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ARBORICULTURAL REPORT

23 Saxby Road, Chippenham, Wiltshire, SN15 1UB



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23rd June 2023

Prepared on the instructions of Upton Specialised Tree Services
on behalf of Wiltshire Council

MDA reference T12

Arboricultural opinion on alleged subsidence damage at 23 Saxby Road, Wiltshire, SN15 1UB

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1. Instructions

1.1 I was instructed by Upton Specialised Tree Services on behalf of Wiltshire Council on 2nd June 2023 to carry out an arboricultural assessment of alleged subsidence damage reported to have occurred at 23 Saxby Road, Chippenham, SN15 1UB. 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 lesser works, including pruning, may be a reasonable alternative;
d) If the tree(s) is/are recommended to be felled whether a replacement 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:

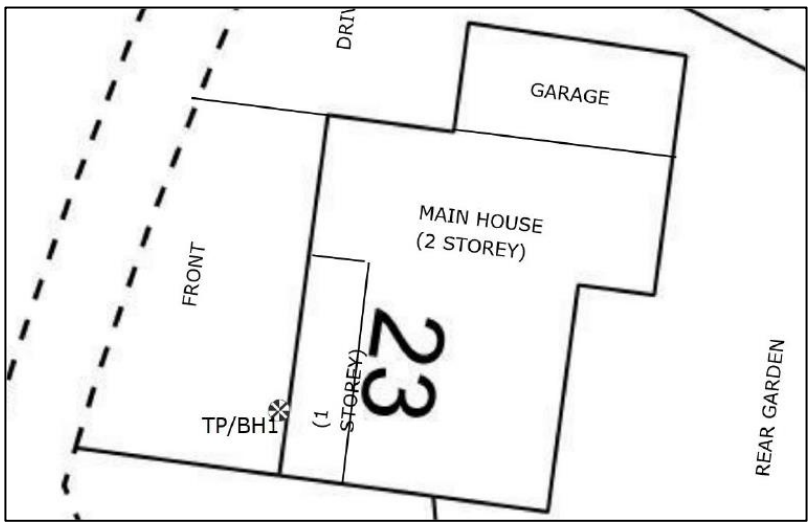
a) SubsNetUK Geotechnical Report dated 14th November 2022;
b) Environmental Services arboricultural report dated 25th November 2022;
c) Environmental Services Soil Analysis report dated 29th November 2022;
d) SubsNetUK Level Monitoring report dated 5th May 2023.

2 Introduction and review of evidence

2.1 The subject property at 23 Saxby Road is a two storey, detached dwelling with a single storey front contemporary addition. The property is part of an estate development which was probably built in the late 1980s or early 1990s. The owners noticed cracking during the summer of 2023 and contacted their insurers who in turn instructed Innovation Group to investigate. I have not been provided with Innovation's engineer's report, which should set out the location of cracking and scale of damage according to BRE Digest 251. However, I understand that damage was principally at the front right corner.

2.2 Innovation instructed SubsNetUK to carry out a site investigation and this involved opening a single trial pit at the front right adjacent to the single storey addition (Figure 1). Foundations were estimated to be around 1.8m deep by pushing a metal probe under the assumed base of the concrete. Soil below foundations to a depth of 2.9m was described as soft moist slightly sandy silty CLAY, becoming very stiff at 2.9m and too stiff to auger at 3.7m. Hand penetrometer readings at 2.9m averaged 4.3 kg/cm^2, which is indicative of tree-related soil desiccation. However, extensive examination of the soil samples extracted from the borehole yielded no evidence of roots, and none have been identified so far from below foundations.

Figure 1. Site plan prepared by SubsNetUK to show location of trial pit/borehole TP/BH1.



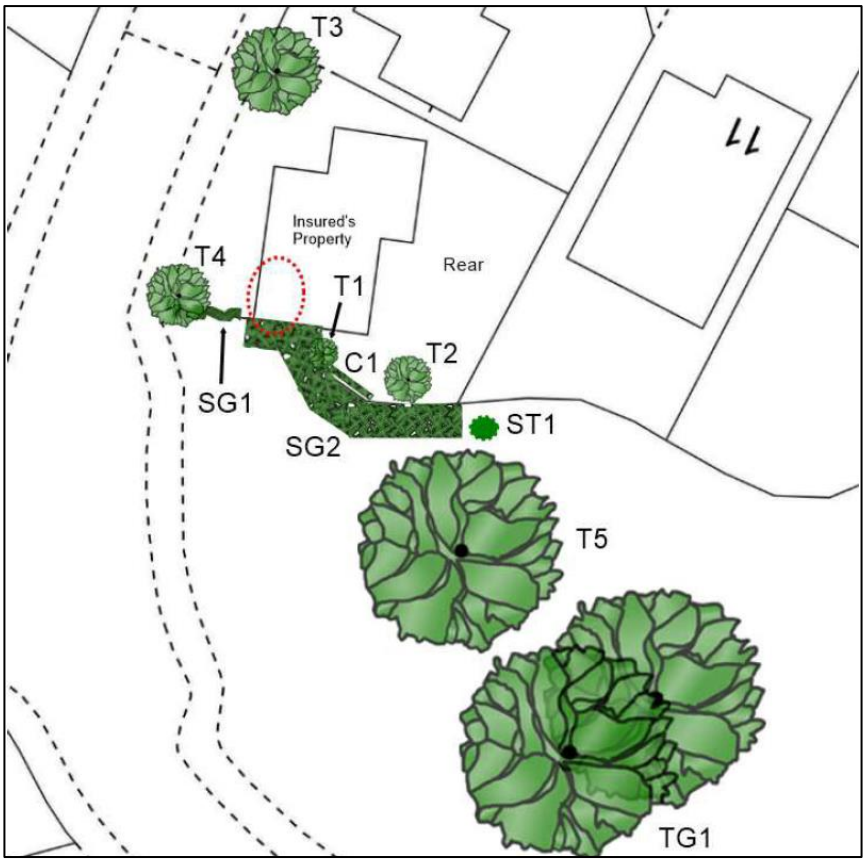
2.3 A single soil sample at 1.9m was tested for Atterberg Limits (liquid limit and plastic limit) and yielded a plasticity index of 19%, indicative of a low volume change potential clay. The plasticity index of soil in the apparently desiccated zone was not established. No further laboratory tests were undertaken to confirm whether desiccation was present.

2.4 An arboricultural report prepared by Environmental Services dated 25th November 2022 confirmed that engineers had advised that damage related to the front right corner of the property. A number of items of vegetation were near to the front right corner, including T4 Snowy mespil (3.1m tall and 4.6m away), SG1 rose and Mahonia (1.8m tall and 1m away) and SG2 various saplings and shrubs (3.2m tall and 0.5m away). It was recommended that elements of SG2 should be removed and that the other vegetation should be maintained at broadly the current dimensions. Oak T5, at rear right of the property (Figures 2 and 3), was identified as the likely cause of subsidence damage and it was recommended that it should be felled.

Figure 2. Details of oak T5, recommended to be removed.

Tree No.	Species	Age Cat	Approx. Height (m)	Distance to Building (m) *	Ownership	Action	Requirement
T5	Oak	3	18.5	14.4	B - Local Authority	Remove	Remove close to ground level and manage stump to inhibit regrowth.
Age Cat: 1 = Younger than property; 2 = Similar age to the property; 3 = Significantly older than property							

Figure 3. Site plan prepared by Environmental Services to show locations of trees/shrubs.



2.5 The arboricultural report provides a number of photographs, one of which shows cracking on the rear elevation (Figure 4) suggesting subsidence of the right hand flank wall (when viewed from the front). Subsidence cracking usually steps up towards the offending vegetation.

Figure 4. Stepped diagonal cracking in the rear wall of 23 Saxby Road indicating subsidence of the right hand flank wall (when viewed from the front).



2.6 Level monitoring commenced on 11th January 2023 and the latest reading provided is 4th May 2023 (Figure 5). In the monitoring period foundations moved upwards by around 4.25mm, focussed at marker 6 in the middle of the right hand flank wall. Upward movement confirms recovery from foundation subsidence, as no other form of structural damage involves a building moving upwards. The monitoring commenced well into the winter recovery period and therefore any recovery from subsidence from October 2022 to January 2023 will not have been recorded. The level monitoring therefore probably underestimates, by at least half, the actual foundation movement that may have occurred.

Figure 5. Results of level monitoring – more positive values indicate recovery from subsidence (location of monitoring markers are shown in Figure 6).

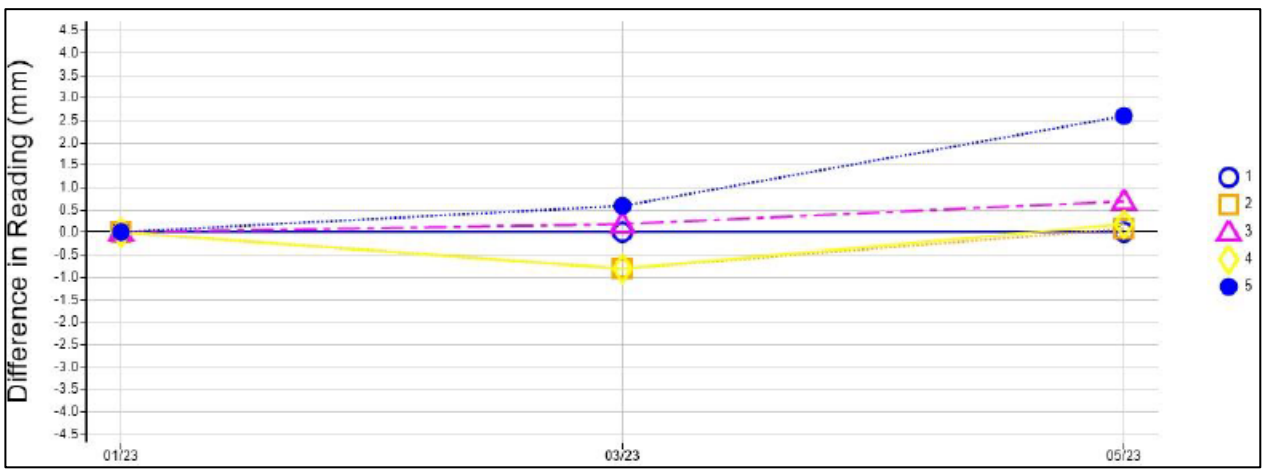


Figure 5. continued.

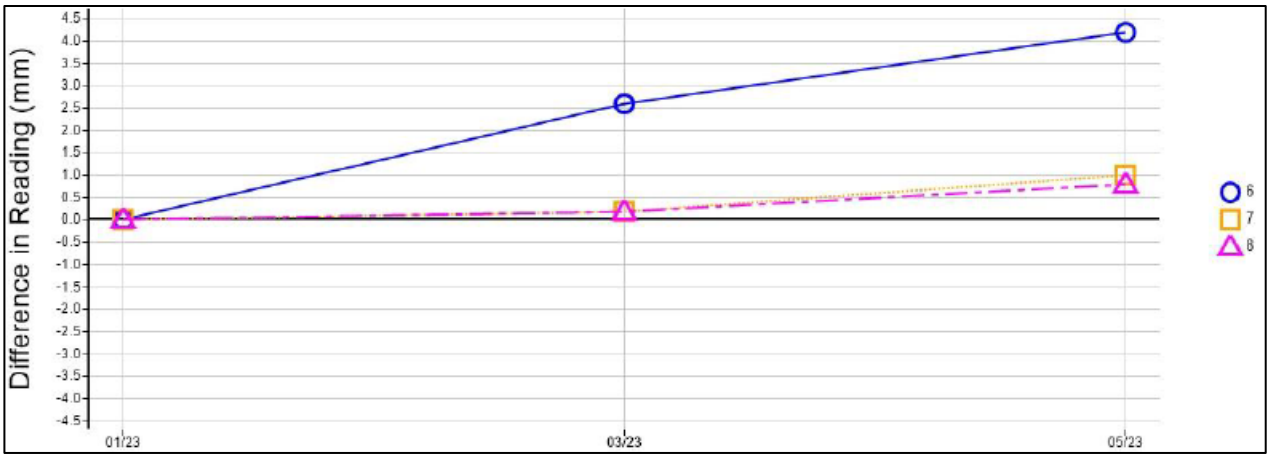
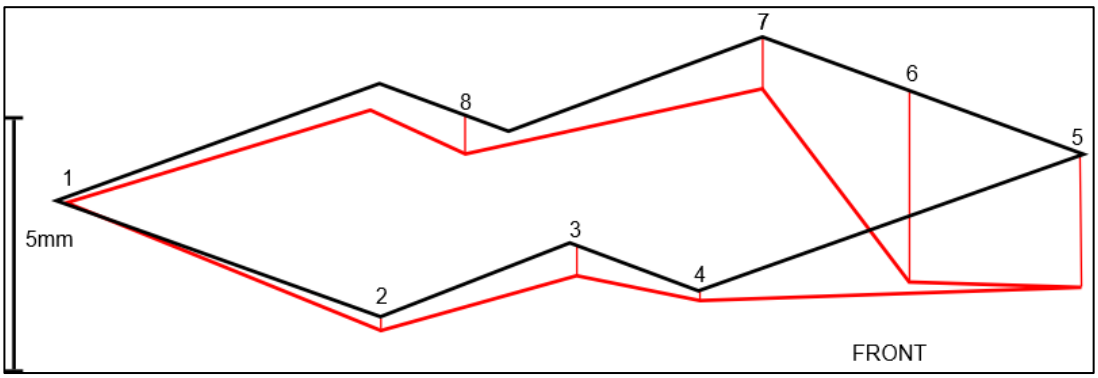


Figure 6. Isometric sketch showing the amplitude of foundation movement at each monitoring location. The movements have been shown as downward subsidence, even though only recovery from subsidence has been recorded.

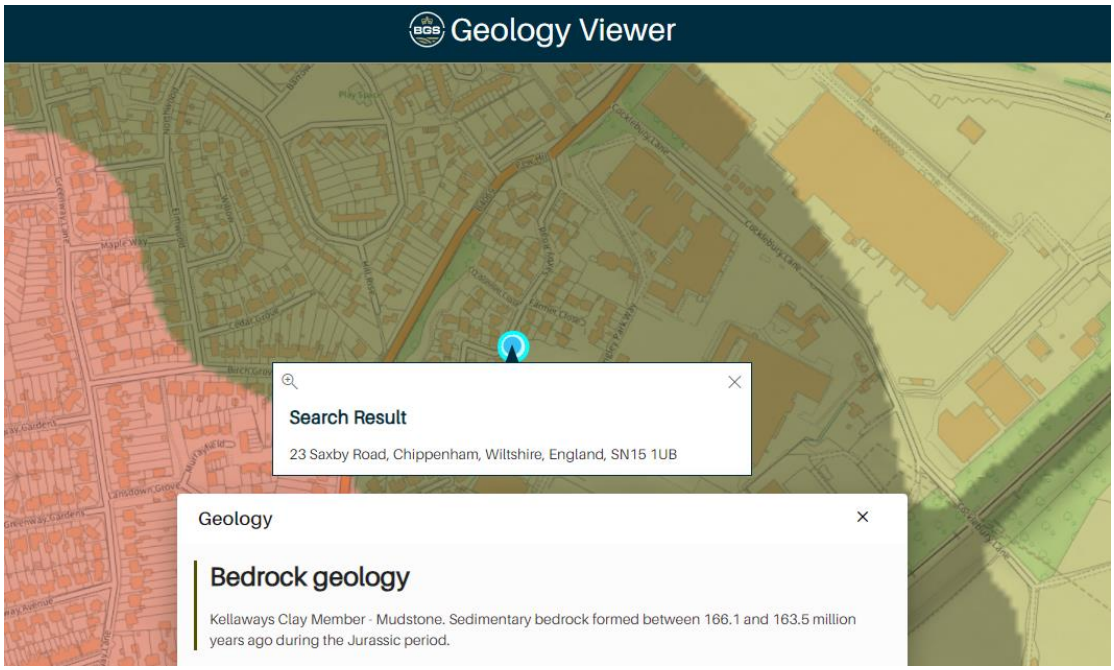


2.7 The level monitoring confirms a pattern of movement consistent with tree-related clay-shrinkage subsidence, with the building moving upwards in late winter 2022/23, by up to 4.5mm, as the soil below foundations recovered from summer drying. The actual magnitude of movements in the period up to January 2023 is not known, but they are likely to have been at least 4.25m, and probably greater than that.

3. Discussion

3.1 The evidence reviewed in section 2 above confirms on the balance of probabilities that 23 Saxby Road has suffered from an episode of clay shrinkage subsidence. The property has relatively deep foundations at the front, situated at 1.8m below ground level onto Kellaways Clay (Figure 7). Foundations under the rest of the building are probably similar, but their depth has not been established. On the assumption that the clay soil is of medium shrinkage potential (soil tests at 1.9m depth suggested low shrinkage clay) foundations are compliant with NHBC guidance. Oak trees can, and sometimes do, cause damage to properties which are compliant with NHBC, as oaks have the capacity to cause desiccation to depths of 2 – 3m, even at some distance. The small trees and shrubs near to the property (T4, SG1 and SG2) are unlikely to have the capacity to cause significant desiccation at depth, sufficient to cause 9mm or so of foundation movement. Therefore, on the balance of probabilities I consider that oak T5 is the material cause of subsidence damage.

Figure 7. 1: 50,000 scale British Geological Map indicating site is underlain by Kellaways Clay Member.



3.2 Whilst I consider that T5 is the probable cause of subsidence damage I would point out that some significant information is missing, namely, the shrinkage potential and desiccation status of the clay soil below 1.9m, the depth of foundations of the main house, and root identifications. It needs to be established that oak roots are present in the area of the worst subsidence and therefore I recommend that the claimant should be asked to provide results of a second trial pit/borehole investigation adjacent to level marker 6 (providing evidence of foundation depth,

plasticity index of the clay, desiccation, and root identification), together with ongoing level monitoring.

3.3 I estimate that foundation subsidence in summer 2022 was probably around 9mm or more. This degree of foundation movement, if attributable to oak T5, which I believe it probably is, means that, as a minimum, the tree will need to be crown reduced. My experience is that a 30% linear crown reduction can assist in abating subsidence damage in a benign summer, but that it will not sufficiently arrest subsidence movements during a hot dry summer. Thus, felling is likely to be necessary, or alternatively a 50% linear crown reduction (equivalent to a 90% crown volume reduction). If pruning rather than felling, is deployed the tree will need to be managed by pollarding in perpetuity, at intervals not exceeding three years.

5. Conclusions and recommendations

5.1 I consider, on the balance of probabilities, that 23 Saxby Road has suffered from an episode of clay-shrinkage subsidence damage.

5.2 On a preliminary basis I believe, on the balance of probabilities, that T5 oak is the material cause of subsidence damage.

5.3 However, I recommend that the claimant should be asked for further evidence to confirm the involvement of T5, namely, a trial pit/borehole at the location of monitoring marker 6 to establish the following:

1) Foundation depth;

2) Soil plasticity index at 2 – 3m;

3) Presence of desiccation below foundations;

4) Root identification.

5.4 If it is confirmed that T5 is the cause of damage then I consider that felling is justified, and would prevent future subsidence.

5.5 If the tree owner wishes to retain the tree then I consider that pruning will need to be applied as an alternative and that the pruning would need to involve a 50% linear crown reduction (90% crown volume reduction). The tree will need to be managed in perpetuity as a pollard, with repeat crown reduction at intervals not exceeding three years.

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.