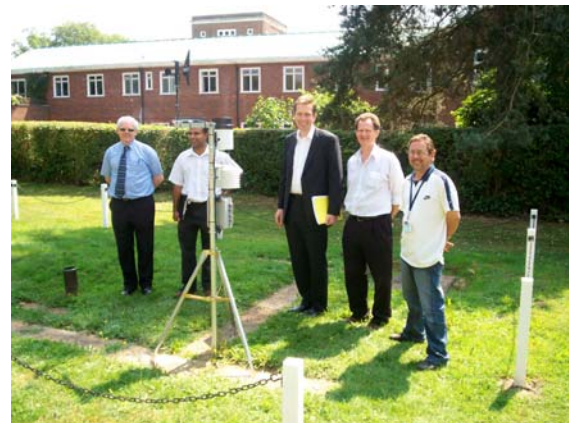
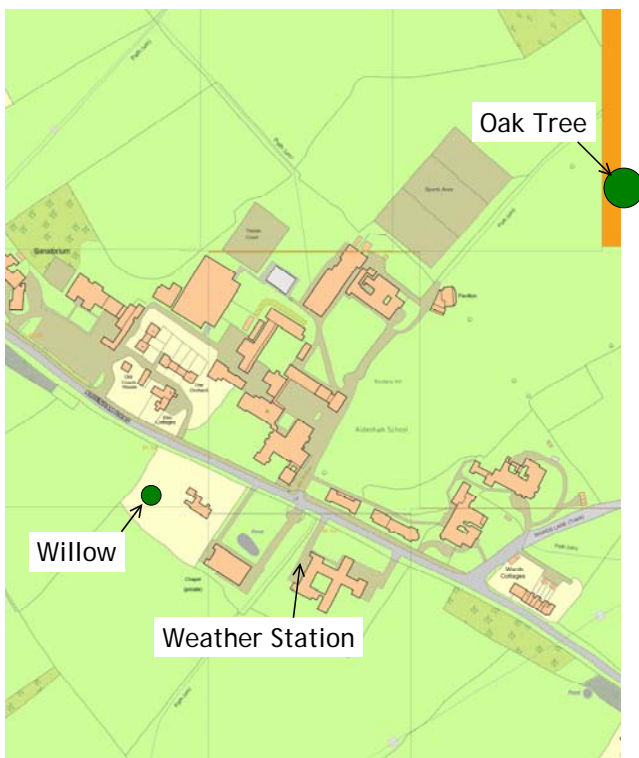


The Site

This is the Aldenham site showing the location of the main features. The Oak is to the north east, on the playing fields. A level area with trees either side, but within its own root zone.

To the south west we have the Willow, situated in the garden of the Headmaster. This site slopes down about 10 degrees to the South West.



This is the weather station - it was erected at the beginning of the week and should be wired to the web very shortly. Our thanks here to Marishal Thompson for meeting the cost and Neville Tomblin from Aldenham School who helped to put the pieces together prior to erection by MatLab.

Aldenham are the local weather station for the Meteorological Office, so the data will be put to good use. The idea is it will help us understand the link between weather and ground moisture with the hope of building an 'early warning' station for insurers in the longer term.

From left to right we have John Ford (GAB), Cyril Nazareth (project leader form InFront Solutions), Richard Rollit (R&D Manager, Crawford & Co.), John Heuch (arboricultural consultant) and Neville Tomblin from Aldenham.

John is testing his radar imaging device (see below) in the hope of tracing roots without digging lots of holes. He has imaged the Oak tree site and we may see something in the next edition.

The weather station is situated on level ground adjoining Kennedy House.

The soil is a highly shrinkable clay, P.I. 55%, but variable across the site.

Cyril Nazareth

Cyril is the project leader for The Clay Research Group and bringing everything together at Aldenham.

If you would like to visit site please make arrangements with him. His mobile is 07793 019 703.

Visits have to be scheduled at specific times to avoid disrupting the school activities. We try and arrange level readings etc., for the last Thursday of the month.



The radar-emitting device is housed in a cradle running along the ground, and supported by the tricycle. Roots appear as bumps in the horizon on the computer screen.

Contributions Welcome

If you have any suggestions, thoughts or proposals please contact us. Ideas on how we might extend the research, thoughts about what we might be missing, or simply suggestions on how we might do it differently to greater benefit.

A New and Different World

The gentleman below is an adjuster who has adopted the new technology, and sits back knowing things are happening day and night, 365 days a year, whether he is there or not. He is using telemetry to gather data.



The chap below still does it the old way. No, don't laugh. There are still people who like sending suppliers to site every few months, disrupting the homeowner - when they turn up of course. They don't like to use the web.



Which do we trust to handle surge? The picture tells the story. The chap below can't. He doesn't have a hope.

It's no good scratching our head hoping for a miracle. It won't happen. Lets plan for surge.

Use telemetry. Job done.

Precise Levels

~ early readings ~

The levels have provided useful discussion material and we will explain why.

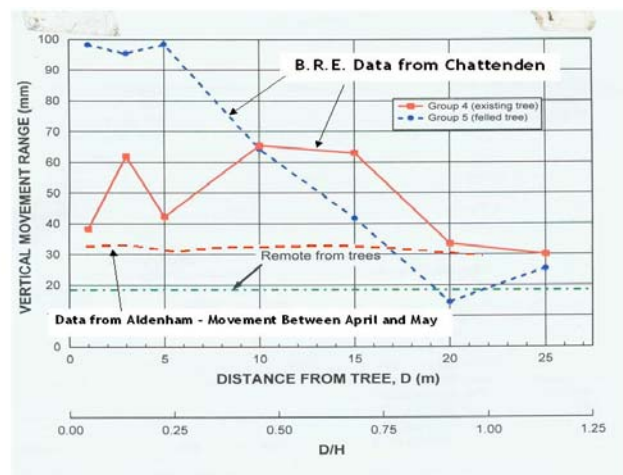
Mike Crilly carried out some work at the BRE research site at Chattenden in Kent. It had mature trees and soils with P.I. of around 50% or a little more. Identical circumstances.

At Chattenden they had Poplar trees, and we have an Oak. Our soils investigations (see extract on following page) show a persistent moisture deficit near the Oak, and we will publish more data on this shortly.

Anyway, back to the headline.

Precise levelling revealed modest rehydration between April and May. Although the tree was coming into leaf, the ground was still rehydrating following rainfall.

Now compare the readings from Chattenden (solid red line) and Aldenham (red dotted line). Amazing correlation.



The amplitude reflects the fact we only have one months readings at Aldenham, but the form is almost identical.

The data elsewhere is less clear, but it is early days and we were encouraged by the correlation we see here.

For clarity, the tree is to the left on both images, and movement reduces with distance. The periphery of the root zone is to the extreme right.

Aldenham is Swell

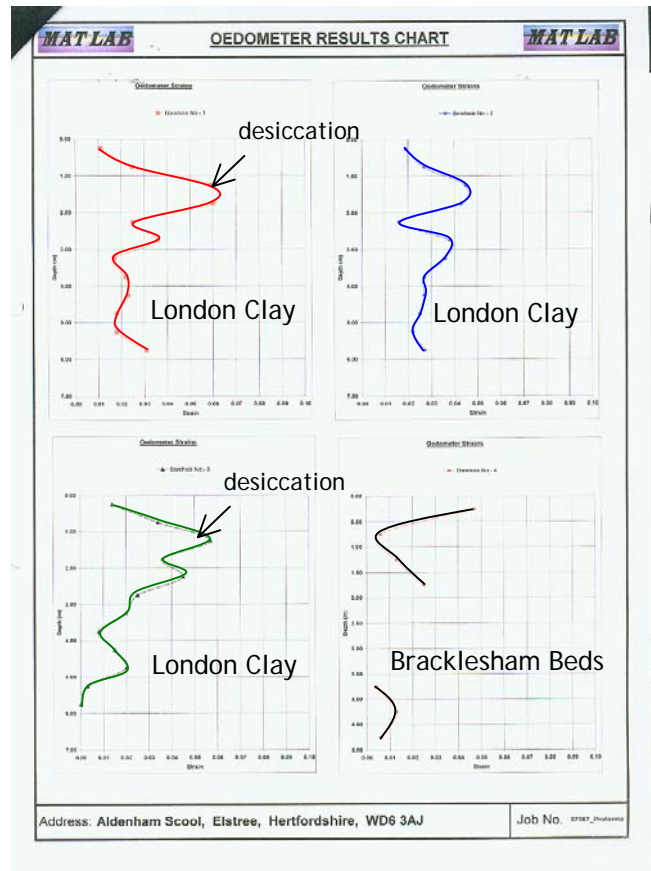
The initial results are in and we are happy to circulate in full to anyone who is interested. The laboratory have recorded a persistent moisture deficiency in several locations.

The results relate to boreholes sunk in April/May, before the trees have come into leaf, and yet we see strains of 0.06 or so, peaking at around 1.5 - 2mtrs bGL.

We see some of the geological oddities of the site, recording sand strata and so forth, but nothing out of the normal range for London Clay.

Most encouraging of all is the fact we have evidence of drying in the ERT readings where we have a swell potential.

The next few months should be interesting, and we have the base line survey of the levelling stations ready for comparison purposes going forward into the summer.



To validate the LiDAR imagery we have used aerial photographs from 1996. We are comparing two worlds, 10 years apart.

There were more trees on the aerial pictures from 1996, and yet most practitioners wonder if Councils ever remove them. Well, yes they do is the answer. And lots of them as our site visit revealed. 'Missing' trees are circled in yellow on the Harrow map.



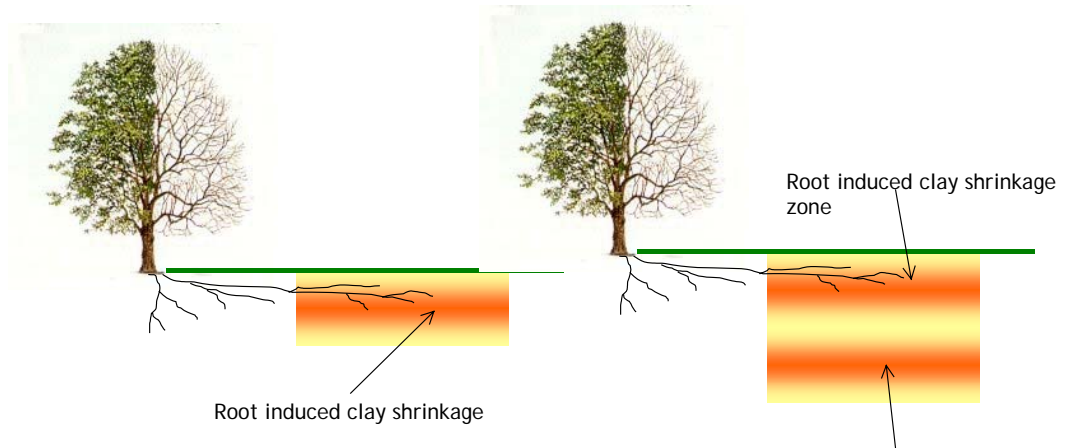
Interestingly, many of the houses 'behind' them show signs of repair. Repointed bay windows. New rendering. Replaced garden walls - see picture below, left.

Evidence of the trees existence was provided by neat repairs in the tarmac pavement and new kerbs in some cases.

So the answer was yes. LiDAR is excellent at detecting trees and because it is digital information, we don't have to worry about measuring anything. Let the system do it.

OSMOTIC POTENTIALS

Imagine raising the osmotic potential of the soil at depth to a level where it competed - successfully - with the tree for the available water. The picture on the left shows the normal situation. Tree roots depress the water table causing clay shrinkage.



Possible Treatment Technique

Introduce a zone of increased osmotic potential in the soil to resist the influence of tree roots.
The zone to below the influence of roots.

From our studies over the years it seems the osmotic potential exceeds the matrix suctions in some soils, in their naturally occurring state. Estuarine clays are a good example, and in some cases we have come across what we term 'high linear suctions' where the osmotic potential masks the matrix using the filter paper technique. This is a failing of the testing technique, but it did get us thinking.

When we have used the suction probe, the matrix potential has been quite low. Part of our research involves looking at this again, and trying to get the tree to express it's genetic response earlier to cope better with the reduction in water uptake by improved stomatal control.

NEUTRON PROBE

A neutron probe is a device used to measure the quantity of water present in the soil.

Typically it will contain a pellet of americium-241 and beryllium. The alpha particles emitted by the decay of the americium collide with the light beryllium nuclei, producing fast neutrons. When these fast neutrons collide with hydrogen nuclei present in the soil being studied, they lose much of their energy. The detection of slow neutrons returning to the probe allows an estimate of the amount of hydrogen present.

Since water contains two atoms of hydrogen per molecule, this therefore gives a measure of soil moisture. (courtesy Wikipedia)

This is the probe. It is lowered down the access tube and counts the actual water molecules before being retrieved and safely locked away.



Southampton University own the equipment and take the readings from a digital box.

GeoServ

Tim was extolling the virtues of precise level monitoring at Aston, and who can argue with him? It is the only method of finding out if the foundations are moving. Everything else is guesswork.

Forget crack monitoring. Suctions and strains simply imply things. We are sure there is desiccation beneath a great part of London, but it doesn't always mean there is subsidence damage.



Tim also pleaded for everyone to stop using the old "0.4 x LL" and so forth. Definitely. Please stop it.

He has graphed the sort of movement that triggers various responses from the several thousand case histories he has been involved with. Most of the movement simply warrants crack repairs. He thought values in excess of 35mm or so might warrant a more serious review.

It would have been good to have the base line distortion of course, to see the level of movement that had occurred prior to commencement of monitoring.

For example, had the building dropped 30mm prior to the onset of cracking, and then Tim was recording 35mm in the monitoring term?

The CRG are going one step further in researching tilt sensors to gather high quality data every hour of every day - if that is what you want to do. You can ask for one reading a day if you prefer but it fits in with the theme of the day quite nicely.

Hilary Skinner

Hilary had conducted a review of the various research projects and explained that the work of the CRG was probably the most pertinent in the sense of being applicable to the industries needs.

She urged everyone to "join in the fun" and register using our web site at www.theclayresearchgroup.org

Richard Rollit

Richard acted as chairperson for the day and outlined some of the problems companies face when introducing new technology. As process and R&D manager he is something of an expert in this area.

Unfortunately, it isn't quite 'plug and play'.

Staff need to be trained and the benefits explained. Many feel outside their 'comfort zone' and resist change, seeing it as threatening.

The message was, it takes time and patience, training and lots of goodwill. All of that said, there are huge benefits for companies that move forward.

The big threat is staying inside the comfort zone and seeing the world go by.

TREES

Our work with Addressology has revealed several interesting facts, some of which you will already know from previous editions.

First, trees grow quite slowly in the urban landscape, and we have seen average growth of less than 100mm a year. Of course we don't know the species, but some don't appear to have grown at all!

There are 170,645 Council trees on shrinkable clay soil within influencing distance of a property. This compares with 1,256,330 trees in private ownership on shrinkable clay soil, in influencing distance.

There is no evidence that trees on the south or north facing side of the street represent different risks, or that corner houses are a problem. The average tree height is around 7.5mtrs and the tallest is 32mtrs (public) and 39mtrs (private).