Neutral Citation Number: [2012] EWHC 2257 (TCC)

Case No: HT-11-493

IN THE HIGH COURT OF JUSTICE
QUEEN'S BENCH DIVISION
TECHNOLOGY AND CONSTRUCTION COURT

Royal Courts of Justice
Strand, London, WC2A 2LL

Date: 16/08/2012

Before:

MR JUSTICE EDWARDS-STUART

- -

Between:

MRS JOSEPHINE ROBBINS	**Claimant**
- and -	
LONDON BOROUGH OF BEXLEY	**Defendant**

- -
- -

Mr Daniel Crowley (instructed by **Plexus Law**) for the **Claimant**
Mr Muhammed Haque (instructed by **Clyde & Co**) for the **Defendant**

Hearing dates: 8 & 9 February 2012

- -

Approved Judgment

I direct that pursuant to CPR PD 39A para 6.1 no official shorthand note shall be taken of this Judgment and that copies of this version as handed down may be treated as authentic.

.....

MR JUSTICE EDWARDS-STUART

Mr Justice Edwards-Stuart:

Introduction

1. This is a claim for damage to a suburban house by the roots from a nearby poplar tree, which is one of a line of Hybrid Black Poplars growing in a park owned by the Defendant ("the Council"). The nearest poplar was about 30 m away from the rear of the house.

2. The Claimant is the owner and occupier of 6 Radnor Avenue, Welling, Kent. It is one of a row of semi-detached houses on the east side of Radnor Avenue which back onto Danson Park. The poplars were planted along the boundary of Danson Park, in a line running parallel with the ends of the rear gardens of the houses in Radnor Avenue, that lies roughly north-south. Internal documents disclosed by the Defendant ("the Council") suggest that the trees were planted at some time between about 1935 and 1945: being poplars, they are therefore mature trees.

3. The house was built in about 1935 and the Claimant acquired it in 1969. It appears that in the early 1970s a two storey extension was added to the rear of the house, to which a further single storey extension was added a little later.

4. In September 2003 the Claimant first noticed damage to the property. She saw a crack in the wall of the downstairs single-storey back room and then, a week or so later, another crack in the wall of the rear bedroom on the first floor. She notified her insurers and shortly thereafter surveyors came to inspect the property: trial pits were dug and bore holes were drilled in the garden to investigate the soil conditions.

5. During the summer of 2005 the cracking became worse but further significant damage did not occur until the summer of 2006, when some of the original cracks became about 25 mm wide. Between May 2005 and May 2008 a programme of crack and level monitoring was undertaken.

6. During 2006 two other events occurred that have assumed considerable significance in this case. First, in April 2006 the Claimant removed a magnolia shrub (or tree), known as T4, that was about 2 m away from the left hand corner (viewed from the road) of the single-storey rear extension. Second, in September 2006 some of the poplars, including the nearest, known as T2, were very severely pruned.

7. During the following summer, 2007, the movement of the rear extension was very much reduced. It is the Claimant's case that this was the result of the severe pruning of the poplar T2.

8. All the experts, both engineering and arboricultural, are agreed that the cracking and movement to the rear of the Claimant's property was the result of seasonal volume changes in the subsoil caused by the extraction of moisture by vegetation. The principal issue in the case is: which vegetation?

9. The losses sustained by the Claimant, principally the cost of repairing the damage and underpinning, are claimed in the sum of £147,081.48. Subject to liability, the

amount of these damages is now agreed. In addition, the Claimant seeks £3,000 by way of general damages for distress and inconvenience. I understand that this figure is also accepted on the same basis.

10. The Council denies that T2, or any of the poplars, caused the damage. Alternatively, if it did, it asserts that it was only under a duty to act reasonably in the light of a reasonably foreseeable risk. It submits that an unusual feature of this case is that only one poplar root has been positively identified in the garden of No 6 and, even more extraordinarily, no poplar roots were found under the foundations when the remedial work was carried out. It says that in the circumstances of this particular case it was not obliged to do anything.

The procedural history

11. This claim was brought in the County Court. It came on for trial on 4 October 2011 in the Croydon County Court. The judge heard three days of evidence and the case was then adjourned to 21 November 2011. On that occasion the judge directed the arboricultural experts to renew their meetings in order to attempt to agree the extent to which the poplar T2 had been pruned in September 2006. By the end of that day the experts finalised a further joint statement. This ran to over 40 pages.

12. On the following day, 22 November 2011, the hearing resumed, both sides expecting to call the arboricultural experts. However, the judge decided to terminate the hearing and to transfer the case to the Technology and Construction Court on the ground that the latest joint statement by the experts was unsatisfactory and that the case was, or had become, far from straightforward. The judge was right: the case is not straightforward, and this has certainly not been assisted by the best efforts of the two arboricultural experts. But whether or not that justified abandoning the hearing in mid-trial and transferring the case to another court is a different matter.

13. Be that as it may, Akenhead J, as Judge in Charge of the Technology and Construction Court, directed, very properly if I may say so, that the trial should be resumed and concluded before a judge of the Technology and Construction Court at the earliest possible opportunity. It was in these circumstances that the trial was resumed before me on 6 February 2012. It was agreed that the parties should obtain a transcript of the evidence given by the expert engineers so that I could have the benefit of reading this, even though I had not heard the evidence. Since I have reached the conclusion that little turns on any differences between the evidence of the two expert engineers, this is not a course that has disadvantaged either party.

14. At this point I must turn to the nature of the vegetation in the vicinity of the property and the history of the site investigations.

The surrounding vegetation

15. Attached to this judgment, marked Appendix B (there is no Appendix A), is a plan produced by Dr Frank Hope, the arboricultural expert retained by the Council, which was appended to the first joint statement by the experts as being agreed. In

fact, as is now accepted, it contains two errors: T4 is shown on the wrong side of the garden of No 6, and T5 is in the garden of No 12 Radnor Avenue (not No 10, as shown).

16. In 2005 a vegetation survey was carried out by OCA, Consulting Arboriculturalists. They recommended the removal of magnolia T4 and poplar T2: they considered the latter to be the most likely main cause of the damage. They noted that pruning was generally damaging to tree health, longevity and amenity given the 70%-90% reduction required annually to make any difference to soil moisture content.[1]

17. In the table below details of each tree are given. Tree heights are based on estimates carried out by OCA. The distances are from the NE (rear left) corner of the extension:

Tree No	Type	Location	Distance (OCA)	Distance (Hope)	Height (est by OCA)	1.25*Height
T1	poplar	Danson Park	32 (est)	36	29	**36.25**
T2	poplar	Danson Park	[30]	[34]	24.3	**30.37**
T3	poplar	Danson Park	37 (est)	39.5*	30.2	**37.75**
T4	magnolia	Garden No 6	2.1	4	3	**3.75**
T5	oak	Garden No 12	22#	24#	12	15
T6	horse chestnut	Garden No 4	18	18.5*	9	11.25
T7	oak	Danson Park		34.5	13	16.25
T8	beech	Garden No 4		13*	9	11.25
T9	bamboo	Garden No 4		5.5*	3	3.75
T10	stump	Garden No 6		4	N/A	N/A
T11	magnolia	Garden No 8		5.2	2.5	3.1
T12	shrub	Garden No 8		5.2	2.5	3.1
T13	pear & apple (two trees)	Garden No 8		8.5	4	5

Distances in the column marked OCA were taken or estimated during the survey in 2005, but the distance to T2 is now agreed at 30.7 m (to centre of trunk). Distances in the column marked Hope were taken or estimated by the Council's expert, Dr Hope. Distances marked with * have been adjusted by me in those cases where Dr Hope appears to have measured the distance from the tree to the

[1] This observation by OCA was almost certainly based on the findings of the Building Research Establishment Horticulture LINK project No 212, published in June 2004 - see paragraph 77 below.

SE (rear right) corner of the extension (this is not always clear because in various places Dr Hope has referred to the south-western, south-eastern and north-western corners of the extension: I have assumed that the first two are the same corner). In reaching my conclusions I have taken into account the comments made by the parties on a previous draft of this table.

The distance from the building to oak T5 has been assessed by the Claimant's expert, Ms MacQueen, (from a 1:500 OS plan) as 27 m, not 22 or 24 m.

18. In the final column I have shown the height multiplied by 1.25. Where this is greater than the lowest estimated distance from the extension, it appears in bold. This is because there appears to be a rule of thumb that the zone of influence of high water demanding trees (such as poplars) is between 1.2 and 1.4 times the tree's mature height[2]. It has to be the mature height because the rule has been developed for the purpose of providing guidance on the depth of foundations required in the vicinity of a tree. It therefore has to cater for the worst case of root influence, which is assumed to be when the tree is mature. However, it is not clear to what extent this rule can be relied on in the case of a tree that has not reached its full height. I shall consider this question later in this judgment.

19. Of the trees listed in the table, it has been said that poplar and oak have a high water demand, whereas beech, horse chestnut, apple and pear are said to have a moderate demand and magnolia has a low demand. However, some experts now take the view that these water demand categories have no biological foundation[3]. For the purposes of the above table, therefore, I have treated all species of trees listed as having a high water demand. For completeness I should add that the Institution of Structural Engineers gives distances of 35 m and 30 m as the distance beyond which a poplar or an oak, respectively, is unlikely to have any influence.

The ground investigations

2003

20. In October 2003 two trial pits were dug at each corner of the single-storey rear extension. These showed that the extension was constructed on concrete strip footings which, on the left-hand side were founded about 600 mm below ground level on very dry stiff silty sandy clay (TP2). On the right-hand side it was a little deeper, founded at about 670 mm below ground level (TP1). However that footing was founded on a 50 mm thick partially reinforced concrete slab which in turn was resting on a column of fill material consisting of broken brick, particles of concrete, stones and flints, which went down to a depth of just under 2 m below ground level. Neither of the experts was certain what this was, but it appeared that it might have been an old soakaway.

---

2 The National House Building Council (as at 2003) and the Institution of Structural Engineers (as at 2000) both took a value of 1.25 times height (although the latter applies a factor of 1.66 for Willow). Ms MacQueen has taken a value of 1.2, which appears to be derived from documents published by the NHBC in 1986 and 1999.

3 See "*Tree related subsidence: Pruning is not the answer*", O'Callaghan and Kelly, Journal of Building Appraisal (2005).

21. However, its presence meant that the right-hand corner of the rear extension was supported by what almost amounted to a small pile, whereas the foundation of the left-hand corner was resting directly on London clay. In each case the trial pits extended to less than 1 m below ground level - between about 800 mm and 900 mm. The presence of the column of fill material below the right-hand corner was established by a borehole that was drilled within the trial pit (BH1). The expert engineers agreed that there was no significant desiccation in the soil in BH1.

22. A borehole (BH2) was also drilled in trial pit 2 (at the left-hand corner). The expert engineers agreed that the soil testing indicated significant desiccation in the soil between 0.7 and 1.5 m below ground level in BH2.

23. One further borehole was drilled during that investigation, in the right-hand side of the rear garden (BH3). Unfortunately, its distance from the house is unknown. In that area there was about 400 mm of topsoil resting on very dry stiff clay down to a level of 1 m. Below that was slightly moist silty brown clay. The expert engineers agreed that the soil testing indicated that there was no significant desiccation in the soil in BH3.

2005

24. A ground investigation was carried out by John Luetchford & Associates, Consulting Structural Engineers, who arranged for two boreholes to be drilled by Soiltec and a third, which they drilled themselves. All three bore holes were drilled by hand auger in September/October 2005. BH1 was in the front garden. BH2 was in the rear garden on the right-hand side some way from the rear extension. BH3 was on the left-hand side, in line with the side wall of the rear extension. In neither case is the precise distance of the borehole from the rear extension known.

25. BH2 went through clay and fine roots were noted down to a depth of 2.5 m. There were no signs of obvious desiccation. BH3 went through made ground to a depth of 0.7 m, and then went through clay down to a depth of 3.5 m, but apart from some fine roots to a depth of 500 mm no traces of roots were recorded.

26. The expert engineers agreed that the soil testing indicated significant desiccation in the soil between 0.7 and 1 m in BH3. They found no conclusive evidence of desiccation in any other boreholes.

2006

27. One borehole was drilled. It was on the left-hand side of the rear extension. It was drilled through clay, and at depths of between 0.3 and 0.5 m four roots were found that were identified as being from one or more of tulip trees, magnolia or liquidamber. Since the only one of these species in the vicinity was magnolia, these roots must have come from either magnolia T4 or from the magnolia in the neighbouring garden of No 6 (T8). These roots were described as containing abundant starch. Between the same depths one very fine root from a broadleaved species was found, but it was too decayed for positive identification.

2010

28. During this investigation, in September 2010, two bore holes were drilled, one in line with the rear wall of the extension but very close to the boundary with No 8 (BH 1). The other was drilled in the rear garden of No 4 (BH 2). Nothing remarkable was found in this borehole, but there were roots to a depth of 2.75 meters.

29. In BH1 a root from a poplar or a willow, with a diameter of less than 1 mm, was found at a depth of between 1 and 3 m. That was the only root which was positively identified as being from a poplar during the course of the various ground investigations - a point strongly relied on by the Council.

The pattern of soil desiccation

30. A notable feature of the soil investigations was that significant desiccation was observed only in the bore holes drilled in the left-hand side of the garden of No 6. The three bore holes drilled on the right-hand side (BH 1 and BH 3 of 2003, and BH 2 of 2005) showed no obvious signs of desiccation. One explanation for this was suggested by the Claimant's expert engineer, Mr Freeman. He suggested that the former soakaway (if that is what it was) under trial pit 1 was acting as a reservoir and distributing water sideways through the subsoil. This was why the subsoil in the area of the boreholes drilled in the right-hand side of the garden did not dry out.

31. It is also apparent from Dr Hope's plan that there is more vegetation to the north-east of the property than to the south-east. The three relevant poplars, T1, T2 and T3 are more or less evenly spread along the boundary. So far as the other trees are concerned there are, on any view, more trees in the vicinity of BH2 (2003) and BH3 (2005) than there are in the vicinity of BH1/3 (2003) and BH2 (2005). This could perhaps account for the significant desiccation observed at a depth of about 1 m below ground level in the former two boreholes. Since poplar T2 is more or less centrally placed at the end of the garden, one would not expect it to affect one side of the garden more than the other. However, increased desiccation on the northern side of the garden would be more likely if poplar T1 - the second closest poplar (32 m away to the north-east) - was also having an influence on the subsoil at a distance of 30 m or more.

32. On the state of the evidence I find it difficult to say which of these factors is responsible for the increased desiccation on the northern side of the garden of No 6. It is quite possible that they are each having an effect, to a greater or lesser extent. However, what this might also suggest is that no one tree is having a dominant effect on the subsoil under the northern half of the garden to the exclusion of all the others.

The movement of the foundations

The rear left-hand corner of the single-storey extension

33. The relevant readings are set out in the table below (shown as movement by reference to a datum point on the front wall of the house):

2006	2007

Date	Movement
27 June	1.6
31 July	24.2
1 September	39.6
26 September	43.2

Date	Movement
13 July	11.5*
28 August	12.5
24 September	15.4
29 October	16.5
7 May 2008	9.3

* No reading was taken between 26 September 2006 and 13 July 2007, and so a reading of 11.5 mm by 13 July 2007 assumes that the foundation fully recovered its original position during the winter 2006/07. The opinion of Mr Freeman (the Claimant's expert) is that it recovered by up to 31 mm, so that subsequent downwards movement in 2007 was less than 5 mm. By reference to the lowest recorded movement, which was at 7 May 2008, it also seems likely that the foundation did not recover its original (pre 2006) position during the winter of 2006/07 and that the true extent of the movement during 2007 was something less than 7 mm. This is in line with Mr Freeman's conclusion.

The rear right-hand corner of the single-storey extension

34. During the summer of 2006 this moved downwards by about 7 mm. The following summer it moved some 3 mm.

The experts

The engineering experts

35. The expert retained by the Claimant was Mr Tim Freeman, of Geo-Serve Ltd, and, by the Council, Mr Peter Ainsworth, of Wardell Armstrong. For the reasons that I have already explained I did not hear either of these two experts give evidence but I have read their reports, joint statements and the transcripts of their evidence.

36. There was in my view fairly little between them, at least on the points that matter. There was some debate about the explanation for the movement at the rear right-hand corner of the single-storey extension and, in addition, the dramatic difference between the extent of the movement there and that at the rear left-hand corner.

37. It is reasonably clear to me that the brick and rubble fill (or soakaway) below the rear right-hand corner of the single-storey extension would have acted like a pile and provided a much firmer foundation at that corner. Since it extended to almost 2 m below ground level, I regard it as most unlikely that the clay subsoil below it was affected to any material extent by the bamboo T9 which was growing at the boundary of Nos 4 and 6. Apart from the views of Dr Hope, there is no evidence that bamboo such as that growing in the garden of No 4 can have an effect at this depth.

38. As already noted, the maximum downward movement of the foundation at the rear right-hand corner was 6-7 mm in 2006, and probably about half that in 2007

(as noted above, there are no readings between July 2006 and August 2007, so one cannot tell to what extent it recovered during the winter of 2006/07).

39. Such movement as there was at the rear right-hand corner can be explained either by some limited shrinkage of the clay subsoil below the soakaway through moisture extraction or as a result of an increase in the imposed load. Mr Ainsworth suggested that if there was substantial subsidence at the rear left-hand corner so that the foundation at that end was effectively unsupported, that would transfer an increased load to the right-hand corner - provided, of course, that the concrete foundation remained intact.

40. That seems to me to be plausible having regard to the significant disparity between the movements of the foundation at each end: 43 mm at the left-hand corner and 6-7 mm at the right-hand corner. There may also have been some slight seasonal shrinkage of the clay below the soakaway during the dry summer of 2006.

41. But in my judgment none of this really matters. The real question is the reason for the substantial settlement at the rear left-hand corner during the summer of 2006, and the very much reduced settlement, some 6-7 mm, at the same corner during the following summer. When it was suggested to Mr Freeman that this could be what one might expect between a hot summer and a normal summer, he said

> "I understand entirely where you are coming from, and if I had ever in my life seen movements of 40 mm reduced to 6 or 7 with nothing being done to the implicated tree, I would be happy to agree with you. But as somebody who has seen more of these measurements than most people, I can assure you that's not the case."

42. The Claimant's case, as this answer indicates, is that the pruning of poplar T2 that was carried out in September 2006 greatly reduced the capacity of its root system to take up moisture from the soil during the following summer. This, says the Claimant, together with the wetter conditions in 2007, is why the movement of the foundations at the rear left-hand corner of the single-storey extension was so much reduced in 2007.

43. The two engineering experts agreed that most, if not all, the damage recorded in 2003, which appear to have worsened quite significantly between May 2006 and May 2008 was "*due to seasonal volume changes in the clay subsoil*". Further, it was agreed that:

> "the most likely, and indeed only plausible, explanation for the seasonal volume changes was moisture extraction through the roots of the nearby vegetation."

By "*the nearby vegetation*", I take the experts to be referring to all the trees and shrubs that were the subject of discussion in the case.

The arboricultural experts

44. I regret to have to say that I derived relatively little assistance from the evidence of either of the arboricultural experts. The experts joint statements, such as they

were, were for the most part discursive and argumentative and of very limited use. They produced three such statements. The second ran to over 40 pages and 72 paragraphs. However, each paragraph was divided into two parts: Ms MacQueen's understanding of the position in relation to some particular point followed by Dr Hope's understanding of the same point. In some of these pairs of paragraphs they said exactly the same thing but in others Dr Hope contradicted or qualified what had been said by Ms MacQueen. Unfortunately, one had to read each pair of paragraphs fairly closely in order to see whether or not they recorded a disagreement.

Ms MacQueen

45. Margaret MacQueen is a lead consultant arboriculturalist employed by OCA UK (the same company that carried out the 2005 survey). From 1977 to 1989 she was employed in the private sector managing both forestry and amenity trees. She then moved to local government as a Conservation Officer, which she did for 14 years. She has been with OCA since 2004. Amongst other qualifications she has a BSc and an HND in Horticulture and Landscape Technology. It was suggested that Ms MacQueen's evidence was tainted by the fact that she was an employee of OCA, the company had carried out the 2005 survey of the Claimant's property. I reject this suggestion: I do not consider that this was a factor that had any material affect on Ms MacQueen's evidence.

46. Unfortunately, however, Ms MacQueen did have a tendency to agree something at a meeting and then to retract it later. She did this on at least three occasions and, on the first of these, on a matter of fundamental importance. This concerned the probability that the defendant's tree or trees had in fact caused damage to the Claimant's house. Paragraph 27 of the first joint statement, dated 17 September 2010, recorded the following agreement:

> "We agree that applying 51% to the "Tree Roots and Buildings" data, indicates that the poplars were not having an influence on the extensions or the house.
>
> Ms MacQueen states that she believes the trees were on the edge of their peripheral zone and limit of influence."

47. On 25 January 2011 Ms MacQueen produced an Addendum Statement, at paragraph 9.0 of which she said:

> "However, it is wrong to say that because 50% of surveyed cases for poplars were located within 11m of the damaged property, therefore any poplar at a greater distance than 11m from damaged property "on the balance of probabilities" is not having an influence on the property. In other words, it is wrong to equate the 50% of cases in Cutler and Richardson with the 50% or more "on the balance of probabilities" test. I was wrong to follow this chain of reasoning. I was wrong to agree to the first sentence of paragraph 27 of the Joint Experts statement. I apologise for any inconvenience or misunderstanding."

48. She then concluded this statement by saying, at paragraph 25.0:

> "In my opinion, poplar tree T2 was were (sic) the substantial and effective cause of the damage sustained by No 6 Radnor Avenue."

49. At paragraph 16 of the first joint statement it was recorded that:

> "It is agreed that the magnolia (tree T4/T10) would have been having an influence on the building.
>
> See Areas of Disagreement for the assessment of the tree's likely influence."

Taking this by itself it is hard to see how it could be read otherwise than meaning that the tree had had some physical effect on the fabric of the building. However, under the heading "Areas of Disagreement" it was recorded that:

> "3. Ms MacQueen is of the opinion that the influence of the magnolia (tree T4/T10), would be localised to the north eastern corner of the extensions.
>
> Dr Hope is of the opinion that the tree would have been having a significant influence beneath the majority of the north eastern side of the extension, and possibly to the rear of the original building."

50. Again, Ms MacQueen appeared to be suggesting that T4 would have had some physical effect on the building, albeit very localised. However, when she gave evidence Ms MacQueen made it clear that she did not accept that tree T4 had had any influence on the building in the sense of affecting its fabric: she said that she was referring to the fact that the tree would have had an effect on the subsoil in the area of the north east corner of the building. When she was pressed in cross-examination with the question "So what influence did tree T4 have on *the building*?" she said:

> "I am in agreement with the recommendation to remove magnolia T4 because it was the closest plant. It was removed in April 2006 before it could have an effect on the subsoil in the 2006 monitoring."

51. This almost meaningless answer was, unfortunately, an example of the nature of Ms MacQueen's response to many questions asked in cross-examination. In such cases instead of answering the question directly she would make an oblique statement along the lines of the example that I have just given. I do not think that she was deliberately seeking to be obstructive, but I have to say that at times her reluctance to give a direct answer to a question could be quite exasperating.

52. The final example of an agreement that was later retracted involves the magnolia T4 and the old (but unidentified) tree stump T10. I discuss the history of the experts' conclusions about these later in this judgment, but it was an example of Ms MacQueen agreeing to something that was not in fact the case.

53. I regret to say that I did not obtain very much assistance from Ms MacQueen's evidence. Her credibility and reliability were, in my view, weakened by her willingness to agree something at a meeting only to retract it later. Further, and perhaps more importantly, I found that her reluctance to give direct answers to critical questions deprived her evidence of much of its value.

Dr Hope

54. Dr Frank Hope PhD is a forensic and planning arboricultural consultant. He has been involved in the profession for over 40 years. He trained at Wisley. His doctorate was at the University of Bath in Biological Sciences. He has held posts as a lecturer in Horticulture and Arboriculture at the Cheshire College of Agriculture and for the BTEC National Diploma course in Countryside Management. He is one of the Arboricultural Association Registered Consultants and is a Fellow of that association. He has practical experience of the management of forestry. He holds the premier qualifications of National Diploma in both Arboriculture and Horticulture.

55. In his first report, dated 1 September 2010, Dr Hope expressed his conclusion about the cause of the damage in the following terms:

> "35.17 In my opinion, there is a very high probability that the material and substantial cause of the damage was the magnolia(s) growing close to the main area of damage, not the poplars growing in Danson Park. The drains and the Bamboo could also have had a significant impact. It is not now possible to quantify the potential influence of [the] tree which was previously removed from close to the area of main damage."

56. In his second report, dated 23 March 2011, Dr Hope put it this way:

> "18.12 In my opinion, based on the evidence, the magnolia (T4/T10) was the material and substantive cause of the damage.
>
> 18.13 I consider that based on "Tree Roots and Buildings", and their proximity to the building, tree numbers "T5 - oak", "T6 - Chestnut", "T8 - Beech" and "T12 - Pear/Apple", would all be capable of affecting the building, and that the probability of these trees affecting the building would be significantly greater than the Defendant's poplars."

And, in his Conclusions:

> "22.15 In my opinion, the material and substantive cause of the damage to the building would have been the magnolia T4/T10, and the Bamboo T9. I do not believe that the Defendant's poplars were involved in any way.
>
> 22.16 I consider that the Publication "Tree Roots and Buildings" by Cutler and Richardson, indicates that there are a number of trees growing within influencing distance of the extension and house, that are more likely, on the balance of probabilities, to have been involved in the damage compared to the Defendant's poplars."

57. In the experts' joint statement dated 18 January 2012 Dr Hope's opinion was summarised as follows:

> "Dr Hope states the minor damage to the right rear corner was due to the Bamboo and the damage to the rear left corner was due to T4/T11 being material factors in 2005 and T4 to April 2006. After April 2006 until repairs were carried out T11 continued to be a material factor.
>
> Dr Hope also considers that the Pear T13 and oak T5 could have been material factors."

58. It will be noted that Dr Hope is here relying on the magnolia in the garden of No 8 (T11) as the cause of the damage that occurred in 2006. T10 is no longer referred to. However, the opinion in Dr Hope's second report disguised a disputed question of fact in relation to T4 and T10. Magnolia T4 was originally identified as a tree (or shrub) that was said by OCA in the 2005 survey to be 2.1 m from the left hand corner of the extension. On their recommendation it was removed in April 2006. T10 was a stump, not reported by OCA, which Dr Hope found at the edge of the patio close to the northern (left-hand) boundary of the garden.

59. In the first experts' meeting between Dr Hope and Ms MacQueen, which took place on 14 September 2010, they agreed the following:

> "4. Ms MacQueen confirms that the stump identified as tree (T10) in Dr Hope's report is the remains of the Magnolia (tree T4).
>
> 5. The Magnolia (T4), said by the OCA surveyor, and John Luetchford Associates, to be 2.0 metres to 2.1 metres from the building is incorrect. The stump of the Magnolia (T10 of Dr Hope's report), was measured by Dr Hope to be at a distance of 4.0 m from the *north eastern corner* of the rear extension.
>
> 6. We agree that the distance of 4.0 m between the Magnolia *and the corner*, as measured by Dr Hope on 25 August 2010, is accurate."
>
> (My emphasis)

60. In her first report, dated 30 July 2010, Ms MacQueen noted that magnolia T4 was 2.1 m from "the risk address". The Claimant's case, as put to Dr Hope in cross-examination, was that magnolia T4 had been 2.1 m from the left-hand corner of the rear extension and that the stump T10, the remains of a different tree, was 4 m away from the corner.

61. In my view, the Claimant's case, as put in cross-examination, is indisputably correct. Careful examination of the photographs (particularly those at 3/1118, 1129, 1130 and 1/261) suggests that the patio extended about 4 m from the rear of the single-storey extension and that the magnolia, T4, was a little less than 2 m away (measured parallel to the line of the garden) and about 1.2 m off to the left (because it was very close to the boundary). This is consistent with a measured distance of 2.1 m from T4 to the left-hand corner of the extension. Accordingly, the stump, which is very clearly shown to be at the edge of the patio, was about 4 m or so from the left-hand corner of the single-storey extension.

62. I asked Dr Hope to explain, when he said that the stump had been measured 4 m from the rear left corner of the property, what he meant by the "rear left corner of the property". His answer was this:

> "As I said earlier, it was the point of the corner of the two-storey - where the two-storey and single-storey buildings butted together."

63. I then pointed out to him that there was no corner at that point, with which, after examining the relevant photographs, he agreed. Dr Hope then said that the point from which he was measuring was where the single-storey extension joined the two-storey extension. This answer was particularly surprising because in the first

joint statement Dr Hope and Ms MacQueen had agreed that the convention regarding measuring distance is between trees and buildings was to take the measurements from the centre of the trunk of the tree to the nearest position on the building, a convention that Dr Hope emphasised in the course of his evidence. On the basis of his own evidence, Dr Hope's measurements of the distances from the building to the magnolia T4 and the stump T10 did not conform to this convention. In addition, it is hard to see what "corner" was being referred to in paragraphs 5 and 6 of the first experts' joint statement, which I have set out above, unless it was the rear left-hand corner of the single-storey extension. Another relevant point was that the magnolia T4 was recorded by OCA as having a diameter of 80 mm, whereas according to Dr Hope the stump T10 had a diameter of 200-250 mm. If these observations are correct, and I can think of no reason why they should not be, then magnolia T4 and the stump T10 could not have been the same plant.

64. Whether or not Dr Hope genuinely believed at one time that magnolia T4 and the stump T10 were one and the same plant I do not know. But at some point he seems to have convinced himself that they were and, when this became the subject of challenge, he reconciled the various measurements by saying that he had measured the distance to T4 from the point where the single-storey met the two-storey extension (which could plausibly have produced a measurement of 4 m, instead of the actual distance of 2.1 m).

65. This was not the only example of Dr Hope relying on measurements that were subsequently shown to have been incorrect. In his first report he asserted that the distance from the rear extension to poplar T2 was 33.95 m, and not 30 m as measured by OCA. The issue was finally resolved when the Claimant's expert engineer had the distance re-measured. It was 30.7 m from the left-hand corner of the rear extension to the centre of the trunk.

66. Although it is not known when the tree that grew from the stump T10 was chopped down, it was clearly well before 2006. As I have said, the magnolia T4 was removed in April 2006. Thus neither tree was in existence at the time of the significant movement to the rear extension during the summer of 2006. It is not in dispute that the moisture that tree roots absorb from the soil is transported through the tree and is either used in the photosynthesis reaction or evaporated by transpiration through the leaves. That is why in winter deciduous trees take up almost no moisture.

67. However, in his first report Dr Hope expressed the opinion that

> ". . . movement to the extensions would have occurred after the magnolia was removed in any event, and the movement cannot be used to attempt to assert that the tree was not the material and substantial cause of the damage."

68. The basis of this opinion was not explained in that report and it still remains wholly unclear to me. To the extent that there is an answer I conclude that it probably lies partly in the statement of Dr Hope's position recorded in the joint statement of 18 January 2012 which I have set out above. That is to say that magnolia T4 had an influence during and before 2005, but not in 2006. In fact,

contrary to Dr Hope's initial view, the experts agreed on 18 January 2012 that T4 had no effect on the building after it was cut down.

69. It is therefore now quite clear that magnolia T4 could not have been responsible for any shrinkage of the soil below the extension that occurred during the summer of 2006. Self-evidently, neither could the stump T10 have been responsible for it.

70. I find that Dr Hope's flawed conclusion in his first two reports that T4 and T10 were the same tree, a magnolia, and the errors in some of his measurements, coupled with his implausible justification for them, are damaging to his reliability and objectivity as an expert.

71. Since the experts agreed that the horse chestnut T6 was unlikely to have been having an adverse influence on the extensions to the Claimant's house, the remaining potential candidates for the cause of the damage put forward by Dr Hope were the magnolia T11, the pear T13 (both in the garden of No 8), the oak T5 (in the garden of No 12, but wrongly shown by Dr Hope to be in the garden of No 10) and the Beech T8 (in the garden of No 8). Of these trees, the only species that has a reputation for causing damage to buildings is oak.

The technical literature and data

72. Both parties referred me to a well-known tree root survey, the results of which are in "*Tree Roots and Buildings*", 1981, by Cutler and Richardson. The authors studied a significant amount of data relating to damage by trees. They recorded, in relation to each type of tree studied, matters such as the maximum tree-to-damage distance recorded, normal maximum height in shrinkable clay in urban areas and the number of cases in the sample. As I understand their methodology, the samples represented a shortlist from all of the notifications received in which all the relevant data were thought to be reliably recorded. In the case of poplars, there was no recorded case of damage occurring at over 30 m. That was based on a sample of 191 cases (extracted from over 1000 notifications received). They noted that poplar roots went deep in clay soils. In the case of magnolia, the maximum tree-to-damage distance recorded was 5 m. However this was based on only 2 reliable cases (out of 14 notified). In the case of horse chestnuts, the maximum tree-to-damage distance recorded was 23 m, based on a sample of 63 cases. The authors said that little was known about the rooting habit of horse chestnut trees in clay soils, but it was thought to be relatively shallow to a moderately deep. A further study involving a much greater number of samples substantially validated the conclusions of the original work about the range of influence of the particular types of tree.

73. It is clear from the evidence as a whole that Cutler and Richardson is widely regarded as authoritative in terms of the distance at which particular species of trees can cause damage. In other words, if a tree is further away from a damaged property than the maximum tree-to-damage distance recorded for that type of tree, then it is usually assumed that damage at that distance was not reasonably foreseeable. That is an assumption that, in the context of this case, I will have to discuss further in this judgment.

74. I have already mentioned publications by the National House Building Council and the Institute of Structural Engineers which give the zones of potential influence on foundations for various species of tree. These zones of influence are expressed as a multiple of the height of the mature tree, usually 1.25. The purpose of such publications is to provide guidance to builders.

75. The 2003 guidance published by the National House Building Council describes the mature height of the tree as being that to which a healthy tree of the species may be expected to grow in favourable ground and environmental conditions. For trees that are not mature, it is suggested that in the case of trees the height of which is more than 60% of the mature height, the tree should be treated as having reached its mature height for the purpose of assessing the likely range of influence of its foundations. Mr Mohammed Haque, who appeared for the Council, submitted that it is not realistic to assume that there is a sudden spurt in root growth when the tree reaches 60% of its mature height: I agree, but this is not the assumption being made. As I understand it, the NHBC is assuming - as a conservative assumption - that full root spread is to be treated as having been achieved by the time the tree reaches 60% of its eventual likely height. Or, to put it another way, at heights below 60% of mature height, root spread can be assumed to be roughly 1.25 times the actual height.

76. I was wholly unable to extract from Ms MacQueen any coherent answer as to how the 1.25 times the mature height rule should be applied, if at all, to trees that have not reached the mature height. Common sense would suggest that there must be some relationship between the height of any particular species of tree and the lateral extent of its roots, although there is no reason to assume that the relationship should be linear. In these circumstances, I propose to adopt the 60% approach recommended by the NHBC.

77. Ms MacQueen relied heavily on a report of the Building Research Establishment Horticulture LINK project 212, entitled "*Controlling water use of trees to alleviate subsidence risk*" (referred to as "Hortlink") dated May 2004. The project involved a series of experiments conducted over a five year period. Its aim was to improve the understanding of how isolated amenity trees use water, and to determine whether reduction in canopy leaf area and root-restriction were sustainable ways to control growth and reduce water uptake from soil. The tree species used in the project to determine the effects of pruning were mature wild Cherry (8 m in height) and London planes (20 m in height).

78. One conclusion of the study relevant to this case was that severe crown reduction - that is, a reduction in the crown size of 70-90% - did reduce soil drying by trees for up to two years. Ms MacQueen sought to demonstrate that the pruning of poplar T2 in September 2006 reduced its crown volume by over 80% so that it would have had the effect of reducing the moisture taken up from the soil during the following season. This, she said, explained the greatly reduced foundation movement of the single-storey extension during 2007, thereby showing that poplar T2 was a material cause of the moisture extraction from the subsoil below the foundations in 2006. This represented a fairly significant change in position by Ms MacQueen because in September 2010 she had agreed with Dr Hope that the crown reduction of the poplars by 25% in September 2006 would not have had any significant influence on the moisture removal of trees.

79. I should explain that at this point that those involved in pruning trees often specify the percentage reduction as a reduction in overall branch length. This does not produce the same percentage reduction in canopy volume. For example, the British Standard, "Tree work-Recommendations" (BS 3998:2010) states that a 30% reduction in crown volume can be considered to be approximately equivalent to a 12% reduction in overall branch length (ie. radial distance). The Hortlink report indicates that a 30% decrease in the height of the crown equates to a reduction in canopy volume of 72%.

80. From this I infer that a 25% reduction in overall branch length will result in a reduction in canopy volume of about 55-65%, which is below the level of reduction required to make major difference in moisture uptake. A reduction in overall branch length of at least 30% would be required to produce a reduction in the volume of the canopy of more than 70%. The relevant conclusions from the Hortlink study were expressed as follows:

- Total tree and water use (transpiration) was reduced by crown-reduction and unaffected by crown-thinning in the year of pruning.

- Crown-reduction reduced soil drying by trees in the year of pruning, but the effects were generally small and disappeared within the following season, unless the reduction was severe, in which case the effects were larger and persisted for up to two years.

The authors therefore recommended that:

- For practical soil moisture conservation, severe crown-reduction 70-90% of crown volume would have to be applied. Reduction of up to 50% crown volume is not consistently effective for decreasing soil drying.

81. In my judgment the results of this study have important implications for the prevention of damage by tree roots. Prior to the study it appears to have been the received wisdom that any significant pruning of trees would reduce the moisture taken up by the roots, with the result that a regular cycle of pruning could reduce the risk of subsidence. The Hortlink study shows that such a general assumption is not well founded. Unless the extent of the pruning is very severe, that is over 70% of crown reduction by volume, the effects will not be significant. Further, even such extensive reduction may not have an effect for more than two seasons.

82. An article entitled "*Tree-related subsidence: Pruning is not the answer*" by O'Callaghan and Kelly, published in the Journal of Building Appraisal in 2005, was also referred to, particularly in the context of soil moisture deficit. It contains a useful description of how moisture is extracted from clay soils:

> "Clay soils are distributed across the UK but are concentrated in the south and east. Clay is a complex chemical medium and its primary interest, in biological terms, relating to plant water use is that clay intercepts precipitation and binds water to its structure against gravitational energy. Plants, including deciduous trees, can access a percentage of the groundwater and it is the shrinking of the clay volume as water is removed that can lead to movements in any structure founded on clay. It is important to appreciate that it is the volume of water in the soil that changes and not the clay itself."

83. Dr Hope said in evidence, and I see no reason to doubt it, that he would expect the downward movement of a foundation to track the change in soil moisture deficit (SMD) so that there would be a linear relationship between the two. There is indeed a remarkable correlation between the foundation movement of the rear left-hand corner of the extension during the summer of 2006 and the SMD for MORECS square 162: this would suggest that during that summer the garden of No 6 was behaving as a typical deciduous tree area in that square[4].

84. There is no similar correlation for 2007. Whilst between the beginning of July and the beginning of October 2007 the SMD increases from 125 mm to 250 mm, the corresponding downward movement of the foundation was only about 6 mm. The curve for the subsidence was much shallower than the curve for the SMD. The true explanation for this is an issue at the heart of this case. The Claimant contends that it was the pruning of T2 at the end of 2006 that reduced the extraction of moisture from the soil during the summer of 2007.

85. Dr Hope contends that the relatively low amount of foundation movement is because 2007 was much wetter. In evidence he said this:

> " Now, we need to go further than that because what we've got is this 150 mm deficit throughout the winter [2005/2006] and when you take the combination of the very early spring drought as well, and significant desiccation, the movement of that being downwards was inevitable it had nothing to do with any of the vegetation. It wasn't affected by the poplar. It wasn't in effect really affected by the magnolia either. We know that it dropped because what happened is this, is that the soil moisture deficit of 150 mm was teetering - or the building was teetering - on the point where further movement would have to occur, and as soon as you get any more drying of the soil from that point, which you have got a massive amount of drying, the building would have had to have moved."

86. He went on to explain that, although the SMD reached over 300 mm by the end of the summer of 2006, having started the summer with a deficit of 150 mm the actual increase in SMD was only 150 mm, not 300 mm. He said that this meant that you did not need to have a massive amount of additional moisture taken out of the soil during the summer of 2006 in order to cause significant movement of the foundations of the extension. He said that the neighbouring magnolia in the garden of No 8 would have been quite capable of doing that.

87. Another paper relied on, but much earlier, published in the Arboricultural Journal 1995, was "*Dead or alive? Is it* really *that simple?*" by Ian Richardson. The summary states that a root's dead or alive status is best assessed by eye immediately after excavation. The author notes that the iodine test for starch is a long-established chemical technique used to test for live status of plant material.

---

[4] For the purposes of the MORECS data the United Kingdom is divided into squares, each 25 miles square. Within each square there are sample areas of different types of vegetation which are monitored for soil moisture deficit (SMD). In this case the correlation is between the SMD readings from about the beginning of June 2006 to the beginning of August 2006. However, whilst the MORECS data for deciduous tree areas consist of a number of readings, there are only 4 readings for the foundation movement between about the beginning of July and the beginning of October 2006. Accordingly, the correlation may be closer on paper than it was on the ground - it is not possible to say.

It can be spectacular because in the presence of iodine starch turns violet. However, roots have been found to contain starch from trees felled years or even decades earlier. In soils such as firm clay, peat or dry sand conditions anaerobic or acid conditions can reduce microbial activity so that there is little decay in the starch content over time. This is of course a little curious, because if there was little or no available oxygen in the soil the root could not be expected to have grown in the first place.

88. I consider that the starch content in a root is only likely to be preserved in situations where the soil conditions have altered soon after the tree was felled so as to reduce the available oxygen and thereby greatly diminish any relevant microbial activity. There is no evidence that such a change of conditions might have taken place in the garden of No 6.

89. The relevance of this is in relation to the origin of the magnolia root that was found in BH 1 of 2006. At a depth of between 0.3 and 0.5 m, four roots were found which were most likely to have been from a magnolia. They had a diameter of about 9 mm and were noted as having abundant starch. The question was whether these roots were from T4 that had been felled some 6 months earlier, or from T11 in the garden of No 8. T11 has been estimated as being 5.2 m from the left-hand corner of the rear extension, although since this is a measurement made by Dr Hope I cannot be entirely certain from precisely what point on the rear extension he took it. If as I suspect, it was from the rear left-hand corner, then some adjustment would need to be made because that was not the position of BH 1. It is now known that BH 1 was drilled in the patio alongside the rear extension. I consider that the actual distance from the borehole to T11 is likely to have been about 5 m.

90. The soil described in the borehole report to a depth of 1 m is either soft/firm or soft brown clay, with occasional dark brown bandings of silty organic soil and some gravel. This description does not suggest anaerobic conditions. Accordingly, I consider that it is unlikely that roots in this soil would show abundant starch some 6 months after the parent tree had been felled. In my judgment, therefore, it is more likely than not that these roots are from magnolia T11, rather than from the removed T4. I therefore agree with Dr Hope on this point.

91. An article written by Mr Freeman for the Clay Research Group, entitled "*Patterns of Ground Movement at Aldenham*", published in June 2011, noted that ground movement lags behind soil drying by a month or so. Measurements of seasonal movement in the soil around a tree for five seasons, starting in 2006/07, were taken for an oak and a willow. In relation to the latter, during 2006/07 there was downward movement of 43 mm. During the following year the corresponding movement was 28 mm (these measurements were an average of measurements taken at distances of up to 1.2 times the height of the tree).

92. This was relied on by the Claimant to show how the movement in the two seasons compared when the relevant tree, in this case a willow, remained in place. Assuming that the patterns of rainfall in Aldenham were similar to those at Danson Park, the measurement of 28 mm at Aldenham compared with that of about 5 mm at No 6 suggests that the removal of T2 (and/or T1) did have a

significant effect on soil moisture levels in the garden of No 6 during the summer of 2007.

Ms MacQueen's reliance on Hortlink

93. Ms MacQueen carried out an exercise in order to assess the canopy volume reduction of T2 that took place in about September 2006. She did this by comparing measurements of the canopy taken by OCA in October 2005 with a silhouette photograph of the tree taken by Mr Freeman in January 2008. She presented this in diagrammatic form showing the tree with an almost spherical canopy in 2005 and a much smaller ellipsoidal canopy in 2008. Effectively she assessed the cubic volume reduction between the one and the other. She did this using a percentage reduction basis. Her calculations produced a result of 83.5% as the volume reduction.

94. This calculation attracted much criticism from Dr Hope and the Council, particularly as to the dimensions derived by Ms MacQueen from the two surveys. However, I do not find it necessary to decide whether or not Ms MacQueen's figures are right or wrong because I am not persuaded that she has carried out the correct calculation. In order to calculate the volume of an ellipsoid it is necessary to multiply the radii in each of the three planes (that is the x-axis, the y-axis and the z-axis) and then multiply the total by $4/3\pi$. Ms MacQueen accepted that this was correct. However, Ms MacQueen took one of these radii twice and omitted the third.

95. When I recalculated Ms MacQueen's exercise using the same variables for the radii that she had taken, but using the formula for the volume of an ellipsoid instead of Ms MacQueen's percentage reductions, I arrived at the same answer. However, when I did the calculation again using the radii for the x-axis, the y-axis and the z-axis, the answer was a 73% reduction.

96. Ms MacQueen's answer to this was that she followed the method used by Hortlink to determine the canopy leaf area. The report stated that a cylindrical model was used for the crown-reduced trees and that the diameter of the cylinder was defined as "*the width to where the majority of the branch tips ended at the base of the canopy*", extremities excluded. It is not clear to me from Miss MacQueen's diagram, which clearly shows an ellipsoid and not a cylinder, whether she has adopted precisely the same approach to assessing the width of the canopy as that adopted by Hortlink. On its face, her diagram shows two ellipsoids - one before pruning and the other after pruning. Treating both as cylinders of the same respective diameters will significantly increase the apparent reduction in volume.

97. Since a 73% reduction is close to the point below which the Hortlink study shows that a crown reduction has limited effect, it is apparent that the conclusion to be drawn from the exercise is very sensitive to the mathematical model adopted for calculating the reduction in the canopy. Further, if there is any force at all in Dr Hope's criticisms of the dimensions used by Ms MacQueen, then the exercise ceases to be of any value at all. One of Dr Hope's criticisms, which I accept, is that dimensions given to 2 places of decimals suggest a precision in measurement which cannot exist.

98. The Council put in a calculation of its own, using what it regarded as realistic dimensions, that yielded a volume reduction of 58%. In my view, this does no more than demonstrate the obvious: namely, that the outcome is very sensitive to the values taken for the variables.

99. In my judgment, Ms MacQueen's calculations, taken on their own, provide no sound basis for a conclusion that the reduction in canopy volume achieved by the pruning that was carried out in the autumn of 2006 would have made a significant difference to the tree's ability to absorb moisture from the ground during the following summer. However, I do accept the separate point made by Ms MacQueen that on any view the pruning would have delayed the bud burst the following summer by some 4-6 weeks.

100. But as events have turned out, this debate has now become academic. Dr Hope agreed, in his first report, that the pruning of T2 in September 2006 amounted to "*considerably more than a 25% crown reduction*". In addition, both experts agreed in evidence that the pruning in 2006 involved the removal of all the leaf bearing shoots on the tree. On any view, this was a very severe pruning indeed.

Which roots caused the damage?

101. In this part of the judgment I will consider only those trees that have been put forward by one or other expert as being responsible, wholly or in part, for the damage to No 6. At this point it is necessary to bear in mind that all experts are agreed that the damage to the house has been caused by the extraction of moisture from the London clay below the foundations by the roots of trees or other vegetation: this is not a case where it is alleged that the sole cause was the weather (or some other factor). The direct evidence for the involvement of any particular type of tree is very limited: magnolia roots have been found in one borehole and a poplar root in another. Otherwise, the roots that have been found have in general not been identified.

102. This is one of those cases where the court must choose between one or more of a limited number of potential identified causes - in this case the various species of tree: as the experts have agreed, it is not a case where there might be unknown causes. Of the known potential causes, the court must choose as the most probable cause the candidate (or candidates) that is the least unlikely.[5]

103. In relation to the relevance of the presence or absence of any particular type of tree roots, the arboricultural experts agreed that:

> "The apparent presence or absence of roots beneath a property as determined by trial pit and borehole investigations typical of subsidence claims does not in itself establish whether any particular tree or shrub is a material cause of damage under investigation or not."

Magnolia T11

---

[5] See the discussion of the authorities on this topic in *Milton Keynes v Nulty* [2011] EWHC 2847 (TCC), at 216-219.

104. I have already found that the magnolia roots found in BH 1 were from T11, and not from the removed T4. Whilst I consider that a strict interpretation of the Cutler and Richardson data is not always appropriate, it is relevant to note that only two cases of damage by magnolia roots were recorded in their survey, and that both of these were at tree-to-damage distances of less than 5 m. Magnolias do not have a reputation for causing damage to buildings.

105. In this case the roots were found at a depth that is some 200 mm or more above the footings of the foundations to the rear single-storey extension and about 1 m away from the left hand corner of it.

106. Dr Hope has not provided any convincing explanation as to why these roots should have damaged the building. He appears to have given no consideration to their depth or their position in relation to the left-hand corner of the rear extension. I am not persuaded that, as a matter of probability, these roots had, on their own, any significant effect on the shrinkage of the clay subsoil below the foundations at the rear left-hand corner or anywhere else below the foundations of the rear extension.

Pear T13

107. This tree is 4 m high and is 8.5 m away from the left-hand corner of the rear single-storey extension. The NHBC table gives the mature height of a pear as 12 m, so this tree is less than 60% of the mature height. Multiplying the actual height by 1.25 produces a zone of influence of 5 m, considerably less than the distance of 8.5 m to the rear extension.

108. No roots from a pear tree have been identified in the garden of No 6. If the zone of influence is only 5 m, this is only to be expected.

109. Dr Hope has not given any reason as to why a 4 m high pear tree might be expected to have an effect on the subsoil over 8 m away. He has simply asserted that the maximum tree-to-distance by Cutler and Richardson is 10 m, so that T13 comes within it. In the absence of any information in Cutler and Richardson about the heights of the trees which caused damage, I consider that the 10 m maximum range cannot be assumed to apply to every pear tree irrespective of its height.

110. For these reasons I consider it very unlikely that tree T13 has had, at least on its own, any influence on the foundations of No 6.

Oak T5

111. This tree was measured as being 12 m high and 22 (or 24) m away from the left-hand corner of the rear single-storey extension. The mature height of an English oak is given in the 2003 NHBC table as 20 m (no one has suggested that this is a Holm oak, which has a mature height of 16 m). 60% of the mature height is 12 m. Applying the NHBC guidance it would be appropriate to apply the factor of 1.25 to the actual height.

112. This produces a range of influence of 15 m, which is considerably less than the distance from the tree to the left-hand corner of the rear single-storey extension. No oak roots have been identified in the garden of No 6.

113. Whilst oaks are known to be responsible for causing damage to buildings, I consider that it is unlikely that T5 has been responsible for any damage to No 6. If, contrary to this conclusion, it has made a contribution, I consider that it is likely to have been a minor contribution.

Oak T7

114. The experts agreed that this tree had not had any influence on the house or the extension.

Beech T8

115. This tree was measured as being 9 m high and I estimate that it must be about 13 m away from the left-hand corner of the rear single-storey extension (see the notes to the table of distances above). The mature height of a beech is given in the 2003 NHBC table as 20 m. 60% of the mature height is 12 m. Applying the NHBC guidance it is appropriate to apply the factor of 1.25 to the actual height, which gives 11.25 m.

116. A range of influence of 11.25 m is less than my estimate of the distance from the tree to the left-hand corner of the rear single-storey extension. No beech roots have been identified in the garden of No 6.

117. I consider that it is unlikely that T8 has been responsible for any damage to No 6. I note that in the first experts' joint statement Dr Hope did not expressly disagree with Ms MacQueen's view that the beech was not influencing the building. This confirms my view.

Horse Chestnut T6

118. This tree was measured as being 9 m high and is about 18 m away from the left-hand corner of the rear single-storey extension. The mature height of a horse chestnut is given in the 2003 NHBC table as 20 m. 60% of the mature height is 12 m. Applying the NHBC guidance it is therefore appropriate to apply the factor of 1.25 to the actual height, which gives 11.25 m.

119. A range of influence of 11.25 m is considerably less than the distance from the tree to the left-hand corner of the rear single-storey extension. No horse chestnut roots have been identified in the garden of No 6.

120. I therefore agree with the experts that it is unlikely that T6 has been responsible for any damage to No 6.

Bamboo T9

121. I am at a loss to understand how the Bamboo in the garden of No 4 can possibly have affected the subsoil under the left-hand corner of the rear single-storey extension which is some 5 m away. There is no evidence whatever that Bamboo

can affect foundations at this distance and nowhere has Dr Hope explained the mechanism by which it might do so.

122. The foundations to the right-hand corner of the rear single-storey extension rest on rubble fill which extends to nearly 2 m below ground level (the possible soak away). I am not aware of any evidence to suggest that Bamboo could affect the subsoil at this depth. I therefore reject the suggestion that this bamboo had any material effect on the foundations of No 6.

The poplars - T2 in particular

123. Hybrid black poplars have a mature height of 28 m and, applying the NHBC factor of 1.25, a range of influence of 35 m. However, Cutler and Richardson have not recorded any case where a poplar has caused damage to a building at a distance of over 30 m. T2 is 30.7 m away from the left-hand corner of the single-storey rear extension (measured to the centre of the trunk) and 24.3 m high.

124. Applying the factor of 1.25 to its actual height gives a range of influence of 30.4 m - 1% less than its actual distance.

125. Unlike any of the other trees present in the vicinity, the poplars in Danson Park have given rise to claims in the past. One of the better documented claims is that in relation to No 10, which was made in 1996/97. There were three large mature poplars fairly close to it: one at a distance of 33.2 m, another at a distance of 35 m (23 m high) and the third was at a distance of 34 m (31 m high). Two trial holes were dug in the garden of No 10: one at the left-hand rear corner of the building (TH1) and the other at the left-hand rear corner of a garage in the garden (TH2). Root samples were retrieved from each trial pit were then sent to a laboratory for analysis.

126. One root in TH1, found at a depth of 0.8 m below ground level, was identified as a poplar. One root in TH2, at a depth of 0.15 m below ground level, was also identified as a poplar.

127. Crack damage had occurred below the kitchen window in the rear extension and at the junction of the rear house wall and the two-storey extension the cracking was 10 mm in width. In the garage there were numerous fractures to the floor slab, and there was evidence of movement at the rear corner of the garage.

128. In my view this is the clearest possible evidence that the roots of these hybrid black poplars can extend to distances of some 33-35 m from the tree. It suggests also that they can cause damage at those distances. However, since the causation of that damage has not been investigated in this trial I am not in a position to make any positive findings about it.

129. Another property where the claim has been fairly well documented is No 36 Radnor Avenue. There were two mature hybrid black poplars near the property: according to an internal memo of the Council dated 11 July 1997 one was 33 m away from the rear wall of the house and was 27.6 m high, and the other was also about 33 m away from the house and was 25 m high. By early 1998 trial holes

had been dug in order to establish whether there was any root growth under or adjacent to the property.

130. In one trial hole poplar roots were recovered at depths of 1 and 1.6 m below ground level. In the other poplar roots were found at depths of between 1 and 1.7 m. This evidence, from the Council's own files, again shows very clearly that by early 1998 the Council was aware that roots from the poplars in Danson Park had been found at distances in excess of 30 m from the trees.

131. In February 1998 loss adjusters acting for the Council's insurers wrote to the Council to say that the poplar trees which had been previously dealt with in 1996 were continuing to exert an influence upon the subsoil supporting Radnor Avenue. An internal note of the Council recorded that the largest tree was approximately 35 m from the rear elevation of No 62. The writer suggested that the soil shrinkage and movement to that property had been caused by the dry summer and winter of 1996/97 and inadequate foundations. However, the Council decided nevertheless to crown-reduce the two largest poplars.

132. In my view, by early 1998 (at the latest) the Council were on notice that roots from the poplars in Danson Park had been found at distances of 33 m or more from the trees and were alleged to have caused damage. The owners of at least four properties had made claims in respect of root induced subsidence. In the light of this I cannot see how it can be seriously disputed that by early 1998 it was reasonably foreseeable that the roots from any one of these mature poplars in Danson Park could extend to distances of up to 35 m from the tree and cause shrinkage of the clay subsoil. It was also reasonably foreseeable that if those roots found their way under relatively shallow foundations, such as those often used when building extensions in the 1960s and 1970s, subsidence might well occur.

133. Accordingly, in my judgment it was reasonably foreseeable by the Council that any house in Radnor Avenue with an extension that was within 35 m of one of the poplars was at a real risk from subsidence caused by the roots of one or more of the poplars extracting moisture from the clay soil below the foundations.

134. As I have already noted, it is now agreed by both experts that what was actually done by way of crown reduction went very much further than a 25% reduction in branch length. Both experts accepted in evidence that the severity of the pruning was such that the dynamic canopy was removed; in other words, that all the leaf bearing shoots had been removed.

135. In the light of these considerations my conclusion is that T2 was the major contributor to the removal of moisture from the clay beneath the foundations of No 6 during the summer of 2006. In addition, I consider it likely that T1 also made a material contribution to this extraction of moisture. I consider that the explanation for the very significantly reduced movement in 2007 was a combination of the severe crown reduction of the poplar T2, and to a lesser extent of T1 also, that was carried out in September 2006 and the much higher rainfall in Danson Park in 2007, particularly between May and July.

136. Accordingly, the answer to the issue about the reason for the much reduced settlement in 2007 (raised at paragraph 84 above) is, therefore, a combination of

both higher rainfall in 2007 and the crown reduction work carried out in September 2006.

Causation

The advice prevailing in 1998-2000

137. A document entitled "*A risk limitation strategy for tree root claims*", 2nd edition, published by the London Tree Officers Association in 1995, advised that crown thinning and reduction should not normally remove more than 30% of the original tree canopy, citing "*British Standard Recommendations for Tree Work, BS: 3998, 1989*" (which advised that the "leaf area" removed should not normally exceed 30% of the original coverage). It is not clear to me whether this refers to a 30% reduction in overall branch length, or a 30% reduction in canopy volume: I suspect the former, but I cannot be sure.

138. The document published by the Institution of Structural Engineers in August 2000, "*Subsidence of low-rise buildings*", 2nd edition, recommended that, in urban areas on clay soils, pruning should take place about once every 3 to 4 years, depending on arboricultural advice. One form of pruning recommended was crown reduction.

What the Council should have done

139. The Claimant's case, as presented in counsel's written and oral closing submissions, is that the Council should have had a proper and adequate system of cyclical pruning of the poplars to prevent the damage to the Claimant's house. It was not said precisely how often the trees should have been pruned under such a regime, but when pressed Mr Daniel Crowley, who appeared for the Claimant, submitted that it should be every two or three years. In a document entitled "*Review of Trees and Woodlands*", dated 30 March 2006, there was a recommendation that the Council "*should maintain its current policy of undertaking inspections and programmed works across the borough on an approximately four-year cyclical programme".* In the light of this, which on its face appears to be a perfectly reasonable policy, I do not see how it could be realistically contended that the Council should have had a policy of pruning trees that presented a risk of causing damage at a frequency of more than once every 3 years.

140. In Mr Crowley's written closing submissions it was made clear that it was not the Claimant's case that the Council should have cut down T2 or any other of the poplars in the vicinity of her house. However, in his oral closing submissions Mr Crowley submitted that a rolling programme of felling trees would have been an alternative to cyclical pruning - perhaps felling one third of the trees in one year, another third in the next and so on.

141. The position taken by Ms MacQueen at some points has been that felling is the only realistic option. In her report dated 30 July 2010 she said that the only way to have prevented the damage occurring would have been to remove the offending tree, "*as pruning does not control the water use of trees sufficiently to alleviate subsidence risk*". In a further statement, dated 11 March 2011, she said: "*Pruning*

is not a viable management tool in relation to controlling the risk of treatment related subsidence damage". However, it must be borne in mind that these statements have been made in the light of the Hortlink study, the results of which were not published until mid 2004. These have been available to be downloaded from the Building Research Establishment website since, I assume, the publication of the paper in about June 2004.

142. However, bodies such as local authorities cannot be expected to know about, let alone react to, current research the instant that it is published: it takes time to consider the relevant material and then, if appropriate, to discuss and modify policies in the light of it. Policy changes are likely to have implications for the local authority's budget and will take time to implement. I do not consider that a local authority such as the Council could reasonably be expected to digest the implications of the Hortlink study and to modify its policies in the light of it within less than about 12 months - it may be longer, depending on precisely when in the financial year the relevant information becomes available. Further, a local authority may have entered into contracts with tree surgeons for particular programmes of work for more than a year ahead (although there is no evidence that the Council entered into any relevant contracts in this case). But looking at the matter generally I do not consider that the Council can be criticised for any failure to take into account the results of the Hortlink study before, at least, mid 2005.

143. I have already noted that in a joint statement dated 17 September 2010 the arboricultural experts agreed that the crown reduction of the poplars by 25% in September 2006 "*would not have had any significant influence on the moisture removal of the trees*". This statement needs some explanation, because it depends on what is the subject of the 25% reduction. I am prepared to assume that it refers to a reduction in overall branch length, and thereby indicates a reduction in canopy volume somewhat lower than the 70% minimum reduction identified by the Hortlink study. However, I have already mentioned that the arboricultural experts said in evidence and that T2 must have had a very severe pruning in 2006 (see paragraph 100 above). I will return to this below.

144. In answer to the question "what should the Council have done with the trees?" Ms MacQueen said in evidence:

> "It could be pruning more often, it could be installing root barriers, it could be cyclical felling and replacement; it could demonstrate that it actually has a responsive policy based on the tree risk limitation strategy promoted by the London Tree Officers Association, of which it is a constituent part. And instead we have reactive tree pruning."

145. I have already found that by early 1998, at the latest, the Council was on notice of the fact that these poplars could cause damage to the rear extensions of houses in Radnor Avenue at distances of up to 35 m. Mr Mollison, an Environment Manager with the Council, agreed in cross-examination that from 1998 at least the Council knew that poplar roots from trees up to 35 m away could get under the foundations of a house and cause damage. In the light of this evidence, any submission to the effect that such damage was not reasonably foreseeable would be doomed to failure. I find that, from early 1998 onwards, the Council knew that

the poplars in Danson Park were capable of causing damage to any rear extension of a house in Radnor Avenue that was within 35 m of any of those trees.

146. In the light of my conclusions about the length of time it could reasonably have taken for the Council to respond to the Hortlink study, I consider that until at least mid 2005 it could reasonably have been expected to respond to its awareness of the foreseeable risk of damage being caused by the poplars by embarking on a programme of crown reduction of the trees, particularly of those trees that were within 35 m of a house. This should have been done from early 1998 onwards.

What the Council actually did

147. With these considerations in mind, it is instructive to see what the Council actually did. In an undated note prepared by Sian Thomas, a Tree and Woodland Technician employed by the Council, which must have been produced in January or February 2007, she recorded that T2 was believed to have been crown reduced in 1998 although no records of the work had been found. She noted also that she had looked through the Council's insurance file and had found correspondence relating to Nos 10, 36 and 62 Radnor Avenue. From this it appeared that over the past 9 years the Council had removed three trees on a "without prejudice" basis and had carried out crown reductions on three other trees. Whether or not T2 was in fact Crown reduced in 1998, this note suggests that the Council did not embark on any structured programme of pruning the poplars between 1998 and 2007. In fact, OCA's survey in 2005 recorded that the poplars, T1, T2 and T3, had been "*very heavily topped*" in the past and had significant new growth that was more than five years old. This suggests that the Council's belief that T2 had been crown reduced in 1998 was correct.

148. On 15 July 2004 Mr Mollison advised the Council's insurance team that trees behind Radnor Avenue in Danson Park would be crown reduced within that financial year, "*probably before the leaves fall*". This was in response to a letter from loss adjusters acting on behalf of the owner of No 4 Radnor Avenue requesting the Council to reduce the size of the trees in Danson Park. The letter suggested also that the poplars "*may be implicated*" in relation to No 6. This gave rise to a works order, No 14865, which required, amongst other things, the crown reduction by 25% of 17 extra large poplars in Danson Park. Since that was in response to the letter in relation to No 4, the trees concerned must have included poplars T2 and T3, and probably T1 also. The order stipulated a completion date of 30 September 2004. It was Mr Mollison's evidence that he usually gave the contractors 6-8 weeks within which to carry out the work, which suggests that the order was probably given at about the end of July - which is consistent with the date when he told the insurance team that the work would be carried out.

149. But it seems that the work was never carried out. In his written statement Mr Mollison merely said that "*I believe that these works were not completed*". A further works order was issued in 2005, No 15182. The completion date for this work was stated to be 30 April 2005. It included the following work (so far as I can tell, the document is not easy to read) to 13 extra large and 4 large poplars:

"Lift branches 6.5 m. Clean out. Reduce and reshape crown 25%."

150. Mr Mollison said in evidence that this was the work that was subsequently carried out in September 2006. He was unable to give any reason why the work was not carried out by the end of April 2005. The exchange in cross-examination went as follows:

> Q. "Why, if it was issued, or with a completion date of 30 April 2005, was the work not carried out until September 2006?
>
> A. I can't give you the exact reasons, but there might be a number of reasons that would account for it
>
> Q. Do you know the reason?
>
> A. No, I couldn't tell you for definite, but it could include wet weather, the contractor started this contract, I think, on 1 April 2005. It was a large job, it requires lots of planning. It's not a particularly simple job. I'm not sure it's one that earns them a lot of money. They have other conflicting priorities, and we might give them a work order. So I can't say which of those. It might be a combination of those."

151. As this summary indicates, the evidence about this is somewhat sparse, but what seems to have happened is that the work to the 17 poplars that was the subject of the order that was issued in about July 2004 was never carried out. As a result, a further order was issued at some time in early 2005, again for a 25% crown reduction to 17 poplars (although, if the order referred to the same 17 trees, this time 4 of them were described as large, rather than extra large).

152. As I have already noted, it is now agreed that the work that was done in September 2006 went a great deal further than a 25% reduction in the crowns of the trees.

153. In the meantime, OCA had carried out its tree survey in October 2005. A copy of their report, which included the recommendation to fell tree T2, was sent to the Council under cover of a letter dated 7 December 2005. Following receipt of that letter the Council's insurers, Zürich Municipal, wrote to OCA and confirmed that their client had agreed "*to reduce T2 by 20-30%*" and to remove the small poplar between T2 and the boundary fence. This work was to be carried out on a without prejudice basis. However, in spite of this statement, the crown reduction of T2 did not take place until September 2006.

154. Mr Crowley submitted, unsurprisingly in the circumstances, that since the Council recognised the need for this work in 2004, and again in early 2005, and indeed placed orders for it to be done, it should have ensured that it was carried out. Had it been done at any time before the summer of 2006, in particular in 2005, he submitted, the damage that occurred during that summer would never have happened.

155. I accept Mr Crowley's submission. Further, if the Council had taken reasonable steps to implement the decision recorded in the letter from Zürich Municipal of 20 February 2006 to carry out a crown reduction of T2, the work should have been done before the summer of 2006. In the light of what it knew (and should have foreseen) I consider that the failure of the Council to ensure that the crown reduction work (to T2 and the adjacent large poplars) it considered necessary in

2004 and early 2005 was carried out reasonably promptly was negligent. I find that if this work had been carried out at that time it would have been done in much the same way as the work that was eventually done in September 2006. This would probably have prevented the significant further damage that was caused to No 6 during 2006. However, it would not have prevented the damage that occurred in 2003.

156. But I consider that the point goes further, since I have already concluded that the Council should have taken a decision to carry out such work much earlier. In my judgment that should have been in 1998, by which time (as I have already found) the risk of damage by these trees was reasonably foreseeable and, indeed, was foreseen.

157. It is a reasonable inference that, if this had happened, the poplars would have received the type of treatment in 1998 that they received in 2006. Indeed, in the case of T2 it may well be that it was pruned in that way in 1998. But, irrespective of this, the trees (not just T2) should then have been pruned again every 3-4 years, which means - assuming that they had been pruned in 1998 - that they should have been pruned again in the spring of either 2001 or 2002. Had the Council done the former - adopting a three-year cycle - it might not have had a material effect on the damage that occurred in 2003. This is because one conclusion from the Hortlink study was that severe crown reduction reduced soil drying by trees for up to two years only. On this basis a severe crown reduction in the spring of 2001 could have been expected to reduce soil drying during the year of pruning and during the following year, 2002, but not after that. So the effects would have been unlikely to persist through the summer of 2003 (although this would probably not have been appreciated at the time).

158. However, if the decision had been taken to prune the trees on a four-year cycle, with the next crown reduction taking place in early 2002, the effects could have been expected to persist through to the end of the following season, 2003.

159. Accordingly, whether or not the damage that occurred in 2003 would have occurred in any event depends on whether the Council would have adopted a policy of pruning every third year or every fourth year: the latter would probably have prevented the damage, whereas the former might not.

160. Mr Crowley submits that this is one of those cases where the onus is on the Council, having been found in breach of duty, to show that even if it had acted with reasonable care the damage would probably still have occurred: see *Phethean-Hubble v Coles* [2012] EWCA Civ 349. That was a case of a collision between a cyclist and a motorist. The case for the injured cyclist was that the motorist was going too fast. The case of the motorist was that the accident would probably still have occurred in any event even if he had been travelling at a reasonable speed. Longmore LJ, at paragraph 90, said this:

> "The injury which occurred was injury of a kind likely to have been caused by that breach: see Clerk & Lindsell, *Torts*, 20th Edn, para 2-07. In these circumstances I do not consider that it is necessary for the claimant to prove positively the negative proposition that the accident would not have occurred if the defendant had been going at a safe speed; realistically it should be for the

> defendant (who has already been found to be in breach of duty) to show that even if he had been driving at a non-negligent speed, the accident would still have occurred. The judge was not satisfied that that was the position and neither am I. The claimant should succeed."

161. On the facts of this case I consider that Mr Crowley's submission is correct. The Council could have adopted one of two approaches to a programme of cyclical pruning: one would probably have prevented the damage that occurred in 2003, the other might not. Since the Council has advanced no evidence as to what it would have done (unsurprisingly, since its case is that it was not obliged to do anything), it must necessarily be unable to show that the damage would have occurred in any event.

162. But even if I am wrong about this, the Council's document, "*Review of Trees and Woodlands*", dated 30 March 2006, to which I have already referred, indicated that its prevailing practice at the time was to carry out cyclical pruning every 4 years. This suggests that if the Council had decided to implement a policy of cyclical pruning of the poplars in Danson Park in 1998, as I find it should have done, it would probably have adopted a policy of carrying out a crown reduction to each tree every fourth year. In my judgment, such a policy, if adopted, could not have been criticised having regard to the prevailing knowledge at the time. It would have prevented the damage that occurred in 2003.

163. For the sake of completeness I should add that, in my view, the Council cannot be criticised for rejecting any suggestion that T2 be felled as opposed to pruned at regular intervals. This is because until the publication of the Hortlink study in mid 2004 the prevailing understanding was that regular pruning was an effective method of preventing tree roots from causing damage to buildings. Indeed, at the trial it was not the Claimant's primary case that T2 should have been removed instead of pruned. I have already found that the Council could not have been criticised if, in 1998, it had taken the decision to carry out crown reduction work to the poplars every three or four years from early 1998 onwards instead of felling the trees.

164. For these reasons, in my judgment the Council is liable for the damage caused by the subsidence that occurred in both 2003 and 2006.

The measure of damages

165. In the light of my conclusions on liability, the Council is liable to pay damages in the amount that has been agreed.

166. If I am wrong about the Council's liability for the damage that occurred in 2003, the appropriate measure of damages in respect of the damage caused in 2006 (to what was by then a damaged house) would be the amount agreed less the costs of the repairs that would have been reasonably required to repair the damage that was discovered in 2003. In the report by John Luetchford & Associates in November 2003, this was described as localised underpinning to the rear elevation of the extension, together with the returns into the north and south flank walls, and repairs to the fabric of the building. Repairs were also required to part of the drainage system that had been damaged by the subsidence. I do not know the

precise cost of these works, but the reserve that was recommended in January 2006 was about £39,500 (including loss adjuster's fees).

Other matters

167. In the light of my findings of fact and of the proper concession by Mr Haque that proof of negligence - or a degree of fault equating to it - would establish liability, I have not found it necessary to consider the many authorities on nuisance and tree root cases that were cited to me. The position in relation to the foreseeability of the risk of damage is clearly established by the Council's own documents and Mr Mollison's realistic admissions in cross examination.

168. However, I was told by counsel that the Court of Appeal has recently heard argument in the appeal of *Berent v Family Mosaic Housing and the LB of Islington* [2011] EWHC 1353, a tree root case which raises the question of the degree of knowledge required by a local authority to support a finding of liability, and that its judgment was reserved. In the light of this it seemed prudent that I should prepare my judgment in draft and delay handing it down until I have had an opportunity to consider the Court of Appeal's judgment. Neither counsel opposed this course. Unfortunately, I had not appreciated that this would result in a significant delay in finalising this judgment (which had been prepared in draft by the end of April).

169. The decision of the Court of Appeal in *Berent* was handed down on 13 July 2012 (Neutral Citation: [2012] EWCA Civ 961). The leading judgment was given by Tomlinson LJ which, if I may say so, contains a helpful and illuminating analysis of the relevant authorities at paragraphs 19-24. This makes clear that there are no special principles of law that relate to tree root cases: they are subject to the general law of negligence and nuisance. Counsel for both parties have made further submissions in the light of this decision, for which I am grateful.

170. In my judgment, the facts of this case, insofar as they involve questions of foreseeability, are quite clear. The risk of damage to No 6 by the poplars in Danson Park was clearly foreseeable from 1998 onwards, so the only questions are what the Council should have done and whether or not that would have prevented the damage that occurred. Again, the facts are reasonably clear and the documents disclosed by the Council provide most of the answers. I felt able to reach my conclusions by applying what I regarded as well settled principles relating to foreseeability and causation. The approach that I adopted seems to me to be entirely consistent with the principles stated by the Court of Appeal in *Berent*, and so I see no reason to reconsider the conclusions that I had already reached.

171. I will hear counsel for the parties on costs and interest if these cannot be agreed.

APPENDIX –B–

Scanned copy of the plan produced by Dr. Hope showing the location of the trees within influencing distance of the property.