Simon Pryce Arboriculture

Report

Client:	**Greville (3) Residents Ltd**
Site:	**3 Greville Place, London, NW3 5JS**
Instruction:	**Mr D Tomlinson, William J Marshall & Partners**
Subject:	**Trees and other vegetation near the building and their effects on it. Specification for necessary or appropriate work.**
Inspection date:	**26 November 2015**
Report date:	**20 December 2015**
Reference:	**15/102**
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REGISTERED CONSULTANT

1 Introduction

1.1 This report has been commissioned by William J Marshall & Partners, the engineers investigating a claim for subsidence at 3 Greville Place, London, NW6 5JS.

1.2 The building has some history of subsidence and there have been previous investigation of this and some tree works carried out. However monitoring and site investigations are ongoing and the purpose of this inspection is to a preliminary survey and record of significant vegetation near the building. This report also makes recommendations for necessary or appropriate work, but these are preliminary and might be modified or supplemented in the light of findings from the ongoing investigations.

1.3 To date the only available background information is:

1. Engineering report by Infront Innovation, with associated site investigation, soil test and root identification reports, prepared in December 2007 for Ecclesiastical Insurance.
2. Arboricultural report prepared in 2008 by Marishal Thompson (MT) in connection with the claim.
3. Camden Council's online records of tree work applications and decisions.

1.4 This report is based on information from these sources and a site visit and inspection on 26 November 2015. The inspections were visual and made from ground level. Trees belonging to other parties were inspected as closely as reasonably possible, either from within the site or from the road.

1.5 This case is appraised and discussed below and a schedule of comments and recommendations for individual trees and shrubs is appended. Left and right are used as if facing the building from the front, unless noted otherwise.

2 Background

The site

2.1 The building is a large L shaped structure based on a large house that has been added to and extended over the years. The original part dates from about 1820, while the most recent parts are about 50 years old. The original part has two main storeys and a lower ground floor, but the other parts vary in size and design. The road in front has a slight fall from north to south (right to left), but the main part of the site is essentially level.

2.2 It is bounded to the right and rear by other back and to the left (south) by a nature reserve run by the London Wildlife Trust, which appears to be a former garden.

Previous damage

2.3 The Infront report states that the external walls of the building were underpinned in 1988, but that there had subsequently been movement in internal walls since at least 2003. They considered that the damage was subsidence caused by shrinkage to the clay subsoil and that it affected mainly the front and rear elevations at the left hand side of the building.

2.4 The site plans with their report and the MT one show two affected areas, one in the rear left addition and the other at the front left.

2.5 MT identified various trees or groups that they considered to be involved or to present threats and recommended either pruning or felling. Some of that work has been carried out, including the felling of a plane tree growing near the rear left hand corner of the building. Camden Council's records show that they did not object to the plane being removed but they refused consent in for the felling of a sycamore, MT's T2, tree 6 of this report. Unfortunately their online records are incomplete and do not include the decision notice.

Previous investigations

Soil conditions

2.6 In November 2008 Infront dug two trial pits (TPs) near the front and rear corner of the building respectively and each was extended to 6m as a bore hole (BH) to investigate soil conditions at depth. This revealed that the subsoil is a brown clay that was firm to stiff at the front, (BH1) becoming firm from 2m down to 6m, while in BH2 at the rear it was firm to stiff down to 6m. Samples had plasticity indices between 40 and 50%, indicating a high potential for shrinkage and swelling with changes in moisture content.

2.7 Moisture content and soil suction profiles show that it was dry down to 2 - 3m in BH1 and for the full depth of BH2, consistent with desiccation, i.e. the soil being drier that would be anticipated under normal climatic effects alone.

Roots

2.8 Roots were found for the full depths of both bore holes and samples identified as:

TP/BH	depth [m]	species	dia.	starch
1	0.7 - 6m	*Acer* (sycamore and maples) + 5 others similar	1.5mm	high
2	1.5 - 6m	*Platanus* (plane) + 2 similar	2mm	high
		Broadleaf too juvenile to identify + 2 other fragmentsin bad condition	1m	low

3 Current and ongoing investigations

3.1 William J Marshall & Partners will be carrying out detailed monitoring of the building to determine the precise nature and extent of the current movements. There will also be further site investigations, which will take place in late summer or early autumn, when the effects of any vegetation will be most apparent. That also allows trial pit and bore hole locations to be determined based on the monitoring results.

4 Observations - trees and other vegetation

4.1 The most significant trees near the house include a middle aged sycamore and horse chestnut in the front garden, a sycamore to the front left, some well established goat willows and a large beech in the nature reserve to the left. There are also a large London plane and other trees in the central and right hand parts of the rear garden. Near the rear left hand corner of the house there is the stump of a London plane listed for felling in the MT report, item 15 in this report. Near the right hand side boundary is the stump of a large black poplar, item 25, reduced in 2008 and felled in 2014 because of its poor structural condition.

4.2 These are described individually in the schedule forming the second part of this report, with preliminary recommendations for any necessary or appropriate work. Some are also listed in the MT report and their numbers are also shown as well. They are numbered on the attached site plan.

5 General comments

5.1 Tree roots grow with little force, but can cause significant soil drying. Most clay soils shrink when dried and swell as they rehydrate, so this combination can cause subsidence in nearby buildings if their foundations do not extend below the affected zone. This usually starts during dry summers and shows a seasonal cycle, with downward movement in summer followed by recovery through the winter when the weather is cooler and wetter and the vegetation inactive.

5.2 Frequently this soil movement is purely seasonal, but large vigorous trees can cause a persistent moisture deficit at depth where the soil does not rehydrate fully in winter. If these die or are removed the consequent prolonged rehydration and swelling of the desiccated soil can lead to heave damage in buildings nearby, especially if they were built after the moisture deficit established. This movement can take several years if the desiccation is deep and severe.

5.3 The size, age and vigour of an individual tree all influence its drying effect on the soil, but there is also considerable variation between species. Poplars and willows are naturally well adapted for growth on clay, having deep, wide spreading roots and a strong ability to extract water. As a result they are more commonly associated with subsidence than many other species. Most of the other trees here are regarded as moderate water demanders but many grow well on clay sub soils and can cause damage in nearby buildings. Large shrubs and climbing plants can also cause significant soil drying and are frequently planted near buildings.

5.4 Pruning to reduce leaf area reduces water uptake, but most healthy trees respond by sprouting, so their water demand increases in proportion with the new growth, which is often vigorous. The small roots that absorb water die each winter, new ones develop in spring and grow according to the tree's needs so, provided the top growth is recut regularly to contain the crown, the extent and water uptake of the root system also reduces over the long term. However this is not always effective with large vigorous trees rooted close to buildings and can also harm the tree, although some species tolerate pruning better than others. Removing trees will eliminate any threat associated with them, provided there is not a potential for heave. It is sometimes possible to replace trees with other species that present a reduced risk without the need for intensive maintenance.

6 Discussion

Damage

6.1 The available results of the previous investigation confirm that the damage at the time was subsidence caused by the clay subsoil shrinking under the drying influence of roots from nearby trees. In particular the presence of plane roots in severely desiccated soil at the rear left implicated the plane tree growing about 3m away, my tree 15, MT's T3, which was felled not long afterwards. However the sycamore near the front, my tree 6, MT's T2 was not removed and it appears that Camden prevented that by making a TPO, although full details have not been found. That tree is now showing signs of decline, as is the smaller sycamore near the same part of the building, my tree 7, so neither of these will be causing as much soil drying as they were in 2007/8.

Remedial work

6.2 The building is a large, complex structure and the most recent site investigation was carried out eight years ago, so soil moisture conditions will have changed, particularly where trees were removed. There is also very little monitoring of any kind available at present, so current conclusions are provisional and might be amended in the light of the findings of the ongoing monitoring and site investigation.

6.3 Recommendations for work on the trees and other vegetation near the building are set out in the attached schedule, based on the available information and the most suitable arboricultural management of the species concerned. This will reduce any drying effect on the sub soil under the foundations significantly. However in view of the points made at 6.1 and 6.2 the specifications are provisional and might also need to be amended in the light of the findings of the ongoing investigations.

Heave

6.4 The previous report found evidence of deep desiccation at the rear left and the removal of the plane there would have caused some soil swelling. However soil conditions will have altered since then and with a complex building like this and a range of trees growing nearby any heave potential will have to be assessed on the basis of the findings of the site investigation later this year.

Restrictions

6.5 The local planning authority is the London Borough of Camden and their website shows that the site is in St Johns Wood Conservation Area, so they must be given six weeks notice of any proposed felling or pruning of trees over 75mm diameter at 1.5m. There is no site specific information about tree preservation orders (TPOs) but Camden's list of planning applications shows work to some of the trees dealt with mainly under the conservation area procedures. It appears that the only tree protected by a TPO is tree 6 of this report, the sycamore at the front left and that this was made following a conservation area notice to fell the tree in connection with subsidence. That would need to be checked and it might be necessary to make a further application, depending on the findings of the ongoing investigation.

6.6 The trees in the nature reserve belong to London Wildlife Trust, so there is no direct control over them. However tree owners can also be liable for any reasonably foreseeable damage that they do not take suitable steps to prevent.

Tree work

6.7 Any treework should be carried out in accordance with BS 3998: 2010, Recommendations for Treework, and any other relevant standards. It is essential that the contractor doing the work has appropriate third party and public liability insurance. The Arboricultural Association has a list of approved contractors, published on their web site at www.trees.org.uk.

6.8 Where any trees or other woody plants are removed it is advisable to remove the stumps and main roots, if possible, in order to avoid colonisation by honey fungus [*Armillaria* sp.]. This can spread and infect other vegetation nearby, either killing plants or decaying structural roots and making them unstable.

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7 Conclusions

7.1 The available information is consistent with the previous investigations showing that the damage in the building is subsidence caused by the sub soil shrinking as it has been dried by roots from nearby vegetation.

7.2 One plane tree was removed, but others are still present and likely to be affecting the soil beneath the foundations. Most are well established, but healthy and capable of more growth.

7.3 Damage has continued and, given the time since the previous investigation and tree work being carried out, the building is to be comprehensively monitored and site investigation carried out later in 2016, when the effects of any vegetation will be more apparent.

7.4 The recommended work will reduce any drying effect on the soil under the building significantly, but the conclusions and specification might need to be reviewed in the light of the ongoing investigation and monitoring.

7.5 The site is in a conservation area and at least one tree is protected by a TPO.

7.6 Some of the trees belong to other parties so there is no direct control over them.

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