



The Heath & Hampstead Society

The Society examines all Notices of Intent for tree work relating to Hampstead and Hampstead Heath Fringes, and assesses them for their impact on the Conservation Areas, the local environment and building stability.

To London Borough of Camden, Tree Preservation Team

Planning Ref: 2020/1700/T and 2020/1705/T
Address: 21 and 25 for subsidence case at 23A Nassington Road
Case Officer: Tom Little
Date: 29th May 2020

These two applications to fell willows accused of causing vegetation-related subsidence to the rear extension of 23A Nassington Road provide *no evidence* of significant tree involvement and the engineering appraisals are full of discrepancies.

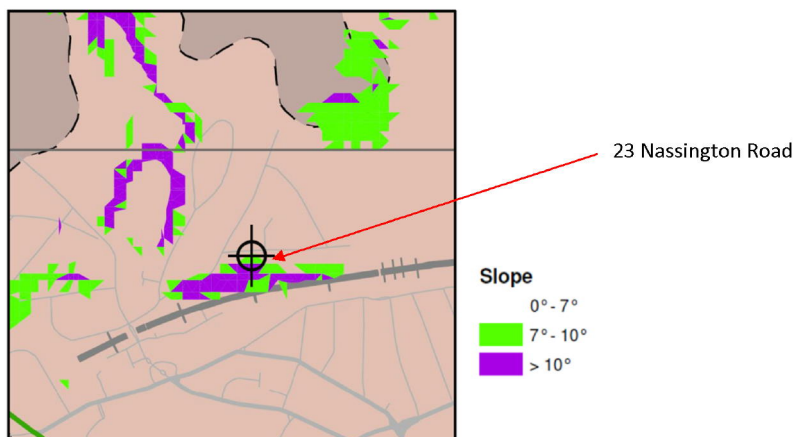
The damage is to an extension built (following a planning application by SA Rosenberg in 1976 and the famous two-year drought of 1975-6) onto a late C19 semi-detached, and not an 'end of terrace' house, and was noted by the present longstanding property owners to have begun in approx August 2019. One can presume the present property owners would have noticed if there was any cracking in the past, and would not have undertaken extensive refurbishment of this area after gaining planning permission in 2011 if they suspected problems without first fixing them.

The willow tree of 21 Nassington Road is said by its owner to be around 50 years old, indicating that it most likely pre-dates the 23A extension. The obvious questions are: 'why was the willow planted here?; why was it retained when the extension was built?; why did the cracking start only in August 2019 if it has been here all this time through much drier periods *e.g.* 1975-6, 1985, 1990, 1992, 1995, 1996, 2003 and 2006 – the individual surge years characterised by more than 50,000 subsidence claims?

The plot is described as level. A description elsewhere of 9 Nassington Road indicates otherwise:

'The natural slope lies at between 7° and 10°, but falls more steeply beyond the rear boundary across the allotments down towards the London Overground railway.'

- as does Arup's 'Slope Angle Map' (Fig 16) from the 'Camden Geological, Hydrogeological and Hydrological Study':



Evidence provided that vegetation-related subsidence is acting here

From the Sedgewick Engineering Appraisal Report:

In-situ testing was undertaken and a shear vane reading of 64 (Kpa) was measured at the underside of the foundations (1.45m), which confirms that the ground conditions at this level as being firm. Further readings of 114 (Kpa) and 120 (Kpa) were also recorded between 2.00m and 3.00m, these readings would indicate that the soil conditions are drier and more stiff at lower level towards the end of the borehole.

This is a travesty of an appraisal. BRE Digest 412 states:

Clearly, $w < 0.4w_L$ should be used only as a rough guide and it is unwise to base an assessment of desiccation solely on this criterion, particularly if desiccation is slight.

Richard Driscoll himself states (Clay Research April 2015 Edition 119 page 2) that

$w < 0.4w_L$ is entirely empirical, it cannot take account of the differing stress histories to which natural clays have been subjected....or degrees of over-consolidation (arising from the removal of over-burden in geological time).... Furthermore, it does not take account of the general decrease in soil water content with depth encountered in most over-consolidated clays.

The underlying clay here on the southern slopes of Hampstead was subjected to compression in earlier ice ages then removal of this overburden, followed by being overlain by 'Head' here mistaken for 'Made Ground', as is common for 'Head', especially when there is a component of brick and concrete within it. 'Head' is a solifluction derived from silt and sand washed down from higher levels and mixed with the local clays by the action of melt water at the end of the last ice age, the deposits being accumulated in pulses of movement, one cutting across another and gradually settling. This laminated ground of differing geological components is, as I understand it, unsuitable for such tests as the Pilcon Shear Vane test. This is demonstrated by lower level soils being described as drier despite standing water being found at 1.6 metres. The boring method precluded any identification of groundwater levels that might have been present. Clearly the aquifer at the base of the 'Head' on top of the underlying clay is going to both interfere with readings and preclude an accurate assessment of desiccation for a diagnosis of vegetation-related subsidence. It possibly indicates why the two willows could have been planted in the first place. The question now is 'what is going on?' 'why is there water in TP1 and BH2?' and 'why now?'

Nassington Road has not had any modern basements dug so no immediately local borehole tests are in the public domain. Soil testing results have not been presented, presumably because either they are not understood (as seems likely from the apparent poor level of knowledge of our area's geology which is given as London Clay which completely misses its known complexity) or they do not support the proposed mechanism of vegetation-related subsidence. I also suggest that any future data presented on such tests be discarded, since they were obtained using disturbed samples which is similarly inappropriate for this laminated and complex ground.

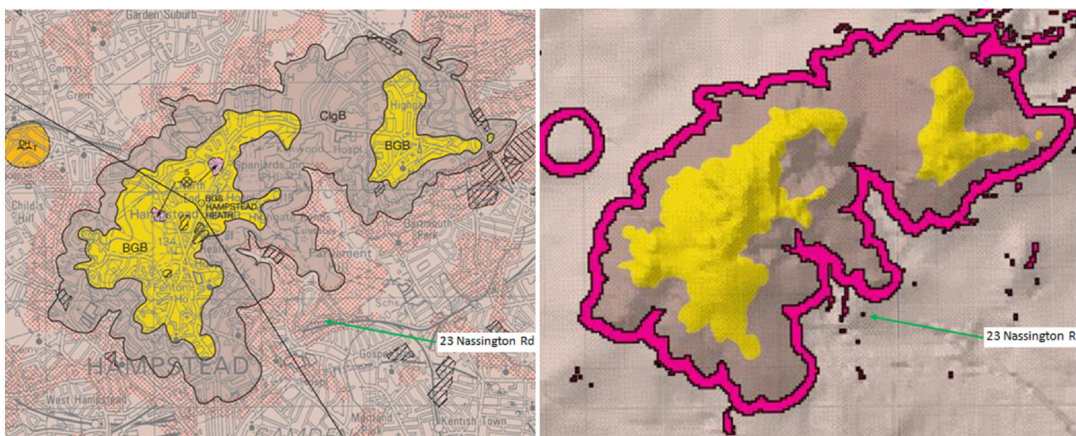
There is usually no reason for roots to go under the dry footprint of a house, so finding roots under foundations *should* normally prompt the question "Why?" In Hampstead though, finding roots under foundations is to be expected due to the frequent presence of groundwater and aquifers. Four of London's rivers start in Hampstead, there are three potential aquifers beneath the 'Head', the Bagshot Sands and the Claygate Beds, many spring lines and wells, and many pumps in basements since the C19. Water was found in TP/BH1 and TP2 but it is not known if this water is groundwater or from a leaking drain.

Likely causes and evidence against this being mainly vegetation-related subsidence

In investigating the causes of Hampstead's high frequency of subsidence, four main factors are emerging: silt erosion by the action of groundwater, landslip, ground pressure changes and vibratory effects of basement dig-out and construction methods and leaking drains or mains. In many cases a number of these act together, principally due to the underlying hydrogeology. I have yet to establish a single case where subsidence has principally been caused by trees in Hampstead or Fitzjohns & Frognal wards. It is my belief that the many willows, lombardy poplars, oaks and limes planted in Hampstead in the past were done so in order to reduce excessive water in gardens, and that both in the past and more recently - such as along the northern side of Finchley Road - trees were planted in order to stabilise slopes that had already undergone landslide or to prevent it.

23 Nassington Road above the railway cutting lies on a thick superficial deposit of 'Head' (red stippled areas on geological map over). This deposit is permeable unlike the underlying clay and susceptible to sliding when disturbed. While 5-13 Nassington Road are, 23A Nassington Road is not on an area of greatest potential for slope instability (solid crimson, map over on right), but of course does not need to be, since it is already on a slope more acute than that known to cause sliding of clays, partly but not wholly due to the railway cutting dug here in the

C19. Add in an aquifer between the 'Head' and clay layers affecting water pressures within the clay and slip is a possibility, as is silt erosion due to groundwater or leaking drains water action. Drains can also cause heave followed by a greater degree of subsidence during dry weather (leaking rainwater drains) or family holidays (leaking waste water drains).



BGS 1:500,000 series N. London Sheet 256 Bedrock & Superficial Deposits BGS Survey Areas for Greatest Potential for Slope Instability
<http://www.largeimags.bgs.ac.uk/iip/mapsportal.html?id=1001750>

Thus, the potential causes I am aware of that could be operating here are:

- 1) Silt erosion by the action of groundwater or superficial aquifer water (particularly during storm surges which have been much more common in the last few years) or leaking water from drains or
- 2) Leaking drains causing heave and thus greater volume loss during dry periods, and additionally enticing unnatural tree root growth to the area which can amplify the effects of dry weather and family holidays.
- 3) Digging out of the swimming pool at 25-27 Nassington Road may have altered ground pressures or vibrated the ground and caused some stability issues to the slope. The methods of construction are not known however, and the trees in the rear gardens here are likely to have had a stabilising effect.

- 1) would seem to be unlikely in that cracking has not occurred before: why now?
- 2) is a distinct possibility, yet no drains testing has been done.
- 3) the timing here does not seem to fit.

A combination of 1) and 2) is also possible. With a modern foundation the extension is likely to withstand quite a degree of silt erosion/volume loss beneath it. But, with further erosion from drains water action, particularly if a broken drain provides further space for silt to be washed into, this could be magnified until cracking appears.

It is of course possible that an engineering problem exists: there are many related to both older and newer constructions that can cause cracking. It appears none of these have been considered.

Future

I am asking that tree fellings be refused and although I am aware that Camden cannot require all of this, I would suggest that fellings not be allowed until

- leaking drains have been checked for,
- continuous (to additionally assess for silt erosion) movement monitoring is performed before and after drains repair and across significant high and low rainfall periods,
- tree root trimming (to encourage roots to go away from the house) is done if leaking drains were present,
- a more comprehensive crack analysis is done to determine the cause, and
- there is clear direct evidence of significant desiccation and absence of groundwater at the appropriate levels with tests appropriate for the geology of the site.

In Hampstead, crack recovery is not necessarily evidence of previous vegetation-related desiccation, particularly when rainfall is still below the 10-year average for the months investigated.

Society Tree Officer, Heath & Hampstead Society