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Comments on
'Review of information provided regarding the removal of a Mature Oak at 9 Barnards Way'
by Johnathan Harpham of Ethical Arboriculture dated 3 November 2021
for
Peterborough City Council

These comments are specifically in relation to the report referred to above and are not intended to form a comprehensive or self-contained report on the matter.

Summary

- **Inaccuracies within the home owner's arboricultural report cited by Mr Harpham do not affect considerations of the cause of the damage, the Council's liability or the decision whether or not to fell the tree.**
- **Issues related to the absence of planning permission for the conservatory do not affect the Council's responsibilities, not least because the damage mainly affects the original house rather than the conservatory.**
- **Mr Harpham's concerns that the level monitoring indicates heave are unfounded. The level monitoring indicates a largely typical pattern of seasonal subsidence and recovery which would be expected from tree related subsidence of this type.**
- **It is possible that removal of the tree might cause some 'one off' heave damage to adjacent buildings. It is to be expected that the home owner's representatives have taken this into account. My understanding is that the Council has no legal liability for heave damage associated with tree removal.**

Background

- There has been structural damage (cracking) to 9 Barnard Way, which is a house. The damage mainly affects the house itself, although there is some additional movement of a conservatory.
- The damage is the result of subsidence which is in turn the result of drying shrinkage of the clay subsoil that lies beneath the foundations of the house.
- The drying shrinkage is the result of tree roots taking moisture from the soil during the growing season.
- Clay shrinks when it dries (in this case as a result of moisture extraction by trees during the growing season) and then swells again when it rehydrates out of the growing season. This results in a continuous annual cycle of subsidence of the house followed by recovery.

- Oak tree roots have been found beneath the foundations, which confirms the involvement of oak trees.
- The only oak trees in the vicinity are T1 (at the rear of the house in the private garden of 9 Barnard Way and subsequently felled) and T2 (a Council owned tree at the rear of the house which is the subject of this matter).
- T2 is very substantially larger than T1. The extent of its roots would be expected to encompass most, if not all, of the footprint of this house (and the adjacent one, 10 Barnard Way).
- So long as roots continue to extract moisture from beneath this house there will be continued seasonal subsidence with associated damage.
- The proposal is to fell T2 which will allow the moisture level of the soil beneath the foundations to stabilise which will, in turn, lead to stability of the house which will prevent future damage from this cause.
- A report from Mr Harpham has been put forward by a group opposed to the felling of the tree.

Comments on Mr Harpham's report

Following the order of Mr Harpham's report:

1. Inaccuracies within the Arb Report

1.1. Tree diameter…….

I have not measured the diameter of this tree. In fairness to PRI their measurement is marked with an asterisk which is referenced below the table as 'value is estimated'. The diameter of the tree is not relevant to either causation or liability.

1.2. Moisture demand and Zone of Influence…….

Historically some arboriculturists listed the moisture demand category of the tree (high, moderate, low) and included a circular 'zone of influence' representing the hypothetical extent to which roots from the tree might influence soil moisture levels. These 'zones of influence' were usually calculated on the basis of figures contained in the guideline document *'NHBC Standards Chapter 4.2 Building near trees'* produced by the National House Building Council (NHBC) – those figures take into account the moisture demand category of the tree.

This practice of including a 'zone of influence' has now largely been discontinued because:

- The zone of tree roots (and their consequent influence soil moisture levels) does not follow such a simplistic model. Root growth is relatively random and influenced by soils, moisture, topography, natural and built features and a myriad of other factors such that the zone of tree roots is highly unlikely to be represented by a circle.
- At any specific point near to a tree the extent of rooting and root influence (which are not necessarily the same thing) may be more, or less, than the hypothetical figure and the actual extent of influence is highly unpredictable.
- A theoretical 'zone of influence' takes no account of the depth of that influence which may be highly relevant where foundations are concerned – only root influence below the foundation is relevant in matters of subsidence; root influence above the base of the foundation has no effect on the building.

- The author of the NHBC guidelines, Dr Giles Biddle, has comprehensively demonstrated that whilst the guidelines are a useful method of reducing the risk of subsidence of buildings being constructed near to trees they are a very poor predictor of actual tree behaviour / influence.

1.3. ……an immature eucalyptus is not included within the report…..

This would appear to be a young tree of about 5 metres height in the rear garden of 10 Barnard Way.

- This tree is too small and too far away for its current influence to extend beneath the footprint of this house and as a result it is not involved in the current matter.
- The 'zone of influence' of 22.5 metres quoted, insofar as it might apply at all (see 1.2 above) relates to a fully mature tree whereas this tree is only young and small and the figure quoted therefore inappropriate.

1.4. That the Oak is at fault.

- The legal case of *Loftus-Brigham v London Borough of Ealing* heard by the Court of Appeal in 2003 specifically considered the relative influences of various trees in different ownerships. It identified the test for considering whether a particular tree was the cause of the damage as *'whether desiccation from the tree roots materially contributed to the damage'*.
- Thus the oak tree is 'at fault' (with the issues of legal liability and requirement to remove it which flow from fault) if it materially contributed to the subsidence damage and the presence of any other contributory factor, such as the home owner's own oak tree T1, is irrelevant.
- Oak tree roots which are at least highly likely, if not certainly, from the oak tree T2 have been found beneath the foundations of the building. Since live oak tree roots must necessarily be extracting moisture from the soil (which is the cause of the subsidence) it follows that the Council's oak tree must be materially contributing to the subsidence damage, even if it is not the only influence, and therefore the Council's oak tree is 'at fault'. This is sufficient to engage the Council's responsibilities in the matter.

1.5. That the Oak is at fault…….tree was present at the time of planning and construction and [*the house*] should have had a foundation designed to reflect its presence.

Agreed. However, this is not a defence to legal liability going forward or, therefore, the issue of whether the tree should be removed or not in order to prevent future damage to the building.

1.6. That the Oak is at fault…….moisture demand is highly unlikely to have significantly increased …….. and ……. it is highly unlikely that the tree has vastly increased in size.

Agreed. However, as 1.5, this is not a defence to legal liability going forward. The oak tree is either a contributory factor (from which follows the issue of whether the tree should be removed or not to prevent future damage to the building) or it is not.

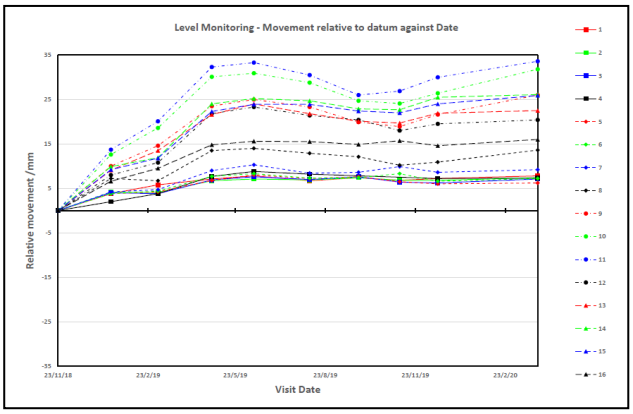
2. Condition C9

I note the position with regard to planning permission for the conservatory. However:

- The damage affects the house, not just the conservatory. Even leaving aside the conservatory the issue of whether or not the oak tree should be removed remains because, whatever arguments might or might not exist in relation to the conservatory, they do not apply to the house.
- As 1.5 the fact that the conservatory post-dates the tree is not a defence to legal liability going forward.
- The absence of planning permission is not a defence to legal liability going forward.

3. Subsidence. The level monitoring clearly indicates a positive figure across all 16 points……. A positive figure usually indicates heave rather than subsidence.

- Heave is where a previously stable building (or part of the building) starts rising as a result of rehydration and swelling of ground that was previously permanently drier than the norm. Heave is almost always associated with tree removal. Recovery is where a building that has previously subsided as a result of seasonal drying shrinkage of a clay subsoil moves back upwards towards its pre-subsidence position as the soil rehydrates and swells again. Heave occurs once (although it may take some time) whereas recovery (and the associated subsidence) will generally occur on an annual cycle until the cause of the cyclical movement is eliminated.
- It is correct that the level monitoring clearly indicates positive figures (ie above zero).
- However, whether the figures are positive or negative depends upon when, and at what stage of the ground moisture cycle, the monitoring started and is not in itself relevant to interpreting the monitoring. For example if the monitoring had started in May 2019 then the first readings thereafter would have been negative.



- Positive readings do not indicate heave (or recovery). What matters is the **pattern** of movement. Heave (or recovery) would be indicated by rising figures (whether positive or negative); subsidence is indicated by falling figures (whether positive or negative). The pattern of movement on the graph exactly mirrors the actual physical movement of the building.
- The allegation here is that the tree (on its own or in combination with others) has caused drying shrinkage of the clay subsoil. Because of prevailing weather (Mr Harpham has referred to rainfall records) the clay tends to dry, and shrink, in the summer and then rehydrate and swell again in the winter. We would expect that to be reflected in the pattern of movement of the house (reflected in turn in the monitoring). Thus we would expect the house to subside in the summer and to rise again in the winter. That is exactly the pattern of movement displayed in this monitoring.

- This pattern of subsidence in the summer and recovery in the winter is unique to drying shrinkage related subsidence (most commonly the result of moisture extraction by the roots of trees). The fact that it occurs here is proof that the cause of the subsidence is drying shrinkage of the clay soil. Since the drying shrinkage is virtually certainly the result of moisture extraction by the roots of trees it follows that the subsidence is connected with trees which, in this case, is the Council's oak tree, on its own or in combination with other trees.
- Mr Harpham has noted that the amount of movement is greater at the rear (nearer the trees) than at the front. The movement of the conservatory is greater than of the house; that is not surprising since the conservatory is nearer to the oak tree.

4. Conclusions.

4.1. …….. removal of the tree would result in further issues if heave were found to be the cause.

- Heave is not the cause of this damage. However, Mr Harpham is correct in saying that removal of the oak tree might cause heave damage (separate from the subsidence damage, or any normal recovery associated with it). Any such damage would occur over a relatively short period of time following tree removal and, unlike the continuous movement associated with the presence of the tree, would then cease, allowing the building to be repaired. Heave damage is uncommon.
- My understanding is that the Council is not liable for any heave damage to property associated with tree removal (and particularly in respect of any heave damage to 9 Barnard Way where the owner's representatives have requested that removal and must be fully cognisant with any risk of heave damage) and it does not change the Council's liability position in relation to any subsidence caused by the tree.

4.2. …….whether the Council would technically be liable for any issues with a structure that shouldn't be there.

- This does not affect the Council's position. See point 2 above.

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