the Headmaster's House following rehydration.

Please remember that articles and contributions are always welcome. For contact details, see below.

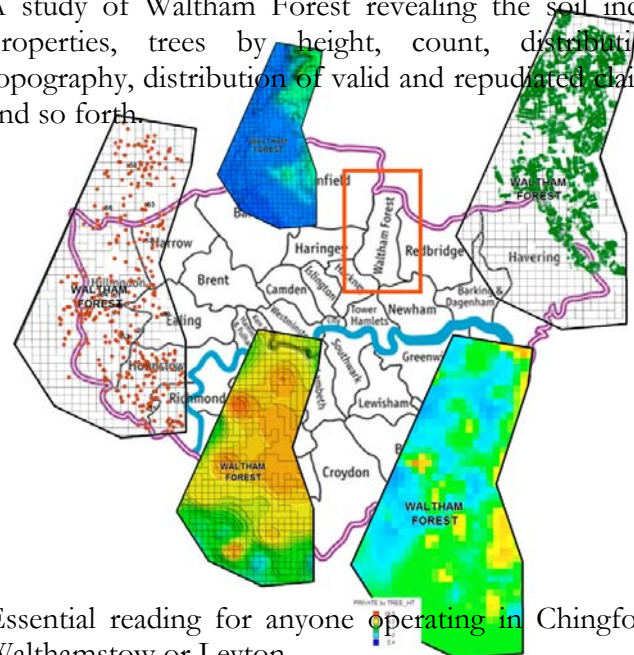
SMD & CLAIMS UPDATE



Climate continues to confound prediction and after a few dry weeks, the recent rainfall is starting to have an effect. Claim notifications have been high throughout October, and are just starting to show signs of decreasing.

NEXT MONTH – WALTHAM FOREST

A study of Waltham Forest revealing the soil index properties, trees by height, count, distribution, topography, distribution of valid and repudiated claims and so forth.

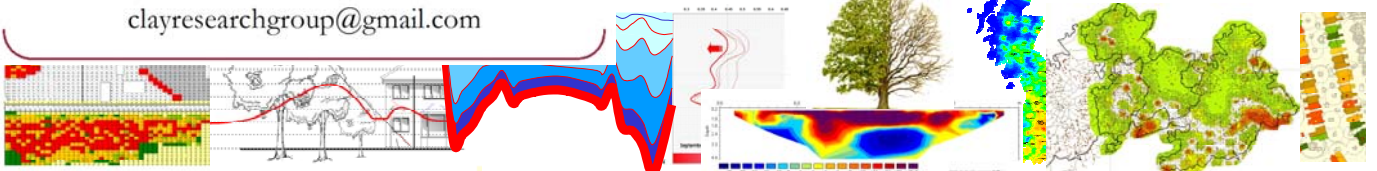


Essential reading for anyone operating in Chingford, Walthamstow or Leyton.

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CLIMATE NEWS

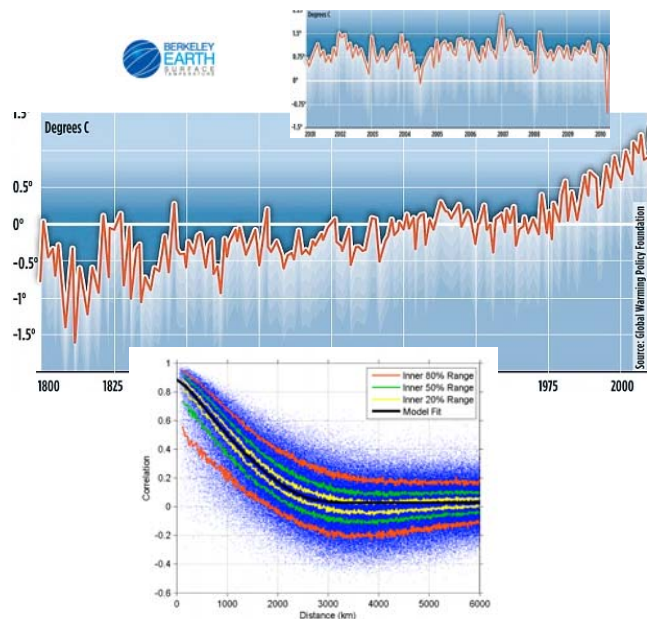
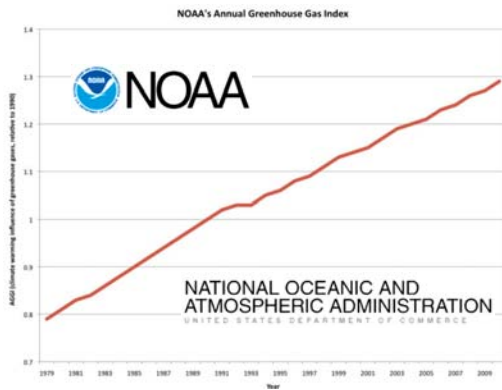
Particle physicists at CERN, the prestigious nuclear laboratory on the Franco-Swiss border, have been ‘shooting simulated cosmic rays into a cloud chamber to isolate and measure their contribution to cloud formation’ for the last few years. The cosmic rays ‘increase pre-cloud seed by up to a factor of 10’. They make the point that cosmic rays are not included in current climate modelling, and should be. The scientists feel that the human contribution to change is far less than was previously thought. Research is ongoing.

The UK Met Office are producing probability estimates of weather in the future, and will be stating ‘there is a 70% chance of rain, and a 32% chance of sunshine’, rather than ‘rain in parts, and some sunshine’.

In addition, there are plans to deliver a probability that any major weather event (hurricanes, floods etc) are linked to climate change.

Scientists at NOAA's Earth System Research Laboratory prepare the Annual Greenhouse Gas Index (AGGI) each year from atmospheric data collected through an international co-operative air sampling network of more than 100 sites around the world.

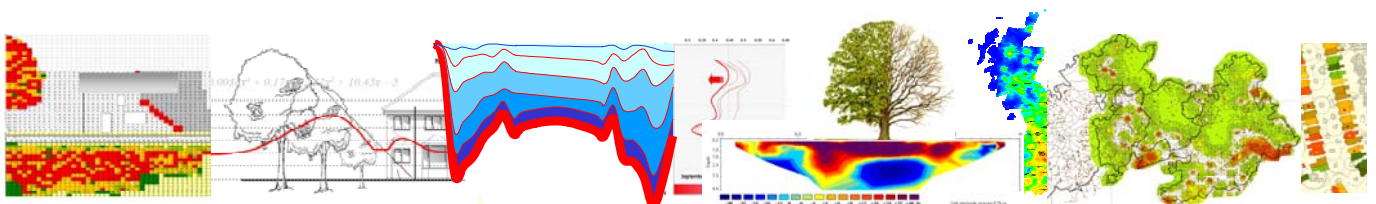
The Berkley Earth Surface Temperature project (BEST) report an increase in earth temperature of around 1 degreeC since 1950. See the graphs below.



They record a steady increase over time saying “global carbon dioxide levels rose to an average of 389 parts per million in 2010, compared with 386 ppm in 2009, and 354 in the index or comparison year of 1990. Before the Industrial Revolution of the 1880s, carbon dioxide concentration in the atmosphere was about 280 ppm.”

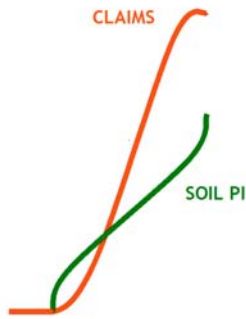
Little change has been recorded over the last 10 years (top right), and another graph (bottom centre), shows the distribution of readings before statistical analysis delivers the ‘model fit’ – the black line. The original paper and accompanying data can be downloaded from...

<http://berkeleyearth.org/resources.php>

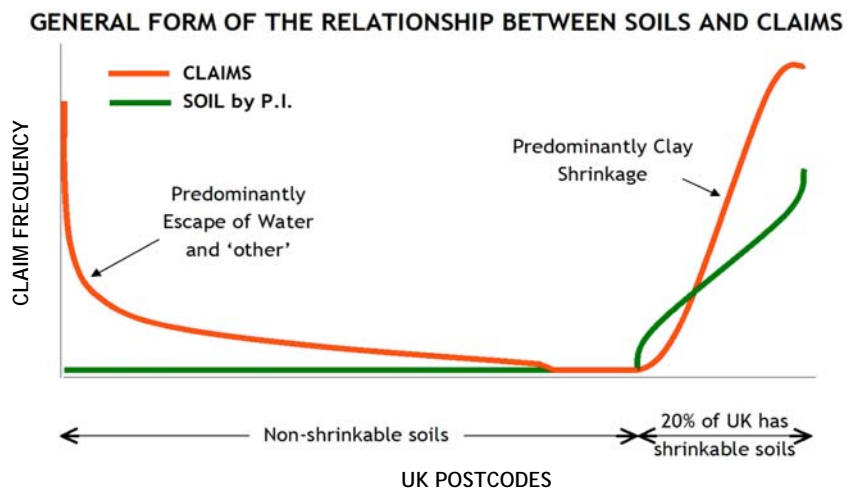


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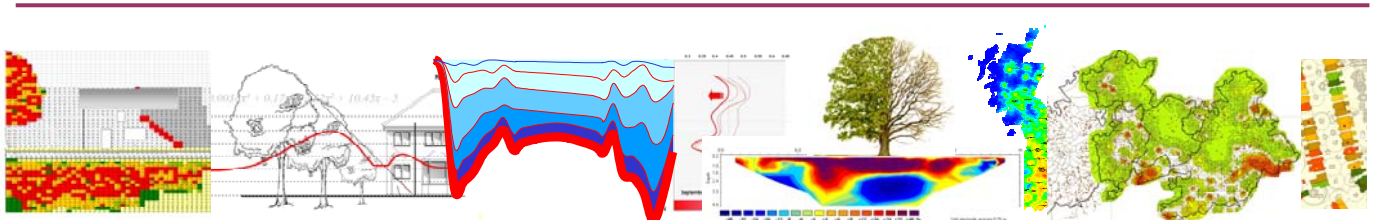
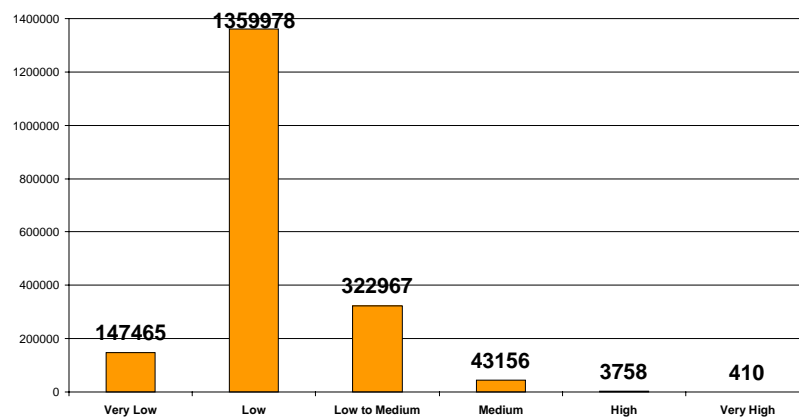
DISTRIBUTION OF CLAIMS AND SOILS BY POSTCODE TO DELIVER RISK.



The graph below illustrates the link between claims and soils, and in particular the general form of the relationship on clay soils. The risk of subsidence increases with increasing shrink/swell characteristics. The lower P.I. values represent drift deposits and the claim frequency reflects the risk presented by the Mercia Mudstone through to the more highly plastic clays of the South East.



When classifying the 1.7m properties in 10% bands, there are 1,359,978 houses in the 'low risk' category. In contrast, 4,168 fall into the 'high' to 'very high' risk category



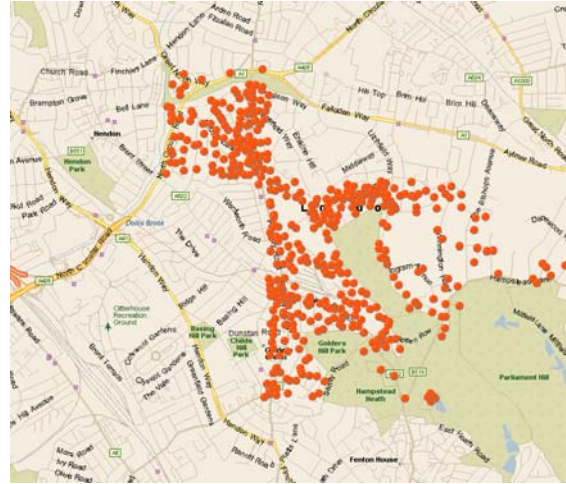
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HIGH RISK POSTCODES

“The riskiest road in Britain?” may be an eye catching headline, and the question might be ‘so what?’.

The CRG uses this sort of analysis to drive its Triage application, matching it with date of notification, weather, soil type and previous claims experience – how many of the claims received were valid, and how many were repudiated?

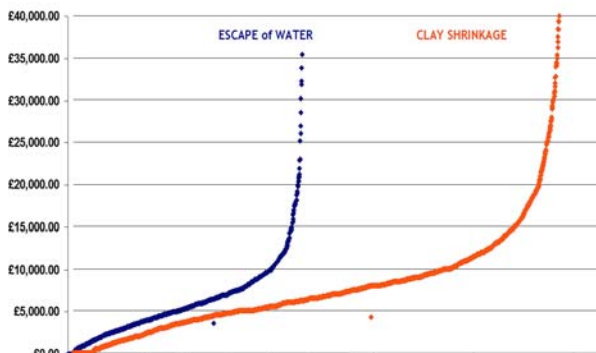
Add the tree database with modelled root zones, combine it with the description of damage supplied by the homeowner, and assess the combined probability of both causation and status – valid or repudiated.



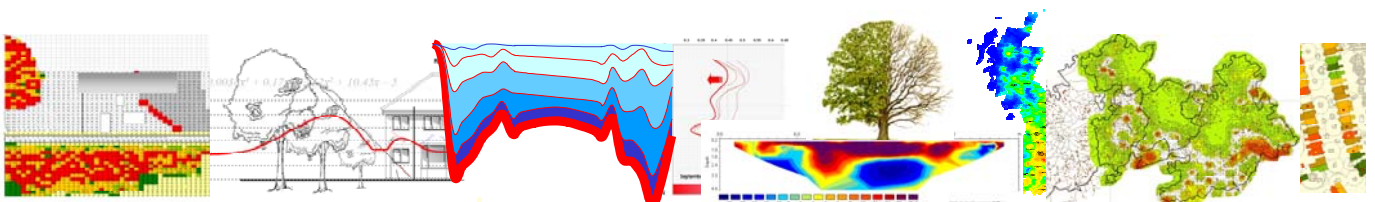
A high risk area of North London stretching between Parliament Hill and the North Circular. This sample from our database identifies NW11 6 as being amongst the high risk postcode sectors, along with adjoining areas, followed by parts of SE 22.

SUBSIDENCE RISK MODEL

As is always the case when analysing subsidence data, we are looking at a snapshot of an ever changing world. For example, the commonly used reference to 70% of valid claims being due to root induced clay shrinkage might be a snapshot of an event year in a certain location looking at a specific portfolio. To obtain this average it suggests that in some locations, in excess of 90% of claims may be due to root induced clay shrinkage. In others, very few.



Typical claim distribution by cost comparing escape of water (blue) with root induced clay shrinkage (red) from a sample of 14,000 claims. Clay shrinkage claims were, on average, around 20% more expensive than Escape of Water claims.



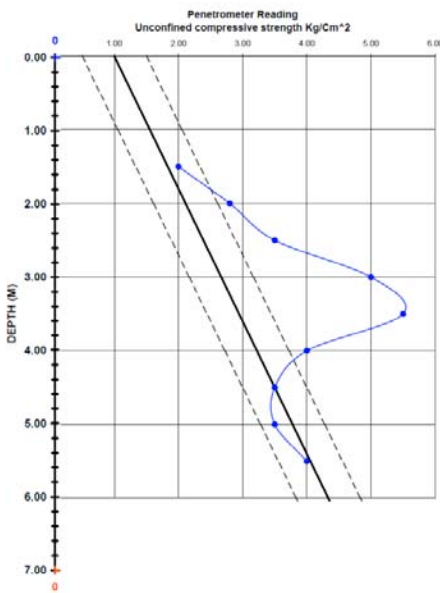
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SOIL TESTS COMPARED

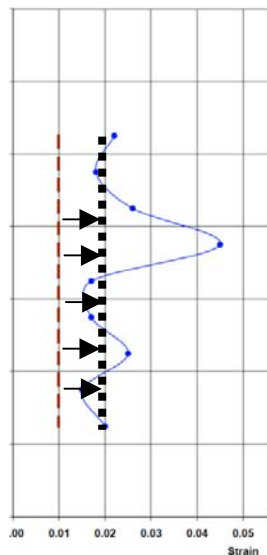
The following graphs have been taken from samples of London clay retrieved from a site in Hornchurch in Essex using a window sampler. The clay has a P.I. of around 50%.

They illustrate the practical issues surrounding interpretation, but also the broad agreement between them.

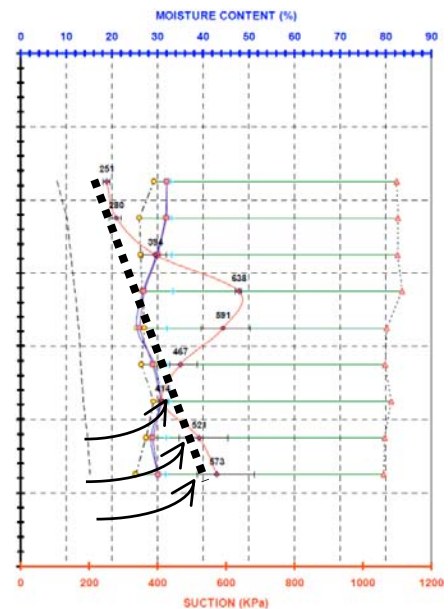
Each has a characteristic root induced ‘bulge’ at around 3mtrs bGL. The oedometer strains above and below the bulge determine the equilibrium moisture content, and the laboratory line representing remoulding disturbance has to be moved across to the right with the value of 0.02 being more likely.



PENETROMETER



OEDOMETER STRAINS



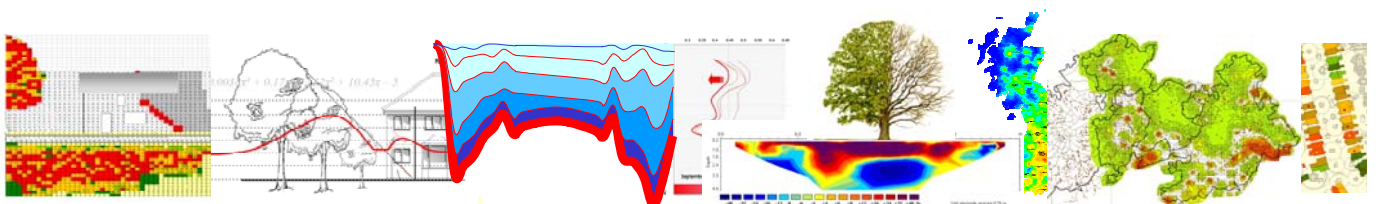
SUCTIONS & MOISTURES

Arrows on the oedometer and suction results indicate the required adjustment to the K_0 line to take account of the soil stress history and sample disturbance. This adjustment will significantly reduce any estimates of swell potential. The results of the penetrometer do not need adjustment in this example.

Similarly, the K_0 line on the suction graph would have to be re-aligned, to correspond with the upper and lower values. This significantly reduces the estimated swell on rehydration.

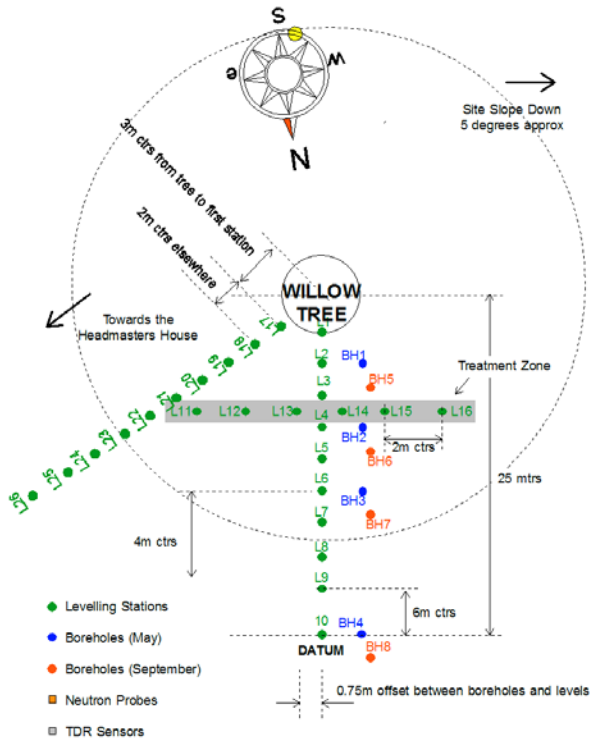
Whilst the moisture content comparisons with the PL tell a similar story, the deficit is much harder to detect, with a difference of a few percentage points.

From a practical point of view, the penetrometer offers substantial operational benefits. The data is gathered from site and is available almost immediately. The cost is nominal.



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ALDENHAM WILLOW GROUND MOVEMENT



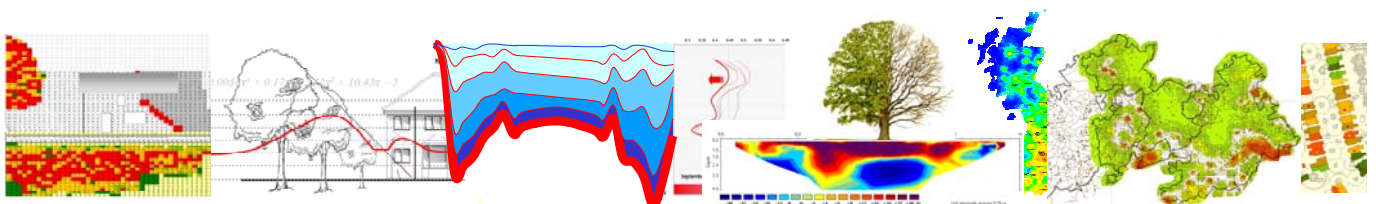
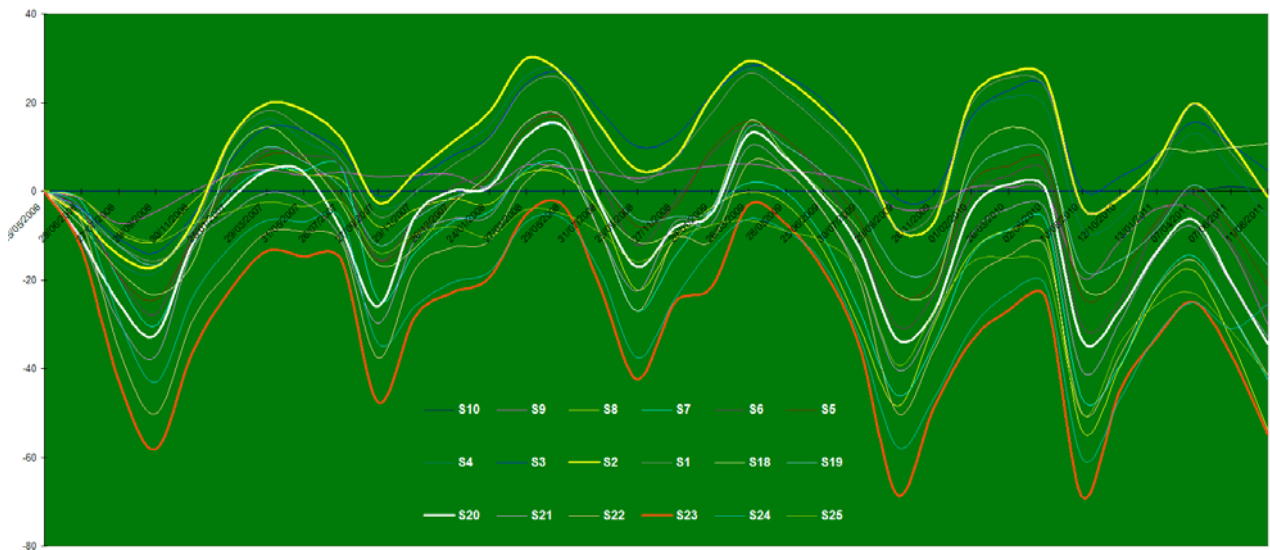
Below is the graphical plot of movement over time for each individual station taken from the site of the Aldenham Willow in North London. The location of the stations is shown, left.

The yellow line traces movement at Stations 1 & 2 (L1 & L2 in the sketch) nearest to the tree. Monitoring commenced in the dry spell of 2006. Upward movement (recovery) was recorded in ensuing and wetter years, with the stations rising above the May 2006 starting point.

In contrast, Station 23 (L23 on the sketch) is situated some 15mtrs from the trunk and has subsided and not fully recovered, suggesting the commencement of a persistent deficit.

The seasonal signature has varied in amplitude and with the weather, but has been remarkably constant between stations.

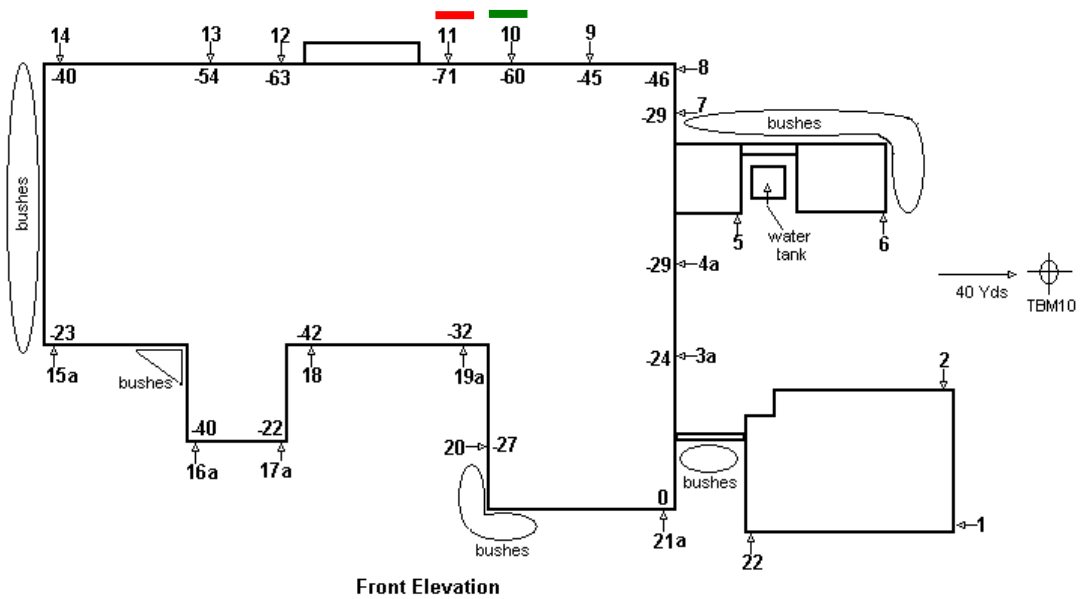
To illustrate this, Station 22 (L22) is plotted as a white line, and follows the bounding envelope of Stations 2 and 23 at around the mid-point.



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ALDENHAM HEADMASTER'S HOUSE

An update following rehydration last year. Stations 10 & 11 – the focal point of movement – were rehydrated and have remained stable since the work was carried out in October 2009.



Precise level monitoring - Graph 3

