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ARBORICULTURAL REPORT

Report on alleged subsidence damage at 8 St Gabriel's Road, Billingshurst, RH14 9TX

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Photograph from Google Street View taken in June 2024.

30th July 2025

Prepared on the instructions of Billingshurst Parish Council

MDA reference V98

Arboricultural opinion on alleged subsidence damage at 8 St Gabriel's Road, Billingshurst, RH14 9TX.

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1. Instructions

1.1 I was instructed by Billingshurst Parish Council (BPC) on 2nd July 2025 to carry out an arboricultural assessment of alleged subsidence damage reported to have occurred at 8 St Gabriel's Road, Billingshurst, RH14 9TX. My instructions were to prepare a desktop advisory report which should include a review of the technical evidence provided in support of the allegation and advise on the following:

a) Whether the evidence confirms, on the balance of probabilities, that the subject property has suffered from clay-shrinkage subsidence, and, if so;
b) Whether the tree(s) alleged to be implicated, is/are a material cause of subsidence damage, and, if so;
c) Whether the implicated tree(s) should be felled, as requested, or if other works, including pruning, and/or a root barrier, may be a reasonable alternative;
d) If the tree(s) is/are recommended to be felled whether replacement(s) should be planted, and if so, recommendations for suitable species.

1.2 The documents provided to assist me in forming an opinion are as follows:

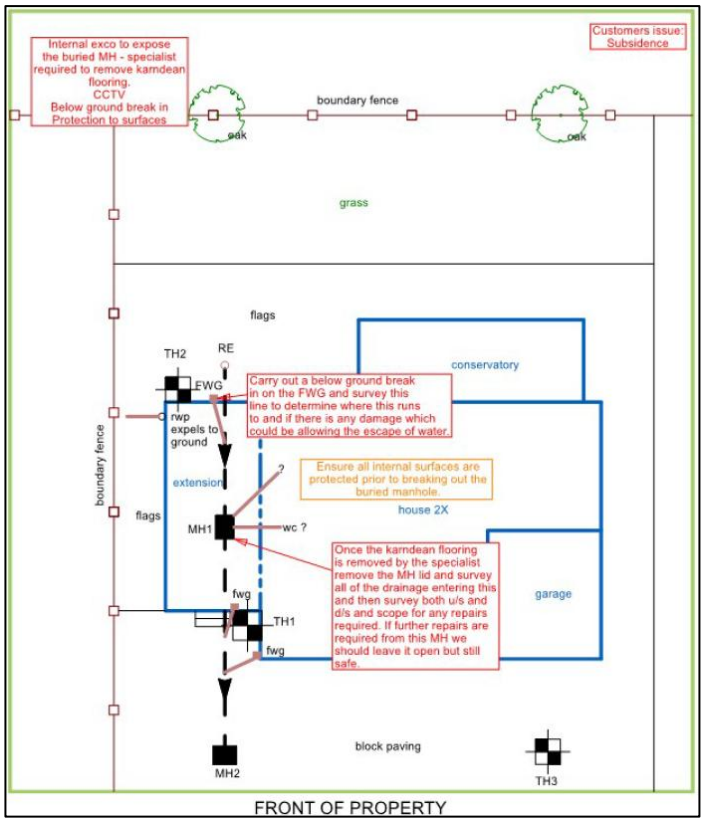
a) Auger Site Investigation Report dated 3rd November 2020;
b) PRI Arboricultural Assessment Report dated 2nd February 2021;
c) The Subsidence Hub Engineer's Conclusion Report (undated);
d) Engineer's site plan;
e) Horsham District Council Delegated Applications Assessment Sheet for application DC/23/2306 dated 21st February 2024;
f) Horsham District Council decision notice DC/23/2306 dated 21st February 2024;
g) Horsham District Council Delegated Applications Assessment Sheet for application DC/24/1649 (undated);
h) MHN Level Monitoring report dated 28th October 2024;
i) Keoghs solicitors letter to Billingshurst Parish Council dated 6th March 2025;
j) Planning history documents.

2 Introduction and review of evidence

2.1 The subject property at 8 St Gabriels Road is a two storey, detached dwelling probably built in the 1980s, with an attached garage at the left hand side, and a conservatory added at the rear. I understand that crack damage was noticed by the homeowners towards the end of summer 2020 and was reported to their insurers AXA. AXA in turn instructed QuestGates loss adjusters to investigate. QuestGates' engineer must have visited the property to assess the damage, but no report of that visit has been disclosed. Nonetheless, on a preliminary basis it seems to have been accepted that the damage was clay-shrinkage subsidence as QuestGates instructed Auger to carry out a geotechnical site investigation.

2.2 Auger visited the property on 2nd November 2020 and issued a report on 3rd November 2020. Three trial holes were opened; TH1 at the junction of the main house and garage at the front, TH2 at the rear left corner of the garage, and TH3 in the front drive (Figure 1).

Figure 1. Site plan prepared by Auger to show locations of trial pits/boreholes (TH1 – TH3).



2.3 In TH1 it appeared that there were no foundations, but that the garage had been constructed off a 200mm deep concrete slab. The soil below the slab was described as 'moist firm brown sandy fine to coarse gravelly silty CLAY' to a depth of 0.7m where it transitioned to 'moist very stiff brown fine to medium gravelly silty CLAY' to 2.2m. Below 2.2m to the end of the trial hole

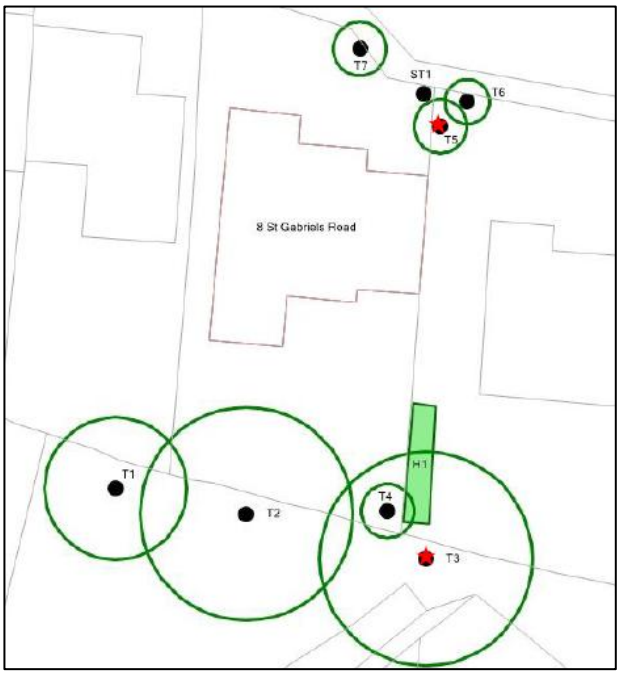
at 3.1m the soil was 'moist very stiff brown silty CLAY'. The soil was tested for stiffness on site using a shear vane, as greater stiffness is an indicator to increasing dryness. Values in excess of 100kPa are regarded as signifying the presence of significant desiccation (the level of drying typically associated with tree-caused clay-shrinkage subsidence). Recorded values increased from 24kPa at 0.2m to 120kPa at 1.7m to 3.1m. Laboratory tests confirmed that the clay below the concrete slab had a medium volume change potential (as defined by NHBC Chapter 4.2) with a plasticity index in the range 22 – 29%. Soil suction tests revealed that the clay at 1.2m was severely desiccated (as defined by BRE Digest 241), with a value of 472kPa, and that the clay at 2.2m was very severely desiccated (4730kPa). The result at 2.2m suggests that the dryness of the soil was significantly outside of normal parameters, which either represents an abnormality, or means that the clay was exceptionally dry. Four very thin live roots at a depth of 0.7m were identified as being Quercus (oak).

2.4 In TH2 foundations were established to be 700mm deep. The soil below foundations was described as 'moist very stiff brown sandy fine to medium gravelly silty CLAY' which transitioned to 'moist very stiff greyish brown silty CLAY' at 2.2m to the end of the trial hole at 2.6m. Shear vane readings were all at 120kPa. Laboratory tests confirmed that the clay below foundations had a medium volume change potential with a plasticity index in the range 21 – 33%. Soil suction tests revealed very severe desiccation at 0.7 and 1.7m depth, but as for TH1 values were exceptionally high (3290 - 5100kPa). Two live roots at a depth of 0.7m were tentatively identified by Richardson's Botanical Identifications as being Quercus (oak), and a further two live roots at 1.2m were identified as oak.

2.5 A remote borehole TH3 was opened in the front drive and the soil profile was similar to that recorded for TH2, with shear vane readings all at 120kPa and plasticity index in the range 23 – 36% indicating medium volume change potential clay. However, soil suction values were all in the normal range expected of an un-desiccated clay (37 – 64kPa).

2.6 An arboricultural report was prepared by Property Risk Inspection on 2nd February 2021, and, on the basis that the engineer was satisfied that damage had been caused by the action of vegetation, it recommended that the following trees should be removed: T3 oak (22m tall and 14.3m away from the rear of the house) and T5, a columnar cypress (7.1m tall and 3.1m from the front of the house). The locations of the various trees and shrubs is shown in Figure 2.

Figure 2. Site plan prepared by Environmental Services to show locations of trees near to the property.



2.7 Monitoring of building levels commenced on 8th October 2020 and continued until 25th October 2024 (Figure 3). The readings confirmed a seasonal and cyclical pattern of foundation movement, with the building recovering from subsidence and moving upwards every winter from 2020 – 2023, and moving downwards every summer from 2021 – 2024. The degree of downward movement varied from year-to-year and was least in the relatively wet summer of 2021 (approx. 6mm max.) and worst in the dry summer of 2022 (max 15.4mm). The greatest relative movements were recorded at marker 10, at the rear left corner of the garage, and at markers 12 and 13 at the rear corners of the conservatory (Figure 4). The general direction of movement was down towards the rear, i.e. towards the oak trees on parish council land.

Figure 3. Level monitoring graphs for the period 8th October 2020 to 25th October 2024. More negative values indicate subsidence and more positive values indicate recovery from subsidence. The location of the monitoring markers is shown in the isometric sketch at Figure 4.

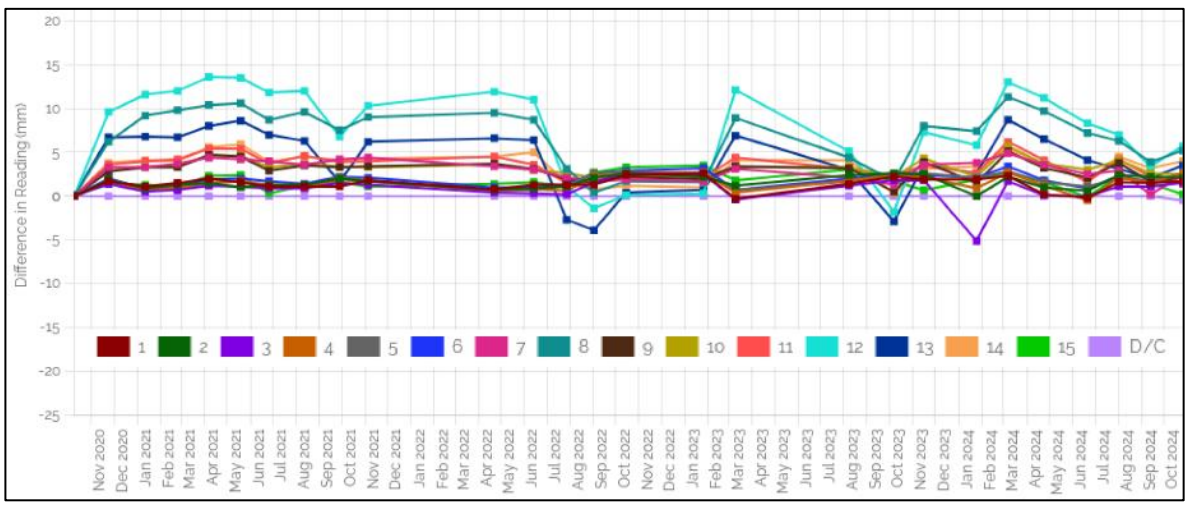
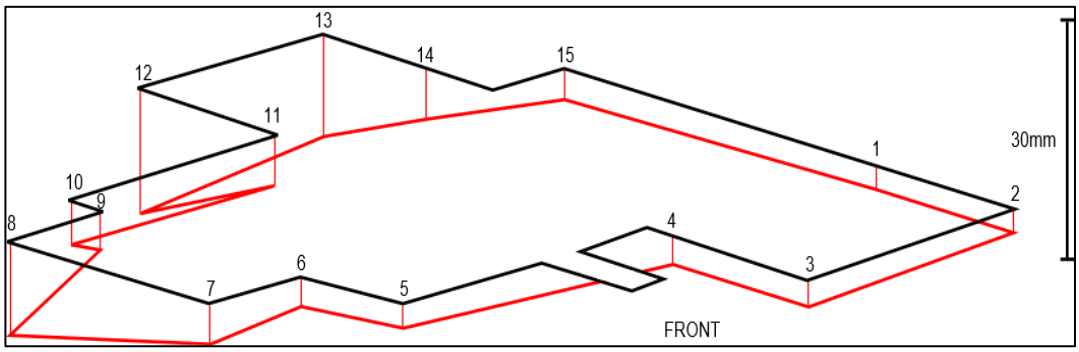


Figure 4. Isometric sketch showing the amplitude of foundation movements in the monitoring period.



2.8 On 20th December 2023 PRI submitted an application to Horsham District Council (HDC) for permission to fell oak T3, which is protected by a Tree Preservation Order – ref: DC/23/2306. A report was prepared by HDC's tree officer who agreed, reluctantly, that the information presented implicated the oak, and advised that permission should be granted. Billingshurst Parish Council objected to the application in writing on the grounds that '*it is felt that this application does not offer an exhaustive case for felling a tree - the supporting documentation is inconclusive and, therefore, further investigation and information is needed, particularly as the submitted reports are over two years old*'. A decision notice permitting felling of T3 was issued by HDC on 21st February 2024.

2.9 I believe that BPC was invited to remove oak T3, but it declined to do so.

2.10 A second application, to fell T2 (18m tall and 9.5m from the house), was submitted by PRI to HDC on 22nd October 2024 – ref DC/24/1649, and again the tree office considered that '*on a balanced judgment it is considered that the reasons put forward for the removal of the tree are reasonable and justified*'. BPC raised an objection to the application by resolution of the BPC Planning and Environment Committee meeting on 5th November 2024. A decision notice permitting felling of T2 was issued by HDC on 18th December 2024. I believe that BPC was invited to remove oak T2, but it has declined to do so.

2.11 On 6th March 2025 Keoghs solicitors wrote to BPC with reference to a council meeting on 12th March 2025 during which it was anticipated that the request to fell oaks T2 and T3 would be considered. It was advised that the reserve held for repairs (which probably included an estimated cost for underpinning in the event that the trees were not felled) was £296,000.

2.12 No decision has been made regarding the future of the oaks T2 and T3, hence the request from BPC for this advisory report.

3. Discussion

3.1 In order for liability to be demonstrated in tort law (a branch of civil law dealing with situations where one person's wrongful actions cause harm or loss to another, resulting in a legal liability for the wrongdoer) a claimant needs to demonstrate 'on the balance of probabilities' that the defendant caused an actionable nuisance (an interference with a person's use or enjoyment of their land). In civil law the test is not 'beyond reasonable doubt', which is reserved for the criminal courts. In 2011 Horsham District Council found itself liable to pay compensation to Mr Wright when the Upper Tribunal (Lands Chamber) found that HDC's tree officer Mr Jones had used the wrong test ('*beyond a reasonable probability*') when determining an application to fell three oak trees because of subsidence[1]. The judge ruled that '*if Mr Jones had applied the proper evidential test, he would inevitably have concluded that the claimed causation had been proven*'.

3.2 In reviewing the technical evidence I have borne in mind that the threshold for determining causation is the balance of probabilities. On that basis I consider that the data support the view that oaks T2 and T3 have, since 2020 and to the present day, caused clay shrinkage subsidence to 8 St Gabriels Road. The foundations of the property are shallow, especially those of the garage, which seem to be limited to a 200mm thick concrete slab. The main house has foundations 700mm deep, but the depth of conservatory foundations has not been established. Nonetheless, the foundations had stood the test of time until summer of 2020. When investigations were put in hand it was established that the soil under foundations was shrinkable clay with a medium volume change potential (i.e. a medium capacity to shrink and swell with changes in moisture content). The soil was infiltrated by oak roots, and roots by their nature extract large volumes of water from the soil to feed the parent tree. Oaks have roots with a high capacity to extract water from clay soils and they are therefore regarded by the National House Building Council (Chapter 4.2 *Building near trees*) as having a high 'water demand', that is, they have a high potential for causing clay-shrinkage subsidence. The roots had caused the soil to become very dry (very severely desiccated), and the depth of drying was significantly below ambient drying that can be caused by climate and short vegetation such as grass, the combined effects of which can extend only to a maximum of 1m. Oaks have a zone of influence[2] that can stretch to distances of up to 30m, and they are known to have the potential to cause desiccation at depths well beyond 2 – 3 m.

[1] UT Neutral citation number: [2011] UKUT 319 (LC) Case Number: LCA/509/2010

[2] The distance within which oaks have a track record for causing clay-shrinkage subsidence.

3.3 The desiccation in the soil caused the clay to shrink and thus support was withdrawn from the foundations of the property causing them to subside. The extent of the subsidence was identified by measuring the levels of the building over an extended period of time (2020 to 2024). A seasonal and cyclical pattern of movement was recorded, with foundations subsiding in summer as the clay dried out, and recovering in winter when trees were dormant and the soil could therefore re-wet. The maximum amplitude of foundation movements was slightly above 15mm, and it occurred at the rear, nearest to the oaks T2 and T3. The fact that markers 12 and 13 at the rear of the conservatory seem to be moving somewhat independently of marker 10 at the rear left corner of the garage strongly suggests that T2 was largely responsible for damage to the conservatory and T3 was responsible for damage to the garage.

3.4 In view of my opinion that T2 and T3 are, on the balance of probabilities, responsible for subsidence damage to 8 St Gabriels Road, I offer below some options for tree management, now that the TPO has been lifted for both trees.

3.5 Option 1: fell T2 and T3. This option has the benefit that subsidence damage to the property will cease immediately, allowing superstructure repairs to be carried out, and avoiding the need for an expensive alternative engineered solution. The downside is that the amenity of the trees and their benefits to wildlife and the landscape will be lost. Any replacement trees will take a number of years to become established features in the landscape.

3.6 Option 2: prune T2 and T3. The evidence on the efficacy of pruning to mitigate subsidence is very sparse. Pruning can be effective, temporarily, provided that it is severe and is repeated frequently (every 2 – 3 years). However, the benefits of pruning decrease the closer a tree is to the area of damage and the greater the degree of damage. It is considered by some that movements of less than 15mm might enable pruning to be applied as a remedy, but that movements greater than 15mm mean that pruning is highly unlikely to be effective. My own experience is that pruning is of very limited use in mitigating subsidence. In advance of damage occurring it is considered in the industry that a 30% crown reduction can prevent subsidence. However, once damage has occurred pruning needs to be more severe because the building has already been structurally weakened by the introduction of cracks. In these circumstances a minimum crown reduction of 40% is required. The benefit of pruning rather than felling is that the amenity and wildlife value of the tree can be partially retained. The downside is that pruning may not work, and even if it does there will be a need for repeat pruning every 2 – 3 years, with associated expense.

3.7 Option 3. Install a root barrier. The purpose of a root barrier is to sever all roots growing towards the property and prevent them growing back by installing a barrier. In the case of oak it is usual for a barrier to extend to a depth of 4m, and it would need to extend for a sufficient length to prevent roots growing round the ends. There is no space to install a barrier on BPC land, as this would entail severing the structural roots of the oaks, potentially making them unstable. A barrier would therefore need to be installed in the garden of 8 Gabriels Road, and it would probably need to cross the boundary into the gardens of Nos 6 and 10 also. There is no certainty that permission to install a barrier in neighbouring gardens would be gained. The benefit of a root barrier is that, if it proves to be effective, the trees can be retained. The downside is that the cost will need to be borne by the owner of the tree, either up-front, or as a consequence of litigation. Typical costs for the installation of a root barrier are £20,000 - £40,000.

3.8 Option 4. Stabilise foundations by substructure work. The usual way of stabilising foundations in the absence of tree removal is by underpinning, i.e. increasing the depth of foundations to extend below the desiccated zone. The benefit of underpinning is that oaks T2 and T3 could be retained. The downside is that the cost will need to be borne by the tree owner, either up-front, or as a consequence of litigation. The costs of underpinning typically significantly exceed the costs of a root barrier. In this particular case I would anticipate that costs would exceed £50,000.

3.9 My recommendation is that oaks T2 and T3 should be felled. But I understand that this is a matter for the council to decide having weighed up the costs and benefits of each option.

3.10 Replacement trees could be planted, but they would need to be low water demand species in this location. Hornbeam is perhaps the tree which would be best suited to the species mix present at the site.

Low water demand species	Mature height (m)
Birch	14
Elder	10
Fig	8
Hazel	8
Holly	12
Honey locust	14
Hornbeam	17
Laburnum	12
Magnolia	9
Mulberry	9
Tulip tree	20

4. Conclusions and recommendations

4.1 I consider, on the balance of probabilities, that 8 St Gabriel's Road has suffered from an episode of clay-shrinkage subsidence damage, which started in 2020 and has continued until the present day. Foundation movements at the rear of the house are up to 15.4mm.

4.2 I believe, on the balance of probabilities, that oaks T2 and T3 are the material cause of subsidence movements at the rear of the property.

4.3 I recommend that oak trees T2 and T3 should be felled to mitigate the subsidence damage. Other options are available, but each of them entails potential risks or costs to Billingshurst Parish Council.

4.4 Replacement trees could be planted but I recommend that they should be of a low water demand species, possibly hornbeam.

APPENDIX 1

Qualifications and Experience

Dr Martin Dobson has been engaged in research and advisory work on trees since graduating in 1986 with a BSc (Hons) Degree in Biology. Subsequent postgraduate research led to the award of a Doctor of Philosophy (DPhil) Degree in Tree Physiology in 1990.

Postgraduate studies began in 1986 at the University of Ulster and continued in 1987 at the Forestry Commission's Research Station in Hampshire and focussed on the influence of air pollution on trees. Upon completion of this research in 1989 Dr Dobson was employed by the Forestry Commission and worked in both the Tree Pathology and Environmental Research Branches. During the next six years he was responsible for Department of Environment research contracts focussing on air pollution, climate change, de-icing salt damage to trees, woodland establishment on landfills and tree root research. He has authored two books: *De-icing Salt Damage to Trees and Shrubs* and *The Potential for Woodland Establishment on Landfill Sites.* He concluded his time at the Forestry Commission as Project Manager for research into the interaction between trees, roots and clay soils which included laboratory investigations, testing of root barriers and a three-year field-scale monitoring programme investigating the influence of woodland and grassland on the moisture status of clay soils.

In 1995 Martin joined the Arboricultural Advisory and Information Service as a senior Arboricultural Advisor. The AAIS advised the (then) Department of the Environment on matters concerning amenity trees and was the principal source of technical advice and information to the arboricultural profession as well as landscape architects, engineers, the horticultural industry and private individuals. A large proportion of advisory work focussed on issues relating to tree diseases and interactions between trees and buildings.

In 1997 Martin started an arboricultural consultancy practice specialising in subsidence and tree root claims, planning and development, tree safety and disease diagnosis. He was a local authority retained consultant providing expertise on tree protection practice and legislation from 1999 - 2006 and has dealt with several thousand Tree Preservation Order and Conservation Area applications.

He has extensive experience as an Expert Witness in the High Court, County Court and Magistrates Court. Notable recent cases he has been involved in include Robbins v London Borough of Bexley and Khan v London Borough of Harrow and Kane.

From 1995 to 2011 he was an examiner for the Professional Diploma in Arboriculture for the Royal Forestry Society/ABC Awards and he is currently Lead Assessor for the Arboricultural Association Registered Consultant scheme and Chairman of its Quality Assurance panel. He has been a guest lecturer for the Middlesex University Countryside Management MSc course and for Portsmouth University. Together with Dr Giles Biddle he has devised and teaches introductory and advanced courses on trees and subsidence and co-presents seminars on trees and climate change with Professor Andy Moffat for the Arboricultural Association.

In addition to over 30 publications in scientific and technical journals he is the author of Arboriculture Research and Information Note 130/95/ARB *Tree Root Systems*, and leading author of:

Driveways Close to Trees. Arboricultural Practice Note 1. AAIS, Farnham.
Trees in Dispute. Arboricultural Practice Note 3. AAIS, Farnham.
Root Barriers and Building Subsidence. Arboricultural Practice Note 4. AAIS, Farnham.

He is a Fellow and Registered Consultant of the Arboricultural Association and is a Member by examination of the Expert Witness Institute.