To Alistair Wilson, Green Space Manager, Cambridge City Council,

Re: Alexandra Gardens – London Plane trees and alleged damage to a neighbouring property.

Thank you for the opportunity to comment on your report: Alexandra Gardens – London Plane trees and alleged damage to a neighbouring property. I note that the property in question is 13, Holland Street, referred to in your report (Sections 3.2, 3.3. and 3.5).

You have included reports from GAB Robins, structural engineers, as instructed by the City Council, Dr P.G. Biddle, arboricultural consultant, recommendations requested by GAB Robins, as well as a report by local residents, primarily written by Dr Adrian Hill – '13 Holland St.: Analysis of the problems leading to a claim against the Cambridge City Council and a refutation of the claim.'

You will be aware that the residents' reports, presented by the Alexandra Gardens Trees Group, were circulated in a document pack to all Cambridge City Councillors but you have omitted two documents from your report, a report by David Brown Landscaping Design – 'Arboricultural consultant's notes', and a letter from Richard Buxton, Environment and Public Law, regarding Alexandra Gardens.

With regard to your report and other associated reports:

Existing damage and chronology

I note that the damage to 13, Holland Street consists of 1 mm hairline cracks along the left hand external wall and internal partition wall, a 1 mm vertical crack through the brickwork where the rear extension joins the original house, a 1 mm vertical crack at the junction of the conservatory wall and gable wall of the house, and 1 mm cracks below the ground floor kitchen window and first floor bedroom window. You refer to Building Research Establishment (BRE) Digest 251 'Assessment of damage in low-rise buildings' and that the damage is accordingly classified as 'slight' (Report Section 1.2 –1.3). Underpinning is not considered necessary in these circumstances.

Given that the original house was built in 1894, the London Plane trees planted in 1905, reaching maturity around 1960-1965, the original house and rear projection extended around the late 1970's/early 80's (I understand that building work was actually undertaken in 1982), and cracking first noticed in 2003 (Report Sections 1.6 – 1.7, 2.1 – 2.3), 40 years after the trees had matured, and root growth and activity reduced to a minimal level, logic surely dictates that, after nearly 100 years of co-existence, cracking is far more likely to be related to building work than the trees. This sequence of events is referred to by Dr Hill's report (p. 4).

Your report (Section 2.3) suggests that the dry summer of 2003 led to an insurance claim based on a conclusion that the trees were responsible. The report by Dr Brown (p. 1) notes that a report by Marishal Thompson (environmental consultancy and arboriculturalists and agents for the insurers, Royal Sun Alliance) is based upon the "…assumption that engineer's are satisfied that the current damage is due to clay shrinkage subsidence attributable to vegetation." (Marishal Thompson Report, July 2004). You report (Section 2.4), that the Council advised that the information (from Marishal Thompson's engineers) did not implicate the trees.

The Council is advised in May 2008 (Report Section 2.6, Dr Brown's report, p. 1) that further investigations carried out by an engineer from Infront Innovation (subsidence claim specialists engaged by Marishal Thompson) advise that damage to the property is "…indicative of subsidence…" and nearby vegetation owned by the Council "…may be a significant influencing factor…" and further investigation would be undertaken "…to confirm if a nuisance is occurring." By definition the information required by the Council to implicate the trees relates to subsidence and the nature of the claim is (GAB Robins report p. 1) Subsidence – Alleged tree root trespass).

The information/data required by the Council included a plan of the property and proximity of the trees; a plan of the property showing the occurrence of damage and location of trial holes/bore holes; soil samples analyzing content and desiccation; level monitoring; crack monitoring; photographs (Section 2.6). Information subsequently received persuaded the Council to reduce trees 1, 2 and 3, by 30% volume in March 2009 (Report Section 2.7).

However, further monitoring during 2009, resulting in a recommendation from the insurers agent to remove the trees otherwise underpinning would be required and costs sought from the Council (Report Sections 2.8 and 2.12), appears to be based upon the establishment of 'seasonal movement' (Report Section 2.8). Based on the information/data supplied in 2009, the Council sought the advice of independent structural engineers (Peter Dann Associates) who, based on their analysis of the data provided by Infront Innovation from Mat Lab and Geo-Serve (Dr Brown's report, p. 1), advised three options – remove one tree/reduce two others; underpin property/costs to be recovered; an agreed tree management regime (Report Section 2.11). The Council subsequently recommended felling one tree and crown reduction of two others (Report Section 2.14).

As noted in your report, the Council, "…in accepting any claim the tree(s) is (are) deemed 'on balance of probabilities' (to) be the causal factor creating the movement." (Report Section 2.15). Dr Brown (pp. 1-2) also considers the key question is whether 'on the balance of probabilities' damage is caused by tree root activity taking water from the underlying clay soil of building foundations and refers to guidance from the London Tree Officers Association (LTOA) *A Risk Limitation Strategy for Tree Root Claims, 3rd Ed., 2008.* The LTOA state that "…tree officers require appropriate evidence that corroborates the view that the tree is the material cause of the problem and that other factors have been eliminated as potential influences" (6. Levels of Evidence).

The GAB Robins report (p. 1) states that the claim is based on *establishing subsidence*. Subsidence is generally considered to be progressive sinking (Sykes, J.B. (Ed.) *The Concise Oxford Dictionary. 6th Ed., Clarendon Press, Oxford, 1976* – subside – sink to low(er) level; settle down lower in ground).

Given that the claim depends on establishing subsidence rather than 'seasonal movement' (the annual fall and rise of clay soils subject to yearly shrinkage and rehydration according to the drier summer/autumn and the wetter winter/spring, irrespective of the presence of trees), and given the importance of full investigation of the complete level monitoring data and laboratory data available, an analysis and conclusions according to these key factors appears to be crucial in determining the 'balance of probabilities' concerning the cause of structural cracking at 13, Holland Street.

Evidence regarding 'subsidence' and data analysis

The 'terms of reference' given to GAB Robins as indicated in their report merely states that "…original instructions were received directly from Cambridge City Council…" and refers to a telephone conversation on the 13th October, 2010 (GAB Robins report, p. 1). In your report (Section 2.16) it is stated that the loss adjuster (GAB Robins) was "…asked to review and challenge where necessary the level monitoring and lab analysis." However, I understand from a Freedom of Information request that the written instructions to GAB Robins were simply to "…carry out a review of the claim, reports and evidence and advise on potential solutions." (notes from a meeting between members of the Alexandra Gardens Trees Group and the Executive Councillor for Arts and Recreation (Rod Cantrill) and yourself, 7th February, 2011).

The GAB Robins report repeats some of the chronology, circumstances and describes the configuration of 13, Holland Street. The GAB Robins engineer attended the site and inspected the damage, noting the nature of the cracking and confirming BRE classification as 'slight' as referred to in your report (Section 1.2 – 1.3). It is also interesting to note that the property is "…in good condition throughout." (GAB Robins report, p. 2), and that "Our engineer does not feel that the severity of the damage warrants underpinning works." (GAB Robins report, p. 4).

However, rather than 'review and challenge', as specified in your report (Section 2.16), the GAB Robins 'investigation' clearly follows the written instructions to 'carry out a review' and is merely a repetition of the reports by Infront Innovation and Peter Dann Associates, and a repeat of the actions taken and meetings held, as already outlined in the chronology. Apart from the conflicting references to 'seasonal movement' already mentioned, GAB Robins accepts the evidence for 'subsidence' and concludes that, in the event of a dry, warm summer, there is a "…high probability that the property will suffer further subsidence." (p. 4). There appears to be *no separate investigation and analysis* of the Mat Lab and Geo-Serve data, merely a repeat of the way previous site investigation and monitoring results were presented.

GAB Robins appointed Dr Biddle. Dr Biddle, in referring back to an email from GAB Robins (Dr Biddle's report, p. 1), states "…you request my recommendations on the management of the plane trees growing in the park on the opposite side of Carlyle Road to the above property (13, Holland Street)." It seems that the 'terms of reference' for Dr Biddle presume that the trees are the cause of damage and must be managed. Had the 'terms of reference' from the City Council to GAB Robins and Dr Biddle required an 'investigation of the reasons for structural cracking at 13, Holland Street', GAB Robins and Dr Biddle's conclusions may well have been different.

It is disappointing to note that, although Dr Biddle subsequently visited Alexandra Gardens and took photographs (appended to the end of your report), he did not visit the site before writing his report and based his observations upon the use of 'Street view' in 'Google map', as well as reports provided by GAB Robins.

Dr Biddle refers to 'seasonal subsidence' and does consider Geo-Serve data. He describes significant movement in the summer 2008, particularly along the flank wall of the main house and front of the garage, and notes diminishing movements progressively across the front elevation of the house and across the front elevation of the rear section of the building (Dr Biddle's report, p. 2, points 5-6). Dr Biddle considers this "…distribution of movement as clearly consistent with the involvement of the Plane trees as the cause of damage."

Dr Biddle's conclusions mirror that of Peter Dann Associates who, in a letter to the Council (21.5.10), consider "The movements recorded are not solely to an extension but occur to the whole length of the gable wall, the rear wall of the property and the side wall of the original rear projection. The movements are reasonably consistent along the length of the gable wall and the side wall of the rear projection" (Dr Hill's report, p. 18, ref. 15). Dr Hill also notes that Peter Dann Associates describes "…rotation of the building towards the trees…", but that Peter Dann Associates *neglect to mention* that the house is end of terrace and will naturally move at the side nearest Alexandra Gardens in response to the seasonal movement of clay soil.

Dr Hill's report offers a far more thorough analysis of the Geo-Serve level monitoring data. Dr Hill analyses the full yearly cycle of building movement, rather than the partial interpretation of the Geo-Serve data offered by Infront Innovation that is basis of Peter Dann Associates and GAB Robins' conclusions. Infront Innovation present Geo-Serve data starting in June 2008 for August, October and December 2008, indicating a fall in building height. However, by analyzing the full yearly cycle, it is evident that there is *no net subsidence* but the usual annual fall and rise associated with buildings built upon clay soils subject to yearly shrinkage and rehydration and the house as a whole returns to the same level (Dr Hill's report, pp. 6-7).

Level monitoring data

As noted, GAB Robins refer to the level monitoring but only to the Geo-Serve data for the period June – December 2008 as presented by Infront Innovation. They do recognize that this is only part of the annual cycle and accept that this is seasonal movement (p. 4). However, in line with their 'terms of reference', they *have not undertaken their own investigation* and have simply relied on partial evidence presented by Infront Innovation, repeated by Peter Dann Associates.

Dr Biddle analyses level monitoring information to compare 'seasonal subsidence' in the summers of 2008 (pre-March 2009 volume reduction) and 2009 (post-March 2009 volume reduction), concluding that reduced building movement in the summer of 2009 compared to the summer of 2008 is attributable to the 'crown reduction' in March, 2009, linking the trees to having an effect on the property. (Confusingly, Dr Biddle refers to crown reduction in March 2009 whilst your report underlines volume reduction in March 2009). Dr Biddle notes that the movement in 2009 might have been expected to be greater due to the drier summer (p. 2, points 4, 5 and 8).

A more rigorous analysis of available data by Dr Hill such as rainfall recorded by Meterological Recording Stations at the National Institute of Agricultural Botany and Cambridge University Botanic Gardens (Dr Hill's report, pp. 14-15) shows that the reduced movement in 2009 that Dr Biddle attributes to the 'crown reduction' in March 2009, could just as easily be attributed to the higher rainfall that actually occurred in the months for which data is compared, June-August, 2009 compared to June-August, 2008. Higher rainfall resulting in less ground shrinkage and reduced building movement. Apparently (Report, Section 2.25) Dr Biddle subsequently acknowledged the weather patterns but this appears not to alter Dr Biddle's recommendations and although an amended report is supposed to be provided, no explanation is forthcoming.

As suggested previously, had GAB Robins' and Dr Biddle's 'terms of reference' been 'an investigation of the reasons for structural cracking at 13, Holland Street', rather than the presumption that the trees were to blame (as noted, Dr Biddle refers to GAB Robins "…you request my recommendations on the management of the Plane trees…"), he may have come to different conclusions.

Dr Biddle analyses Geo-Serve data (p. 2, points 5 and 6) and it is evident that the level monitoring data shows that the "…significant movement along the flank wall of the main house and front of the garage" (over 5 mm) compares to movements of less than 5 mm (3.7 mm max.) along the central two-storey extension. Dr Hill's report plots the same Geo-Serve level monitoring point data as Dr Biddle but Dr Hill's far more detailed analysis demonstrates the significantly different relative movements of the building according to an axis plot (Dr Hill's report, p. 8).

The relatively new, central two-storey extension, built onto the original house rear projection and linked to the garage by a further single-storey extension, were built with new, concrete foundations (Dr Hill's report, p. 9). The original house and rear projection built on shallow Victorian foundations to a depth of c.800 mm remain affected by seasonal variations in moisture content (that affects the annual fall and rise of clay soils) regardless of tree root activity (Dr Brown's report, p. 3). The conservatory wall foundations are also shallow at 700 mm (Dr Brown's report, p. 3) and the garage would almost certainly be built on shallow concrete foundations.

Dr Hill's report demonstrates that the building is moving up and down in three articulated sections according to differential movements. The rigid central section with concrete foundations is moving vertically but relatively evenly, and to a limited degree, like a flat horizontal plate (Dr Hill's report, p. 9). The outer sections with shallow foundations move far more unevenly and to a far greater extent as they respond flexibly to the seasonal movement of the ground.

Dr Hill notes that the points of greatest stress match the distribution of cracks, with 91% of the cracking relating to the left hand rear gable wall and house rear wall where the flexible old house and projection has been fixed to the extended central section built with rigid, concrete foundations (pp. 11-12).

Compared to Dr Brown's and Dr Hill's very persuasive and evidence-based analysis, *there is no analysis by GAB Robins* of the sections of the building and whether the old house and projection and its relationship with the central extended section built on rigid concrete foundations has a bearing on the nature and location of the cracking. Instead there is repetition of the advice by Infront Innovation and Peter Dann Associates, based on only partial analysis of Geo-Serve level monitoring data.

The residents' survey of reported settlement and cracking related to properties built in the same period as 13, Holland Street, including many with rear extensions added, should be noted. This survey of properties around Alexandra Gardens and the wider area, all built upon high-plasticity clay soils over the site of a former brickworks and associated pits, shows no correlation with the proximity of trees (Dr Hill's report, p. 5).

Soil and root analysis

Regarding soil and root sampling data, GAB Robins' engineer has, as in accordance to their 'terms of reference', simply viewed some site investigation documentation, identified clay subsoil, and believes that London Plane tree roots were found below the property, merely repeating the findings of Peter Dann Associates, that "…clear positive identification of roots…" had encroached beneath the left hand elevation of the property and conservatory (GAB Robins report, p. 4). Clearly GAB Robins, in line with their 'terms of reference', *did not rigorously investigate* the partial data presented by Peter Dann Associates.

Peter Dann Associates, in analyzing data extracted from boreholes at the property by Mat Lab, stated “Boreholes were excavated on the south side of the property to obtain soil and root samples…root samples were found to a depth of approximately 2.75 m…and the samples identified as belonging to Plane trees.” – omitting to mention that a proper analysis of the Mat Lab data revealed that *no roots were found in borehole 2* (Dr Hill’s report, p. 18, ref. 15). Borehole 2 is closest to the conjunction of the left hand elevation and the conservatory where the greatest amount of cracking has occurred and nearest to tree 3, alleged to be the main cause of damage to 13, Holland Street, and originally recommended for felling. (Dr Hill’s report, p. 6).

GAB Robins does not ‘challenge’ the Mat Lab data or ‘challenge’ Peter Dann Associates incomplete analysis, merely repeating that ‘clear positive identification of roots’ had been found, implying that all boreholes identified roots. A proper analysis of the Mat Lab data would have shown that boreholes 1 and 3 revealed small, weak roots with moderate starch content (Dr Hill’s report, p.6). Dr Brown notes (report, p. 3), that moderate starch levels at the time of sampling (December) indicates tree roots of limited activity, as expected in trees 40 years past maturity.

Boreholes sunk previously at a property backing onto 13, Holland Street and opposite tree 2, previously recommended for significant reduction, reveal root diameters too small for identification and no detectable starch (Dr Hill’s report p. 6 and p. 17, ref. 5). High starch levels indicate healthy, active roots (Biddle, P.G. *Tree Root Damage to Buildings. Vol.1. Willowmead, Wantage, 1998,* p. 31). Biddle also emphasizes that “…even the presence of live fine roots within a clay soil does not prove that they are causing drying and shrinkage of the clay.” (*op. cit.* p. 221). Clearly there is minimal evidence of healthy, active roots within an extensive root system in the area around the property in question, as expected in trees 40 years past maturity.

Dr Hill also points out that the extent and strength of the Alexandra Gardens London Plane tree root systems are dictated by the fact that normal root growth will extend into the park, where open access to water and air is self-evident, whilst extending roots under pavements, tarmac and buildings whilst also contending with sewers and utilities, results in a poorly developed root system (Dr Hill’s report, pp. 5-6). Dr Brown confirms that tree roots “…would preferentially exploit the soils of the open space rather than those beneath impermeable hard surfaces…” (Dr Brown’s report, p. 3).

Guidance on the probability of root damage from Plane trees (Kew Root Study/BRE Digest 298), states that the distance within which 90% of root damage occurs is 10 metres. Tree 2 is 18 metres, tree 3 14.5 metres, and tree 4 16 metres away from the property in question and well beyond the likely zone of influence (Dr Hill’s report, p. 17, ref. 1, Dr Brown’s report, p. 2).

Dr Biddle also appears to include borehole 2 as indicating the presence of Plane tree roots (Dr Biddle’s report, p. 2, point 7), and counts this as a factor confirming the trees as cause of the damage, even though a full analysis of the Mat Lab data would have shown that *borehole 2 had no tree roots*. Boreholes 1 and 3 had weak roots and moderate starch but Dr Biddle makes *no analysis of the starch content* even though he himself has written elsewhere that healthy, vigorous roots would be indicated by high starch at the time of sampling (December). (Biddle, P.G. *Tree Root Damage to Buildings. Vol.1. Willowmead, Wantage, 1998,* p. 31).

Dr Biddle *does not analyse* the extent or otherwise of the root system or refer to likely activity given that the trees are 40 years past maturity. He *does not* examine the location of the trees within the park and the likelihood of tree roots preferentially exploiting soils of open space rather than soils beneath impermeable hard surfaces.

In addition, Dr Biddle *makes no analysis* of the proximity of the trees and whether the distance from the property (the nearest tree is 14.5 metres away) is relevant given that the Kew Root Study/BRE Digest 298 guidance referring to Plane trees is that the distance within which 90% of damage implicating roots occurs is within 10 metres.

Moisture analysis

GAB Robins, in accordance with their 'terms of reference', do not challenge the soil analysis but simply repeat the findings of Mat Lab data as interpreted by Infront Innovation (GAB Robins report, p. 4), that soils were only slightly desiccated, but implying soils should be fully rehydrated at the time of sampling (December).

Dr Biddle finds the borehole soil moisture content investigations of 'very limited value' but also refers to 'slightly' lower moisture content in borehole 2 with 'possible desiccation', but states that "…elevated soil suction…" values corroborate the trees as a cause of damage (Dr Biddle's report, p. 1, point 2). Even the 'very limited value' of this data does not stand up to a more rigorous analysis of the Mat Lab data cited by Dr Biddle. The Mat Lab data refers (report 29th January 2009) to the *low suction potential* in 3 out of the 4 boreholes and in the remaining one (presumably borehole 2) *no Standard Deviation* (Dr Hill's report, p. 18, ref. 13).

Dr Hill (report, p. 7) has already demonstrated that the fall in level of the ground and property during the drying phase of the year is reversed during the wetter half of the year and the ground and house return to the same level, concurring with the Mat Lab evidence of low suction potential/no Standard Deviation.

Amenity value

Your report (Sections 1.8 and 1.10) states that the London Plane trees are an effective and impressive boundary feature, are a highly valued and significant public resource, are in good health, and that each tree is a fine specimen and they collectively create an impressive and statuesque feature. You also refer to the Capital Asset Value for Amenity Trees (CAVAT) (Sections 1.9 and 3.4) that value the trees at £115,000 to £140,000 per tree. There is also a collective amenity value (no calculation provided) referred to in the original report by the City Council Principal Arboricultural Officer (Objection and representations to tree works proposed to three London Plane trees growing on Alexandra Gardens, Section 7.2).

Dr Biddle's report (p. 1, point 1 and p. 3, points 12 and 15) appreciates the "…high amenity value…" of the trees and accepts that his recommendation, "…significantly heavier crown reduction…" (over 30%), of trees 2, 3 and 4 (these are referred to as trees 1, 2 and 3 in your report in order to match the captions on Dr Biddle's photographs, appended as Appendix D), will be "…detrimental to the appearance of the trees…" The actual volume reduction in crown size is not specified but from the photographs supplied at the end of your report this appears to be around 70%.

Dr Biddle states that "The reduced crown size will at least retain much of the avenue effect." (p. 3, point 15). However, the original report by the City Council Principal Arboricultural Officer (Objection and representations to tree works proposed to three London Plane trees growing on Alexandra Gardens, Sections 8.4, 8.8 and 8.9), in response to the 'requirement' by insurers to fell tree 3 and reduce trees 2 and 4 by 70-90%, states that the amenity value of trees 2 and 4 will be severely diminished, their long-term health is likely to be affected and their life expectation likely to be reduced considerably and concludes that a prudent option would therefore be to fell these two trees.

Clearly the significant crown reduction recommended by Dr Biddle to all three trees not only would be detrimental to the appearance of the trees in the immediate term but may well lead to the felling of all three trees in the short to medium term and of even greater detriment to the amenity value of Alexandra Gardens.

The fact that Dr Biddle recommends crown reduction rather than any felling and refers to the 'high amenity value' of the trees denotes recognition of amenity value. However, neither Dr Biddle, your report, or GAB Robins' report makes any attempt to assess CAVAT values against the known costs that may be incurred by the Council if the insurers of 13, Holland Street seek to recover £60,000 reportedly estimated for underpinning the property and £20,000 reportedly estimated for re-housing the occupants whilst building works were undertaken (Report Section 4.3.1). Against these costs that may be claimed for, CAVAT values equate to £345,000 – £420,000 for the three trees (plus uncalculated collective amenity value). The *absence of a detailed analysis* of respective costs against amenity value is a serious omission from these reports.

Likewise, although the 'high amenity value' of the trees is recognized, there is no assessment of the public interest against alleged nuisance through the investigation and costing of any remedial work against the significant amenity loss were severe crown reduction undertaken. The public interest assessment is identified as necessary by Richard Buxton, Environmental and Public Law (local residents' report, Appendix 5, p. 2).

It is interesting to note that, where a tree is considered to be involved in foundation movement and damage and existing foundations would be adequate in the absence of the tree, when it is queried "Is a tree so valuable as to make felling or pruning unacceptable?" Dr Biddle himself has stated that the property should be underpinned (Dr Hill's report, p. 16, Biddle, P.G. *Tree Root Damage to Buildings. Vol.1. Willowmead, Wantage, 1998,* p. 295).

Summary

Your report summarises the key points made by GAB Robins, Dr Biddle, and local residents detailed earlier in your report and my comments (Sections 2.16 – 2.19).

Your report (Section 2.21 – 2.22), notes Dr Biddle's recommendation for tree works and forms the basis for your recommendation (Report Section 6), "…to shorten all of the main branch structure, removing all of the foliage to create a significantly smaller crown size for trees 2, 3 and 4." As noted, these are referred to as trees 1, 2 and 3 in your report in order to match the captions on Dr Biddle's photographs, appended as Appendix D, and indicating the tree works.

The photographs appended are unsatisfactory as no crown/volume reduction is mentioned. Dr Biddle's report doubts that the 30% 'crown' reduction applied in March 2009 would suffice in future and that "…significantly heavier crown reduction should be applied." (Dr Biddle's report, p. 3, point 12). However, nowhere in the reports is the proposed crown reduction actually specified although, as noted previously, from the photographs supplied at the end of your report this appears to be around 70%.

The basis for the recommendation, and the ongoing maintenance required to maintain the reduced crown size (Report Section 6.3), is Dr Biddle's assertion that the "…distribution of movement, combined with the evidence of probable desiccation in borehole 2 and the presence of Plane, confirms that the trees were the cause of the damage." (Dr Biddle's report, p. 2, point 7, Report Section 2.22).

As noted in my comments, an analysis of *all the evidence* presented, including the *full analysis* of the Geo-Serve and Mat Lab data, *does not indicate* 'on the balance of probabilities' that the distribution of movement is due to subsidence caused by Plane tree roots. Rather, 'on the balance of probabilities', that the configuration of the property with a rigid central section and concrete foundations attached to two outer sections with shallow foundations has resulted in differential movement and is the cause of structural cracking.

The 'slight' soil desiccation, uncorroborated by soil suction data (Mat Lab analysis), and, in the context of the ground and building returning to the same level after *seasonal movement* (Geo-Serve data), *does not* 'on the balance of probabilities' implicate the Plane tree roots. The presence of Plane tree roots, weak with moderate to minimal starch content and without evidence of an extensive root system adjacent to the property in question (Mat Lab borehole analysis), *does not* 'on the balance of probabilities' mean that Plane tree roots were the cause of the damage. As Dr Biddle himself has stated (Biddle, P.G. *Tree Root Damage to Buildings. Vol.1. Willowmead, Wantage, 1998,* p. 221), "…even the presence of live fine roots within a clay soil does not prove that they are causing drying and shrinkage of the clay."

You state in your report (Section 3.1) that insurers acting for the owners of the property have provided evidence and alleged structural damage from trees – this 'evidence' is *not based on a proper analysis* of the Geo-Serve and Mat Lab data.

You state in your report (Section 3.2) that, despite volume reduction of 30% in March 2009, further movement of the property was shown but Geo-Serve data indicates that the ground and property returned to the same level according to usual seasonal movement of the clay soil.

The expert evidence from Peter Dann Associates, GAB Robins, and independent professional advisors cited in your report has relied on partial evidence and *not taken account* of all Geo-Serve and Mat Lab data (Report Sections 3.3 and 3.5). The expert advisors also state that the trees are the cause of seasonal movement. But the claim, according to GAB Robins, is in regard to subsidence, not seasonal movement (the annual fall and rise of clay soils subject to yearly shrinkage and rehydration according to the drier summer/autumn and the wetter winter/spring, irrespective of the presence of trees).

CAVAT values are mentioned (Report Section 3.4) but there is *no analysis* of the amenity value of the trees against costs that may be claimed against by the Council were a claim to be made, and *no analysis* of the public interest against alleged nuisance.

With reference to your report (Sections 3.6 and 3.7), local residents and their expert, professional advisors have provided a far more persuasive and evidence-based analysis that 'on the balance of probabilities' other factors are influencing the movement of the property and that the trees are not the causal factor.

It is stated that the law of nuisance has been established and it is 'presumed' that it is likely that liability will attach to the Council (Report Sections 2.16 and 3.8). Dr Biddle is quoted that "…he was confident that if the claimant went to court, the Council would be held fully liable for all the costs." (Report Section 2.23). This is an assumption. Dr Brown notes (Dr Brown's report, p. 1) that, with regard to 'the balance of probabilities' that 'damage is caused by tree root activity taking water from the underlying clay soils of building foundations…there are a number of legal cases around the subject of actionable nuisance from tree roots.'

Your report notes (Section 4.1, option 6, ref. 8) that, were nothing to be done to the trees and the claim defended, the Council should evaluate the extent to which other claims have been made, or successfully made, in the vicinity. This evaluation should include other legal cases, as noted by Dr Brown. Notwithstanding this, the preceding analysis has demonstrated that, 'on the balance of probabilities', the *claimant has not provided information* that could make the case that the trees are causing nuisance.

Your report (Section 3.9) recommends that the Council considers tree management and I assume 'tree management' to mean the works outlined in Section 6, Recommendation: - 6.1 – 6.3, referred to previously.

Options

Your report (Section 4) refers to solutions that have been considered and discounted but this presumes, in advance of any consideration by the Planning Committee under the Tree Protocol, that option 1 (Section 4.1), no tree work and continued monitoring of the property, has been discounted. Reference 5 (Report Section 4.1, option 1), states that the Head of Legal Services has been advised that the trees have been identified as posing a 'risk' and the Council has a 'Duty of Care' to manage the trees.

This presupposes that the trees have been identified as posing a risk. As already noted, the preceding analysis has demonstrated that, 'on the balance of probabilities', the claimant *has not provided information* that could make the case that the trees are causing nuisance. It is also incorrect to assume 'no tree work' (Report Section 4.1.1) as the Council already undertakes tree management at Alexandra Gardens and no doubt some tree management will continue. With regard to the volume reduction work first carried out in March 2009, I assume the report means bi-annual work to maintain current tree size rather than continued reduction of the remaining volume by 30% every two years (Report Section 2.7).

Options 2, 3 and 4 (Report Section 4.1) referring to tree management at Alexandra Gardens additional to the three trees in question, has been considered and discounted. In my opinion, regardless of the desire to consider the management of trees in a group, it is completely inappropriate at this stage to introduce this consideration into a report that has been specifically about the three trees concerned.

Option 6 (Report Section 4.1) 'Do nothing to the trees (again, this is incorrect as the Council already undertakes tree management at Alexandra Gardens and no doubt some tree management will continue) and defend the claim' with reference that "The claimant has provided information that could make the case that the trees are causing nuisance…" *has not been demonstrated by the evidence presented* and this option *should not be discounted*.

In considering the cost and insurance implications of doing 'no work to the trees' (again, as noted, the Council already undertakes tree management at Alexandra Gardens and some tree management work will continue), the report assumes that costs will apply (Report Section 4.3.1). Section 4.3.2 further states that "If the Council's insurers accept on the balance of probabilities the trees are the primary cause and liability would attach but the Council chose not to abate the nuisance, the Council would no longer be covered by the insurance policy." With regard to Section 4.3.2 and 4.3.2.1, the detailed assessment of all the evidence, including all the Geo-Serve and Mat Lab analysis, should be presented to the Council's insurers as the 'balance of probabilities' *does not demonstrate* that the trees are the primary cause and that liability would attach.

The claimant has to prove causation but GAB Robins' report indicating that this is likely *is not sustained*, based on their repetition of partial presentation of data and the *absence of a full analysis* of all the Geo-Serve and Mat Lab data.

With regard to Section 4.4 of your report, carrying out tree management, it is stated that the London Plane trees have been identified as causing structural damage, they are identified as posing a 'high risk', and that the Council has a Duty of Care to manage the trees (Report Section 4.4.2). Detailed analysis of all available data, including all Geo-Serve and Mat Lab data, *has not* 'on the balance of probabilities' identified the trees as causing structural damage. Tree works and associated costs are mentioned, along with CAVAT value, but there is *no analysis* of costs against CAVAT values of the trees at £115,000 to £140,000 each.

Concerning insurance implications (Report Sections 4.4.3, 4.4.3.1, the loss adjuster (GAB Robins) and independent arboricultural expert (Dr Biddle) *have not* demonstrated that their evidence, which is not based on a full analysis of all the data available, indicates that the trees are the cause of the nuisance (subsidence). Your report (Section 4.4.3.2) notes that following GAB Robins' and Biddle's advice means the Council's insurance cover will remain in place. This seems to be a far greater concern than the actual evidence as to whether, 'on the balance of probabilities', the evidence shows that the trees are implicated in damage to the property or not.

You also note in your report (Section 4.4.2) that the Council's insurers may require that other London Plane trees on Alexandra Gardens could influence a neighbouring property. Again, I believe it is completely inappropriate at this stage to introduce this consideration into a report that has been specifically about the three trees concerned.

Report conclusion

Your report states (Section 5.1 and 5.2) that there is evidence (citing Peter Dann Associates and GAB Robins) to link the trees as the causative agent or prime cause for the cracking and that the claimant has provided information that could successfully make the case that the trees are causing nuisance. However, Peter Dann Associates and GAB Robins have *not properly analysed* all the available data, including the Geo-Serve and Mat Lab information, and *have not demonstrated* that the trees are the causative agent, prime cause, or are causing a nuisance.

Furthermore, your report (Section 5.1) again notes that the evidence from Peter Dann Associates and GAB Robins claims the trees are a contributory factor in seasonal movement (the annual fall and rise of clay soils subject to yearly shrinkage and rehydration according to the drier summer/autumn and the wetter winter/spring, irrespective of the presence of trees), rather than subsidence – the basis of the claim (GAB Robins report p. 1) Subsidence – Alleged tree root trespass).

Report recommendation

As previously noted, your recommendation (Report Section 6.1 – 6.3), is "To avoid liability for underpinning it is essential the Council carry out tree management, to detail to the insurer that the Council does not believe underpinning is necessary, and to ask the claimants insurers to continue monitoring to confirm efficiency of tree works." The tree works consist of shortening all of the main branch structure, removing all of the foliage to create a significantly smaller crown size for trees 2, 3 and 4 (referred to as trees 1, 2 and 3 in your report in order to match the captions on Dr Biddle's photographs). Ongoing maintenance is required to maintain the reduced crown size.

Submission conclusions

A detailed analysis of all the evidence, including all the Geo-Serve and Mat Lab data, *does not* 'on the balance of probability' show the trees to be the prime cause of nuisance/structural cracking in the property concerned. The LTOA state that "…tree officers require appropriate evidence that corroborates the view that the tree is the material cause of the problem and that other factors have been eliminated as potential influences" (6. Levels of Evidence), and go on to note that amongst 'Levels of Evidence' "Insufficient foundation design for structures that are ancillary to the main superstructure of the property, resulting in the differential movements between the two e.g. garages, conservatories, late addition extensions, porch, steps and bay structures…" are rated 4th from a list of 14 (Dr Hill's report, p. 18, ref. 14).

The 'terms of reference' for GAB Robins were simply to 'carry out a review of the claim, reports and evidence and advise on potential solutions' and for Dr Biddle 'recommendations on the management of Plane trees growing in the park', therefore precluding challenging analysis of the existing data and presuming that the Plane trees were implicated.

As a result, the evidence provided by Dr Biddle and GAB Robins, essentially repeats the partial analysis of Geo-Serve and Mat Lab data presented by Peter Dann Associates and Infront Innovation, without *challenging or fully analyzing all the data available*. However, Dr Hill and Dr Brown demonstrate a persuasive and evidence-based analysis of all the available data and show that 13, Holland Street is subject to seasonal movement (the annual fall and rise of clay soils subject to yearly shrinkage and rehydration according to the drier summer/autumn and the wetter winter/spring, irrespective of the presence of trees), rather than subsidence.

Furthermore, Dr Hill analyses all available data to show that the building is moving up and down in three articulated sections according to differential movements. The rigid central section with concrete foundations is moving vertically but relatively evenly, and to a limited degree, like a flat horizontal plate. The outer sections with shallow foundations move far more unevenly and to a far greater extent as they respond flexibly to the seasonal movement of the ground.

Dr Hill has noted that the points of greatest stress match the distribution of cracks, with 91% of the cracking relating to the left hand rear gable wall and house rear wall where the flexible old house and projection has been fixed to the extended central section built with rigid, concrete foundations.

Dr Hill also points out that the extent and strength of the Alexandra Gardens London Plane tree root systems are dictated by the fact that normal root growth will extend into the park, where open access to water and air is self-evident, whilst extending roots under pavements, tarmac and buildings whilst also contending with sewers and utilities, results in a poorly developed root system (Dr Hill's report, p. 5-6). Dr Brown confirms that tree roots 'would preferentially exploit the soils of the open space rather than those beneath impermeable hard surfaces' (Dr Brown's report, p. 3).

Guidance on the probability of root damage from Plane trees (Kew Root Study/BRE Digest 298), states that the distance within which 90% of root damage occurs is 10 metres. Tree 2 is 18 metres, tree 3 14.5 metres, and tree 4 16 metres away from the property in question and well beyond the likely zone of influence. There is *no analysis* by GAB Robins or Dr Biddle of either the extent or otherwise of the root system, the activity levels, given that the trees are 40 years past maturity, or of factors relating to the proximity/distance from the property of the trees.

The residents' survey of reported settlement and cracking related to properties built in the same period as 13, Holland Street, including many with rear extensions added, should again be noted. This survey of properties around Alexandra Gardens and the wider area, all built upon high-plasticity clay soils over the site of a former brickworks and associated pits, shows no correlation with the proximity of trees (Dr Hill's report, p. 5).

Although the 'high amenity value' of the trees is recognized, there is *no assessment* of the CAVAT value of the trees against verbally estimated costs that may be claimed against the Council and *no assessment* of the public interest against alleged nuisance through the investigation and costing of any remedial work against the significant amenity loss were severe crown reduction to be undertaken.

The Council should undertake a full assessment of the CAVAT values equating to £345,000 – £420,000 for the three trees (plus uncalculated collective amenity value) against the costs that may be claimed of £60,000 reportedly estimated for underpinning the property and £20,000 reportedly estimated for re-housing the occupants whilst building works were undertaken at 13, Holland Street.

The Council has only one recommendation, tree works that shorten all of the main branch structure, removing all of the foliage to create a significantly smaller crown size for trees 2, 3 and 4 (referred to as trees 1, 2 and 3 in your report in order to match the captions on Dr Biddle's photographs), and to continue to maintain the reduced crown size.

The Council should assess other alternatives, including negotiations with the claimants' insurers if necessary over other building solutions. As previously noted, the damage to the building is classified as 'slight' (BRE Digest 251 'Assessment of damage in low-rise buildings') and underpinning is not considered necessary in these circumstances.

The Council should undertake its current tree management commitments but *not proceed with the recommendation stated in the report* (Section 6), which is based upon the partial and flawed analysis presented by GAB Robins and Dr Biddle.

The Council should present a *full and thorough analysis of all the available evidence to its insurers*. The evidence 'on the balance of probability' *does not* implicate the Alexandra Gardens trees and therefore the Council's insurers should be instructed to contest any claim against the Council and not accept liability.

Yours sincerely,

Cllr Mike Todd-Jones,
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