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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Climate : Telemetry : Clay Soil : BioSciences : GIS & Mapping
Risk Analysis : Ground Remediation : Moisture Change
Data Analysis : Numeric Modelling & Simulations : Software

July 2015

Edition 122

The Clay Research Group

The Annual Subsidence Conference

Accredited CPD Course at Aston University

An excellent day and our thanks to Aston for hosting the event and to the speakers for their efforts in preparing and delivering presentations on a wide range of topics. Feedback forms suggest that the day was a success and a brief resume of topics are included inside this issue.

A thread ran through the day. Tony Boobier painted a picture of a future using data and technology in a more subtle way to improve our understanding of the human element to help us deliver more value at every level.

Mike Mortished and Sne Patel explained how their respective companies were tackling the day-to-day issues that homeowners, insurers and adjusters/engineers face. How do we remove conflict if we don't identify its cause? By carefully analysing the nature of calls and correspondence from homeowners they have reduced time wasted on unnecessary exchanges.

Tim Freeman and Ian Brett-Pitt outlined their new offering. An expert report with all of the evidence boxes ticked to resolve tree root nuisance disputes quicker and at less cost.

In terms of investigations and ground treatment, some might say the industry is broadly where it was 30 years ago. Measuring odd things now and again. Digging holes, sinking bores, testing soils in a variety of ways, some of which are poorly understood by the engineers involved. Paper reports (pdf at best), monitoring periodically. Prof. Ian Jefferson and Dr. Nigel Cassidy hinted at a new way.

Aldenham Willow - Precise Levels

Updated Graphs

GeoServ take readings every two months from the arrays in the root periphery of the Aldenham willow, situated in the rear garden of the Headmaster's house. The work is funded by Crawford & Company.

The first readings were taken in May 2006. See page 10 for updated readings.

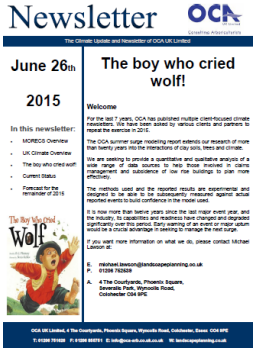
Peter Osborne

Personal Reflections

We asked Peter Osborne to provide his thoughts on the industry from his unique career representing the interests of both insurers and arborists. We are pleased to print his recollections (see pages 10 & 11) and to recognise his role in bringing groups together.

OCA Weather Update

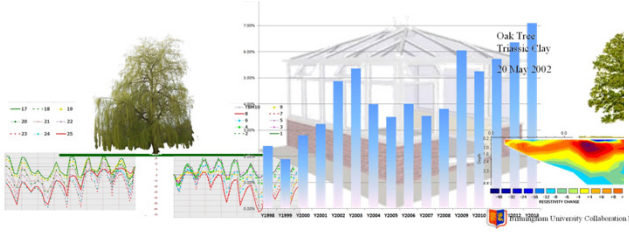
Event Risk Rated Moderate to High


Newsletter OCA

June 26th 2015

The boy who cried wolf!

Mike Lawson has produced an updated Climate Newsletter which is available for download from the OCA web site. Current forecast for an event year is rated moderate approaching high.



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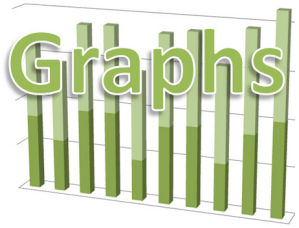
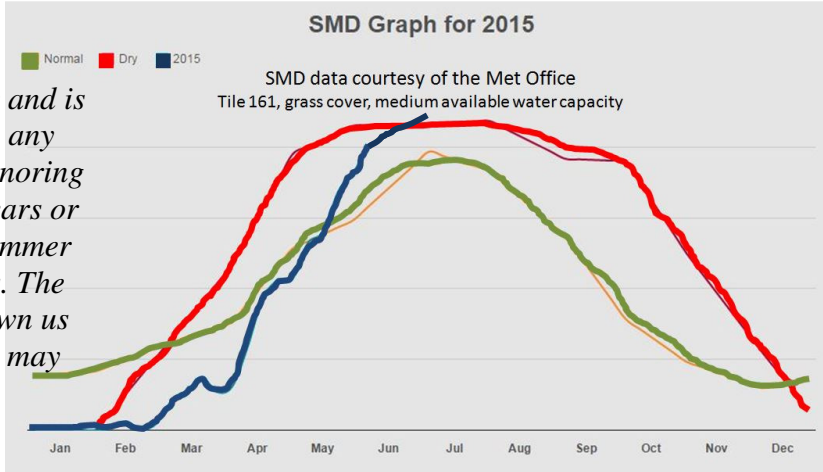
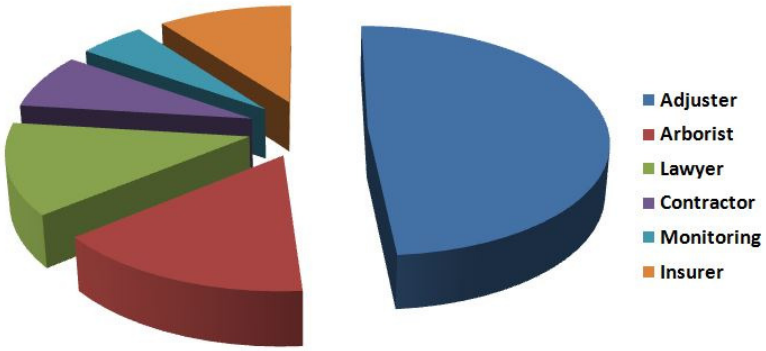


The SMD is rising sharply and is almost at peak value. In any other circumstance and ignoring patterns over the last 8 years or so, one might expect a summer with high claim numbers. The last eight years have shown us that intermittent rainfall may reduce the risk.

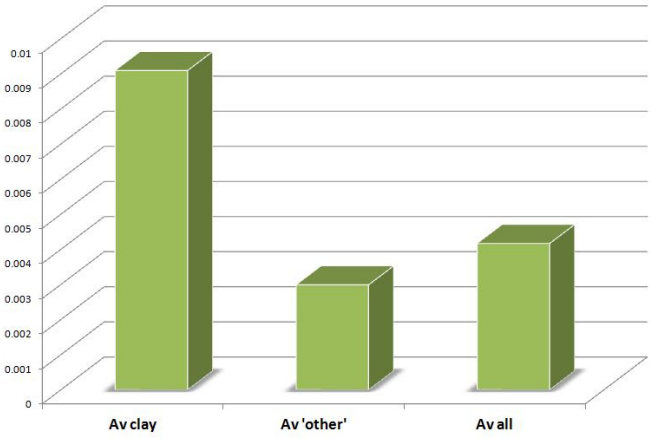


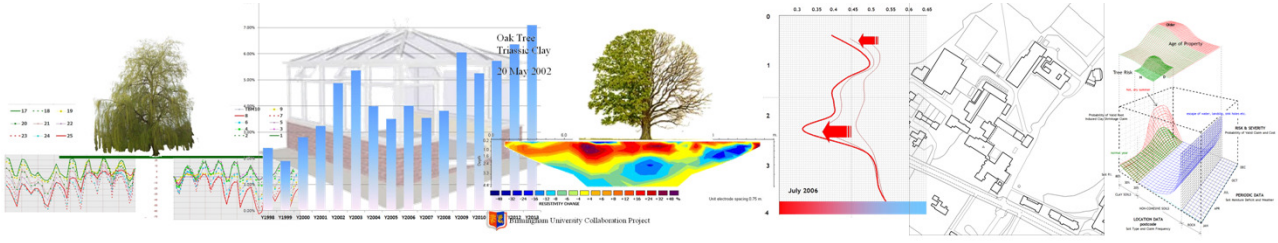


Attendance by interest group at this year's Subsidence Conference is shown left. The category 'adjuster' includes engineers, surveyors and claims handlers and accounted for nearly half of the delegates. Feedback forms gave a high satisfaction rating for the various presentations.

Average claim frequencies by soil type from our claim sample - not claims frequency for a particular year. Soils categorised as 'clay' (soils with a PI > 15%) and 'other' and then compared with the average for the UK - 'Average all'.

Clay soils in the range specified are 3 times riskier than 'other soils', and twice as risky as the UK average when they are included in the analysis.





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"THE FUTURE of SUBSIDENCE CLAIMS HANDLING"

Tony Boobier, WW Executive for Insurance, IBM

Tony gave a high level view of where insurers are heading with emphasis on the analysis of data to deliver greater value. This introduces us to the age of cognitive computing - using the output to improve our understanding of customers. Not just a binary 'yes/no', but refining our understanding of customer behaviours.

For example, what preferences do older people have when selecting an insurer? Current work identifies a rich spectrum ranging from the "security oriented individualist" to the "informed optimiser" with several shades in between.

Will life insurance providers adopt the use of telematics, following the example set by motor insurers with premiums based on lifestyle using 'live feedback' from iPhone type devices? The prediction is that "The Customer Experience will Dominate the Future of Subsidence" as we move to an "Everyone to Everyone Economy".

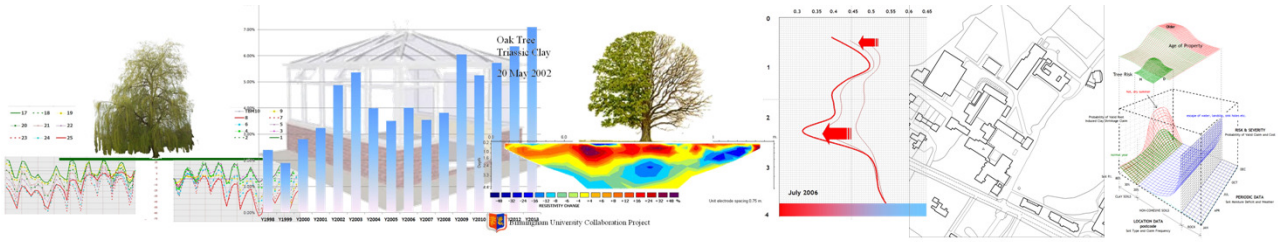
We can't do the talk justice in the space we have and fortunately Tony has kindly agreed to release his slides which can be downloaded from our web site. Select 'Monthly Newsletters' along the top row of tabs and download " Tony Boobier Presentation".

"TIME TO LET THE EVIDENCE DO THE TALKING"

Tim Freeman and Ian Brett-Pitt, BASE

The talk from BASE outlined a new expert service that was available to insurers and adjusters/engineers to tackle the more complex TP recovery claims against owners of trees that have caused damaged to the insured property.

BASE offer a range of expert services. For example, they review closed cases for adjusters and/or engineers to identify possible recoveries on a 'no win, no fee' basis. They offer a similar service as an extension of their monitoring service called "Monitoring Plus" where if, in the course of taking their readings they detect seasonal movement of say 5mm or more in the first three months, they are willing to carry out a file review and if they felt there was a reasonable chance of securing a recovery then we would offer our services on a no win, no fee basis.



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As we know, adjusters' fees are not recoverable, but those of an independent expert are, although they might be capped in sub-£10k claims issued in the Small Claims Court.

BASE have designed a service that includes as much (or as little) help as the adjuster/insurer requires. This might mean that the adjuster would continue to handle the claim, but BASE would provide the engineering input to see the claim through to conclusion – i.e. liaison with the tree owner, specifying repairs, administering the contract and negotiating settlement - if required.

STABILISING CLAY SOILS - RESULTS OF THE EKO TRIALS

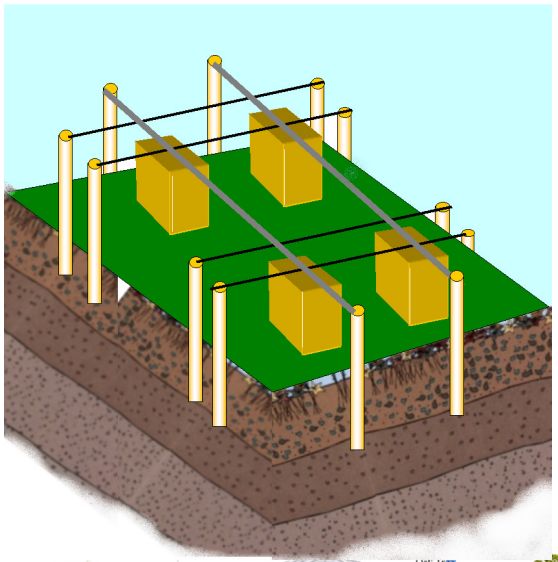
Professor Ian Jefferson

Ian presented pictures from the Aldenham Research Site where the test rig was set up comprising four concrete pads. The ground beneath three was treated using electrokinesis and a fourth acted as a control.

Vertical and diagonal rods were inserted into the ground and a charge passed between them, carrying chemicals to change the soil structure by reducing their hydraulic conductivity and strength. An increase in shear strength was recorded following treatment.

The work was the basis of Tom Clinton's PhD and his presentations at Aston over the last two years. We understand that Tom has handed in his thesis and has found employment in his field of interest.

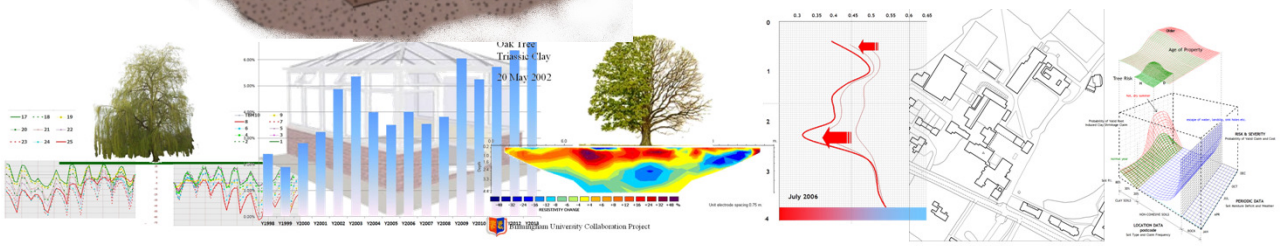
Ian's talk linked into Nigel Cassidy's later in the afternoon as we will see later.



A diagrammatic of the installation at Aldenham showing the four pad bases. The ground beneath three of the pads was treated and the fourth used as a control.

A scaffold rig supported on a shallow piled foundation acted as a datum and support for the extensive cabling.

The assembly was erected within the root zone of the willow tree.



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MEETING CUSTOMER EXPECTATIONS : Mike Mortished, Ageas Insurance

Mike explained in detail how Ageas view the claims process, describing the stages that have been introduced to meet the various challenges the industry faces. For example, homeowners are perhaps more aware of their rights and less reluctant to complain than they may have been in the past. The insurer faces compliance pressures from the FCA

We also found a number of areas where insurers could further increase consumer satisfaction. The key issues to emerge were:

- Recording and use of inbound claims calls
- Communication and ownership throughout the claim.
- Management of supply chains
- Consumer outcomes in long chains of delegation.
- The clarity of product documentation

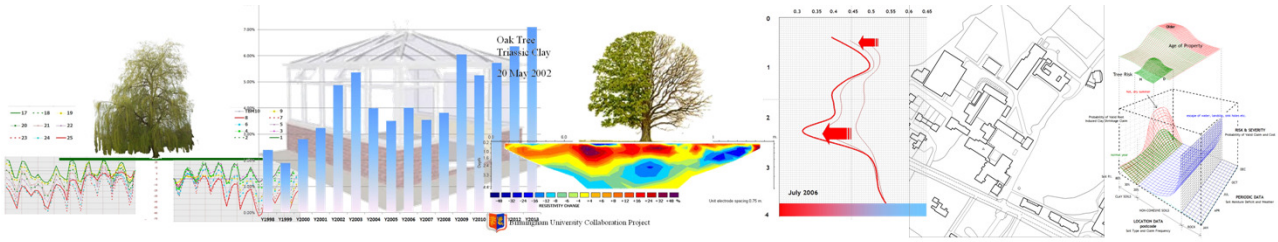
In summary, Ageas work closely with their supply chain and spend time to identify areas that could be improved. Rather than see the same problem arise repeatedly, they study claim progress to remove the areas where complaints arise, recognising of course that everyone is different and systems and processes can't be designed on a 'one size fits all' basis. To conclude, Mike said, "*Part of our process is to seek feedback, identify and understand demand and respond appropriately.*"

3D ELECTRICAL RESISTIVITY IMAGING. Dr. Nigel Cassidy, Keele University**.**

Dr. Cassidy has been working closely with Professor Ian Jefferson and Tom Clinton at the Aldenham site, measuring electrical resistivity of the soil in the vicinity of EKO treatment. He produced some interesting slides showing the variable change in moisture content at shallow depth between areas that were treated and the surrounding ground.

The EKO treated ground had a more stable moisture content. There was less change than beneath the untreated control pad.

From discussions before and following the presentation, the work at Aldenham could be developed for use in handling domestic subsidence claims and Nigel has already come up with the proposal to use the Raspberry Pi computer, linked to a very simple assembly of rods to image ground resistivity over time by linking into the homeowners Wi-Fi - agreeing a suitable payment to cover broadband costs of course.



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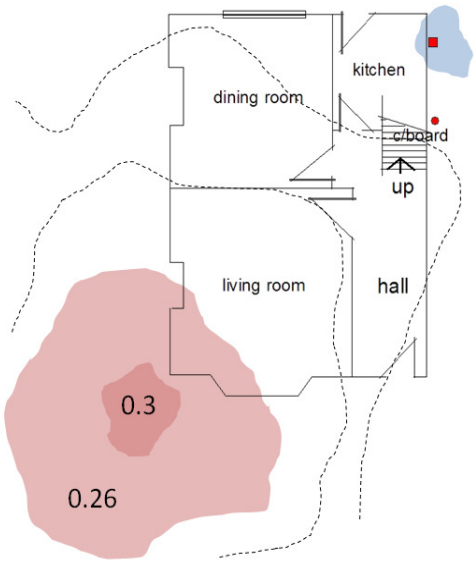
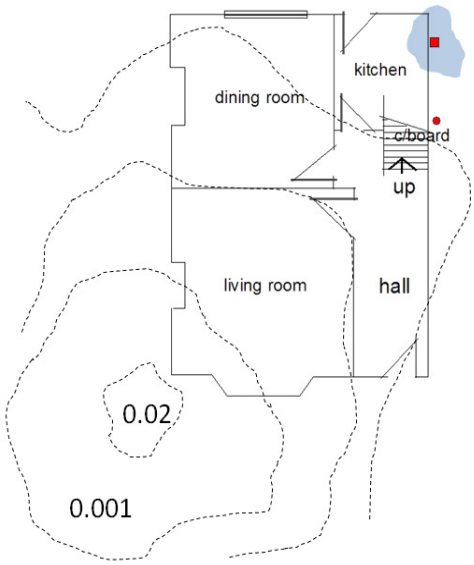
SUMMER RESISTIVITY PLOT



Tree roots dry soil in the summer, resulting in an increased electrical resistivity

WINTER RESISTIVITY PLOT



Soil rehydrates in the winter, leaving the soil with a reduced resistivity.

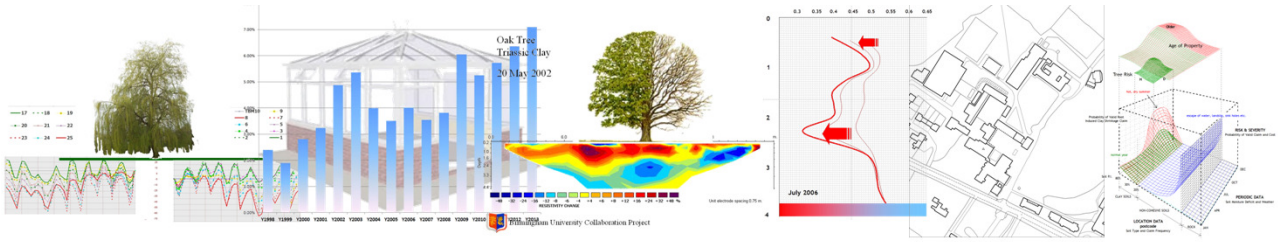
We take responsibility for the simplistic diagrams above, but they hopefully illustrate how ER would work in cases of root induced clay shrinkage. A low cost array around the building would obtain readings over time and plot changes in resistivity.

In this example, there is a tree situated close to the front left hand corner of the property. Traditionally we might sink bores in two locations, take soil samples and obtain information at a point in time, or see change over time which is probably more relevant. It also overcomes the problems with soil testing generally.

Additionally, it reveals the root footprint and would be valuable, adding to our knowledge of tree rooting - perhaps.

The issue we have to overcome - and something that will hopefully form the next stage in our research - is gathering data from a depth where mature trees exert the greatest influence - 2mtrs or so below ground level.

Apparently, the Raspberry Pi could also be wired to receive data from electrolevels, combining evidence of building movement and moisture change over time.



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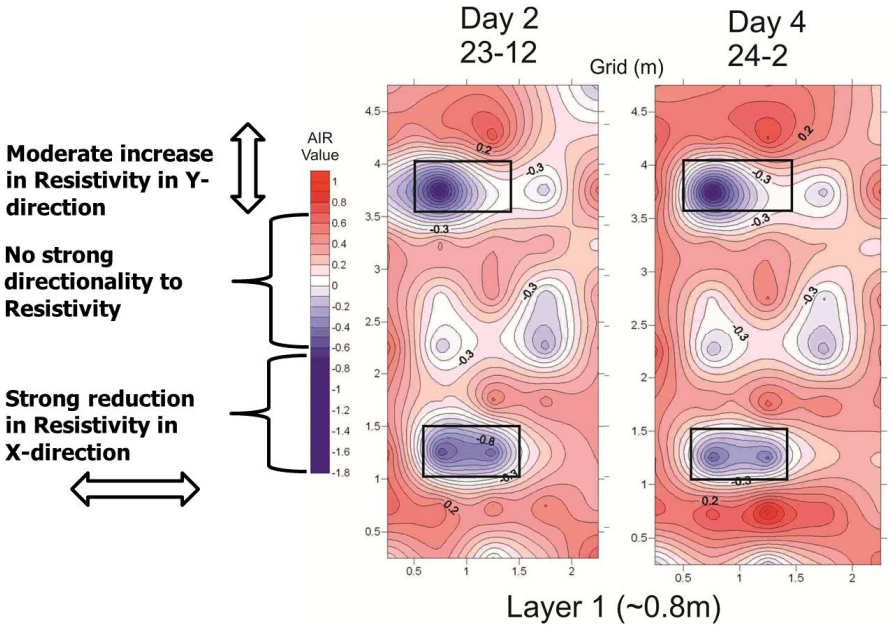
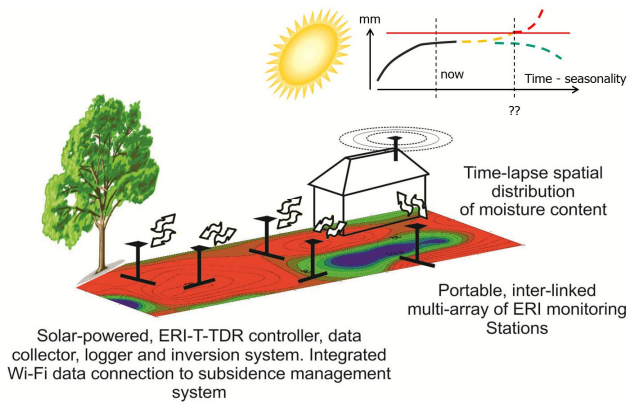
Electrical Resistivity Measurements from Aldenham

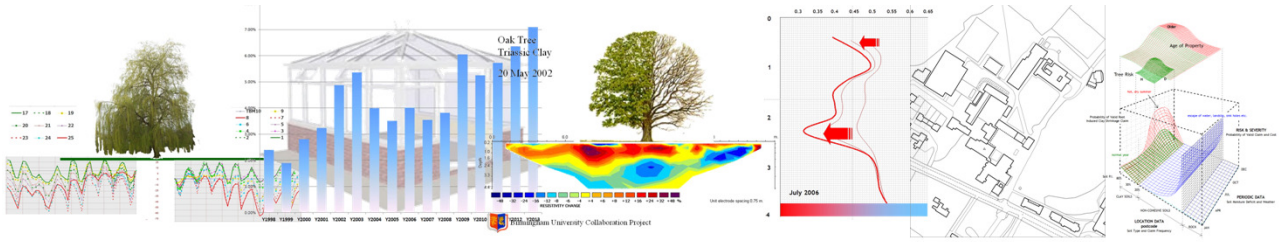
Nigel has provided the following images recording electrical resistivity from 800mm below two of the pads at Aldenham research site, situated in the zone of root activity of the willow.



He explains "The above slides show the change in resistivity as a function of its directivity. It shows the "**A**zimuthal **I**nhomogeneity **R**atio" or "AIR" and is a measure of the x versus y direction dominance in the change in the resistivity value. The side shows that under the plinth the resistivity has dropped and that the 'flow' of fluids causing the drop is predominantly in the X-direction (i.e., matching the electro-kinetic polarisation direction)."



Monitoring using the Raspberry Pi approach outlined by Nigel. Solar powered arrays gathering data on moisture change in the soil using ER possibly supplemented by electrolevels attached to the face of the building to correlate ground moisture change and building movement over time.



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WHERE DO WE GO FROM HERE?

Sne Patel, Head of Subsidence, Crawford & Company Adjusters (UK) Ltd.

Sne has been working alongside a range of clients to develop new working practices, some of which link in to Mike Mortished's approach of understanding exactly what is happening in the claims handling process and developing solutions for issues that arise instead of taking a formulaic "production line" approach.

An interesting talk both in terms of the presentation and discussions afterwards when Sne went into more detail.

His approach is to discuss the problems with the staff involved. They put their view and explain what they think would cure the problem. Sne takes this on board and develops solutions in partnership with his teams. This open and frank feedback improves the job satisfaction of the claims handler (they have been party to the solution) and delivers an improvement in service.

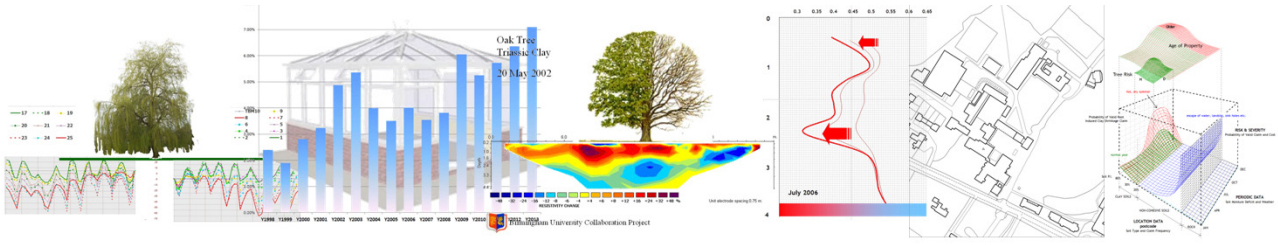
Another point of interest was the fact that sometimes, complying with various SLAs and standards to gather MI are the very obstacles that foil delivery. Staff ticking boxes and checking dates on systems can take as much time as doing the job.

They become system, rather than customer, facing.

This ties in with earlier talks from Tony Boobier and Mike Mortished. The IBM vision is that data is essential but using it wisely to understand the client's needs is central to success. Ageas are reviewing all processes to see where the obstacles might be and then addressing them.

One of the key findings from the analysis undertaken was that 80% of the calls received were generated by 20% of the process. For example, not explaining something properly in a letter attaching monitoring data or soil results produced more enquiries than would otherwise have been received.

By changing some practices, they reduced their workload whilst improving client satisfaction.



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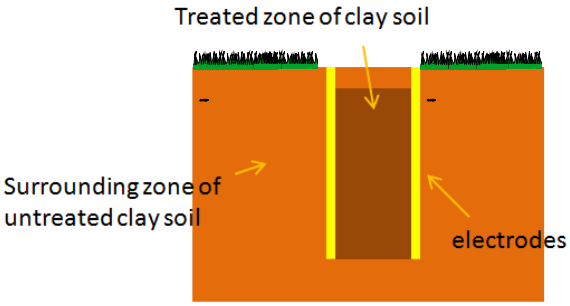
Areas for Further Research

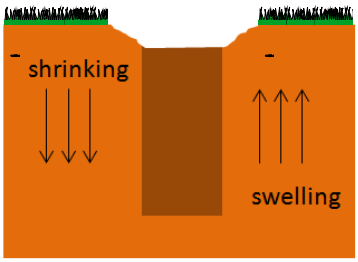
Ground movement data wasn't provided but may be available if Tom's thesis is published. Our queries are, first, was there any shrinkage associated with the treatment? Initial hopes were that the introduction of the chemicals in fluid form would avoid this, or keep it to a minimum.



Is there any shrinkage resulting from the treatment?

Second (bottom), can the treated strip of soil be stable when embedded in the surrounding untreated ground, with no slip plane/compressible material to separate them?

Third, would the method 'fix' heaving ground to avoid the need for piling? For example, if there is unexpired heave, could the treatment stabilise the ground sufficient to warrant superstructure repairs alone?

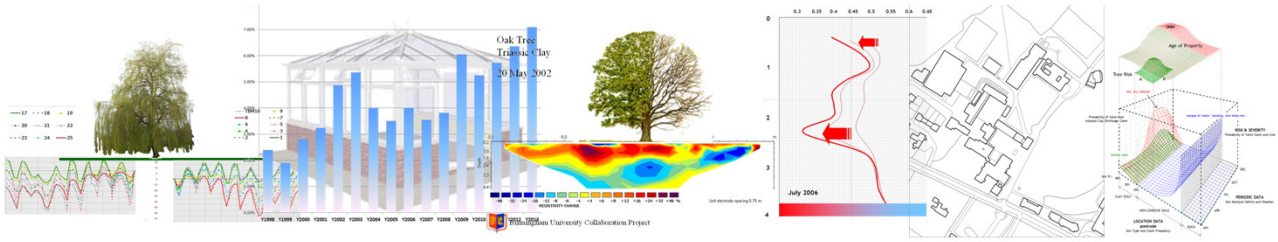


Can the treated zone be 'stable' when surrounded and encased in a shrinking and swelling soil with no slip plane?

EKO treatment is of course already in use commercially to stabilise landslips by increasing the shear strength of the soil and reduce water content.

Precise level monitoring of adjoining stations plotted seasonal movement. Ground movement data from the pads and in the vicinity would have been interesting. Finally, the trials at Aldenham reflect treatment at fairly shallow depth, whereas the influence of mature trees can extend to 4mtrs or so.

Turning now to the ER work, the readings at Aldenham were also taken at shallow depth. Can the method be used to take readings from 1.5 - 2mtrs below ground - the depth of peak desiccation when mature trees are involved? Also, could the system detect wetting from leaking drains? What do the resistivities mean in terms of moisture content? Can they be calibrated to relate to absolute moisture content, or is change alone sufficient for our needs? At Aldenham, are we satisfied that the resistivities aren't a function of the concrete pads and/or interference where ground may have shrunk away from them?



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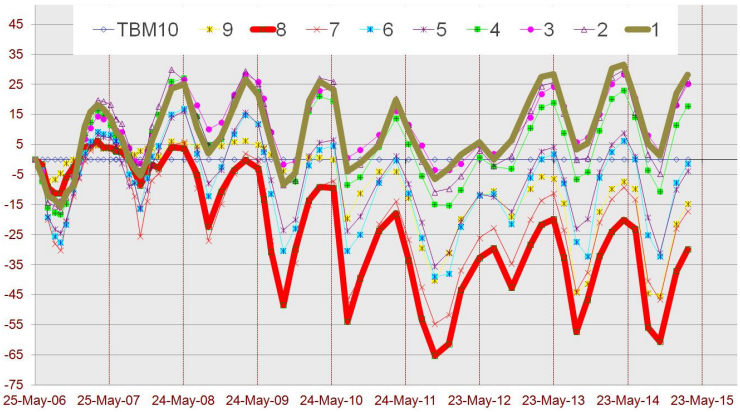
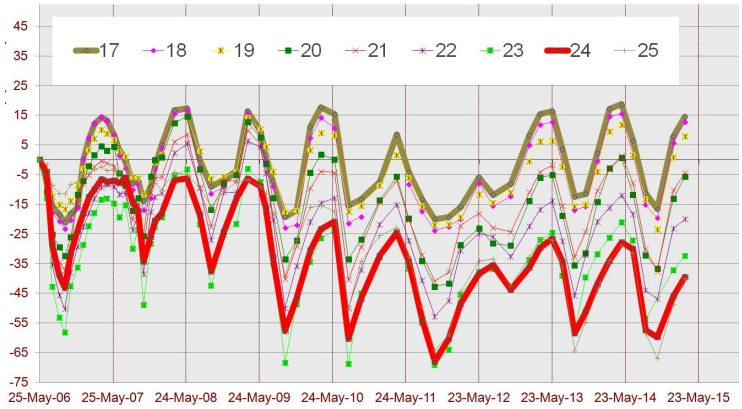
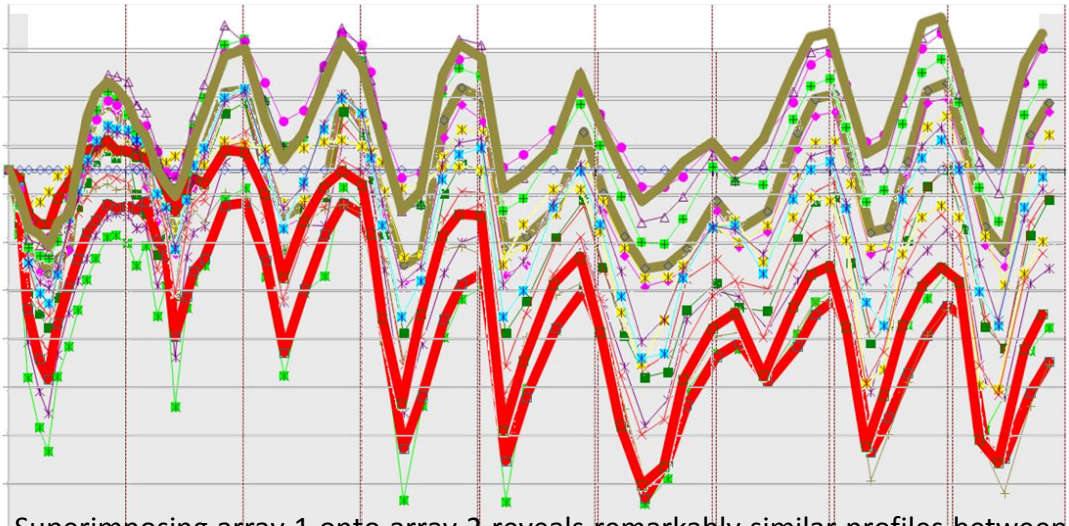
Aldenham Willow Levels - Update



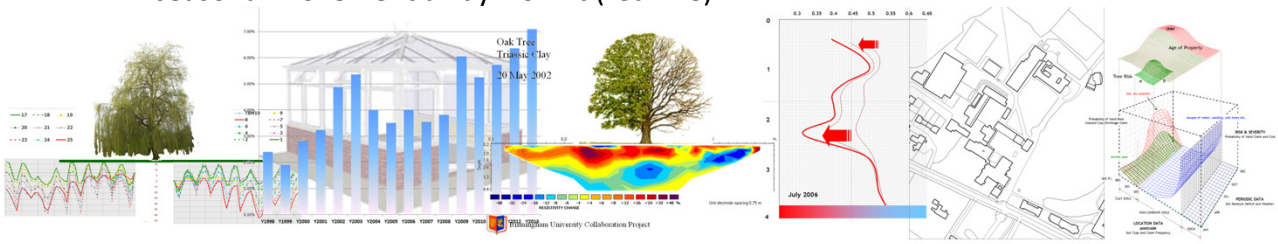
Precise levels taken from the Aldenham willow stations, commencing May 2006. Left, readings along array 1. Station 1 is closest to the tree and station 9 is furthest away. A persistent deficit has developed at the root periphery with some recovery closer to the tree following heavy rainfall in 2012.

Readings along array 2 reveal a similar profile with root activity at station 24 (towards the periphery of the root system) drying the ground and a more normal pattern of seasonal movement closer to the tree.





Superimposing array 1 onto array 2 reveals remarkably similar profiles between stations close to the tree and towards the root periphery. Array 1 shows slightly greater recovery closer to the tree (green line) and a greater amplitude of seasonal movement away from it (red line).



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Peter Osborne - Reflections

Peter has been reluctant to speak at recent conferences but we have managed to persuade him to put together his thoughts relating to his extensive experience in the field of insurance and root induced subsidence.

Although it may seem that little has changed in tree root claims, that is not necessarily the case.

When I first became involved with tree-related subsidence claims it became apparent that the very important person in such claims was the Council's tree officer, but the amount of direct contact between us (claims handlers/liability insurers) and them was minimal. Decisions were being made by the tree officer, the impact of which was not always appreciated within the Council.

Therefore I set about getting to know them. It soon became apparent that the understanding of the technical evidence supplied by the claimants varied considerably, so I addressed that aspect.

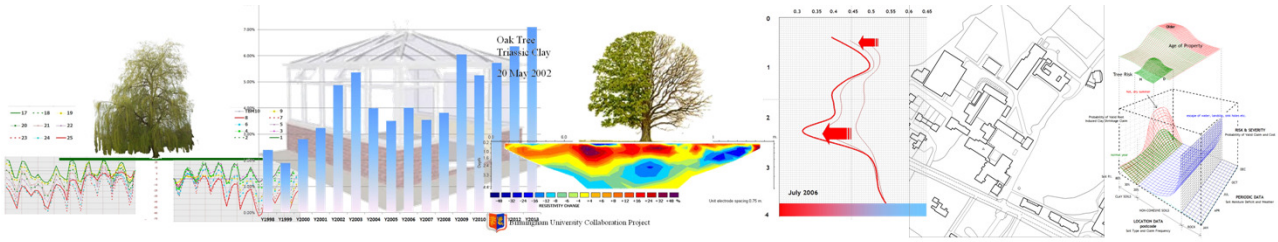
One benefit from that was that I began to know the tree officers and this helped considerably when dealing with some difficult decisions that needed to be made. 2003 was a subsidence event year and this was when insurers' arboriculturalists had a major impact on the handling of these claims in that just for about every claim that was made, their report would ask for the council tree(s) to be felled. Because of the number of claims received in that time this created a strong reaction from many tree officers, which to some extent is still felt today.

What was contentious then, and remains the case now is, “Does pruning work?”.

From a purely non-scientific basis my view is that in many cases pruning must work. Otherwise where there has been a claim and the tree was reduced and maintained, but remains within the zone of influence, and further damage does not occur, then pruning must have worked.

An obvious aspect that has changed is a better understanding of each other’s situation shown by working together on the Joint Mitigation Protocol and involvement in the Subsidence Forum.

A change from crack monitoring to level monitoring has been very useful in pin-pointing exactly the way a building is moving, allowing more targeted tree maintenance to take place.



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The law has been a contention for many years – it still seems illogical that tree-root damage is within, in the main, the tort of nuisance as with noise, smoke etc., the effects of which are immediately apparent and can be stopped before any real damage occurs, whereas we only know tree roots have caused damage when the damage appears.

Berent v Family Mosaic Housing has addressed that point to some extent.

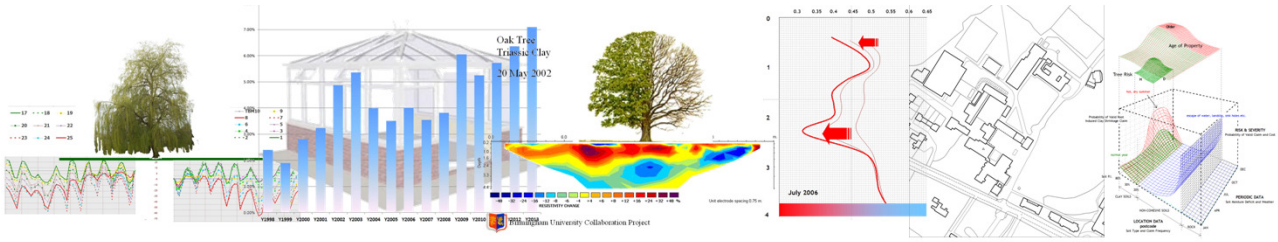
The involvement of solicitors before any dispute has occurred has been contentious and has resulted in money being taken unnecessarily from the public purse.

One topic on which I was pleased to stretch myself was in putting the Council's view-point on subsidence claims – whether this be speaking at Post Magazine or Aston conferences, submitting articles to Post Magazine, being quoted in the Guardian - I tried to bring some humour to such a dry subject.

The thing I have most enjoyed is meeting many people from the claimant's side who were willing to accept I had a right to my view even if they did not accept it, such as Graham Rex, Neil Curling, Mike Duckworth and Martin Holmes; also those from the defendants side John Parvin (although he had a dual role), Pat Dutson, Andrea Plucknett, Nick Bathurst, members of the Subsidence Forum executive and many tree officers. On a personal note Steve Plante, along with others who encouraged me when I was ill.

Peter Osborne in good form at the 2011 AGM of the Subsidence Forum, held at the BRE in Garston, Watford.

Peter pointed out that the meeting was attended by the same people every year and asked where the new blood was coming from. Succession planning is a big topic at the moment as we know. The same point was made by Sne Patel at this year's Aston conference.



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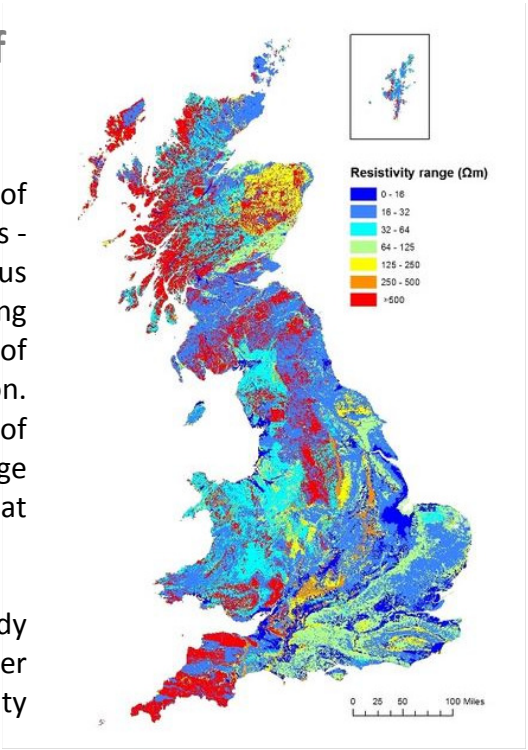
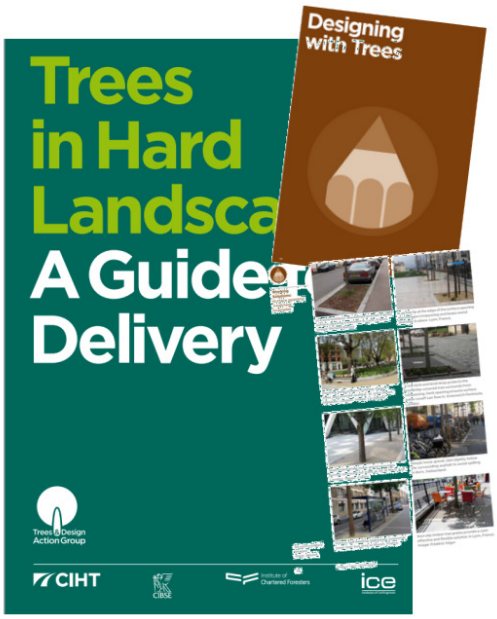
British Geological Survey map of Electrical Resistivity

The BGS have produced a high level map of electrical resistivity for the various geological series - see right. The map is part of their DiGMap-Plus range which cover numerous solid and outcropping geologies. On their web site they describe ways of gathering data using less formal instrumentation. "ALERT permits the use of arbitrary arrangements of electrodes, and enables the collection of very large measurement sets that can cover extensive areas at high data density."



They also predict the future as seen by Dr. Cassidy when they say "These advances (in computer power) should make 3D survey optimisation a reality in the near future."



Tree Design Action Group

TDAG offer a wide range of publications offering guidance and advice as well as a view of future planning and strategy at their web site … www.tdag.org.uk.

We note their comment in A Guide to Decision Makers "Assessing the overall canopy cover in an area might be based on field survey work via visual crown size estimates. Canopy coverage can also be estimated remotely using geographic information system (GIS) and aerial or satellite images to manually or automatically map tree crowns."

The article also recommends that "All efforts should be made to ensure that the local tree survey results can be used in the corporate Geographic Information System (GIS). This means that data on trees and canopy cover can be analysed spatially and in combination with other datasets, which is particularly helpful in understanding needs, benefits and value from trees."