



Scope

A non-invasive assessment was made of one oak tree on 24th January 2014. The assessment method followed the principles of VTA and employed a nylon mallet for the purposes of auditory assessment of decay.

The subject tree is within influencing distance of plot 85 Penmere Park, Penley, near Wrexham. The site is defined to the north west by grassland, to the east by an access track and existing residential properties and to the south by the Penmere Park housing development. The assessment was made from ground level by a qualified arboricultural consultant.

The site has recently been developed and the adjacent property is now occupied. A number of ad hoc observations of the tree have been made by TEP arboriculturists over a period of around 2 years in the course of other activities. These also inform the findings of this report and relevant photographs are appended.

This report describes the findings of the inspection and draws conclusions on the basis of the inspection and other available evidence relating to the context and history of the tree. It is understood that the owner of the tree and the owner of the adjacent house wish for the tree to be removed. The tree is protected by TPO.

Observations

Form and vigour

The tree is a large and prominent feature within the estate, being located at the edge of an area of public open space. It is close to the adjacent property and the tips of lower branches have been pruned. The lower branches may otherwise have touched the adjacent garage and/or fence. The branches are around 2m from the nearest permanent structure and also overhang the private drive. The stem is around 4m from the nearest permanent structure.

The tree was not in leaf at the time of inspection but the crown was noted as being structurally intact, with good bud proliferation. Extension growth on lower accessible limbs was generally between 5cm and 10cm. This suggests good vigour for the species and maturity of the tree. A small amount of dead wood was noted in the crown. The larger pieces tend to be associated with previous branch losses rather than dieback and all larger pieces were located on the shaded side of the tree (away from the house).

One scaffold limb is missing, which gives rise to an asymmetry (biased towards the house and open space) but this is an old failure that is not considered to be significant in terms of structural stability or relevant in terms of the current observations. Split wood at previous branch failures and cavities at smaller socket failures may offer roosting potential for bats. The tree has good form and good union structure and the species is not prone to branch failure.

Fungal infection

The principal decay fungi *Ganoderma resinaceum* was noted at the base of the tree on the southern side. Two large brackets (38cm and 45cm) were growing between buttresses. There was also evidence of previous bracket growth on one other buttress (staining of bark and residual mycelial tissues). The existing brackets are known to have been growing over the period June 2013 to present (see photographs) and were beginning to just degrade at the time of survey. The uppermost bracket was removed in order to observe the presence of a stalk to confirm the species identification.

Sounding of the main stem, buttresses and root collar with a nylon mallet was undertaken. Degradation of tissues and/or hollowing was noted on the southern side of the tree up to around 0.5m and in principal root buttresses. This area corresponds with the fungal infection and the findings were consistent with the anticipated pattern of decay for the species.

Reasonable meristematic growth (in girth) was observed, as evidenced by visual inspection of growth tissues between bark ridges. This was particularly noted on the buttresses.

Context

A recommendation was made for the removal of the subject tree in April 2011 on the basis of suspected fungal infection and the proximity to the proposed buildings. Removal was proposed in an Arboricultural Method Statement. The application was not submitted.

It is known that some disturbance of damage to roots and soils occurred during the course of the recent development. This was the subject of discussions at the time between the developer and the local authority. Tree protection fencing was thereafter installed according to best practise BS5837. It is reasonable to assume that some root severance has been the inevitable consequence of the construction of the garage and driveway. Damage in the form of soil compaction has also occurred within the rooting area. At the time of survey, no crown symptoms were observed that could be associated with or attributed to root damage.

The minor natural lean and weighting of the tree is towards the house and public open space, which is also the area in which root damage is suspected. Tension roots on the far (eastern) side of the tree have not been affected. This will mean that any increase in the likelihood of failure that is associated with the root damage would be less likely to cause a corresponding increase in risk to the house. However, if basal or rootplate failure were to occur it is likely that the tree would fail towards the house or public open space in any regard because of the crown weighting. This factor outweighs any variation in directional stability associated with root condition or intactness.

There has been an increase in ground levels to the west and south of the tree. It is anticipated that this will be associated with a change in local hydrology, such that the growing environment around the stem will become wetter. The area immediately around the stem has been mulched and beyond that, re-turfed.

Discussion

The significance of *Ganoderma resinaceum* is not well-documented but it is thought to be a relatively hazardous species because of its ability to invade healthy sapwood. It is associated with a selective delignification of tissues as well as a degradation of cellulose, which is thought to result in a higher risk of failure than is associated with other *Ganoderma* species. Where it occurs, failure would normally be anticipated either by windthrow or stem breakage.

The anticipated extent of root damage would tend to increase either the immediate risk of failure, or the vigour of the fungal pathogen and thereby the future risk of failure. It is not considered that the fungi is sufficiently established as to present an immediate risk of stem or rootplate failure beyond that which would be associated with the root damage. However, the root damage alone is associated with some increase in risk. It is considered inevitable that the risk presented by the fungal decay will increase, compounding the risk associated with any root damage and eventually become the most likely cause of failure.

The fungal infection appears to have developed relatively rapidly; it has produced multiple large fruiting bodies without any record or previous infection of a similarly established nature. It is not known whether the level of structural degradation associated is similarly advanced but it is probable that this is rather less advanced currently and that the outward symptoms indicate a relatively recent but aggressive infection. This conclusion would be consistent with a reduction in available resources and damage associated with soil and root disturbance. However, it is thought unlikely that the fungi could have become so well established during the period of development. Root and soil damage are therefore considered to have contributed to the progress of the decay but probably not to have caused the infection by creating points of entry for fungal spores.

On the balance of probabilities, decay caused by the *Ganoderma resinaceum* infection will be the most likely cause of tree failure. This would probably be by means of failure at the lower stem or root plate. It is not possible to make an estimation of when this might happen without further investigation, such as by longitudinal observation or tomography. The anticipated increase in waterlogging caused by the increase in surrounding levels may further contribute to a decline in tree health and an acceleration of the decay.

It is possible that the tree would grow to accommodate the effects of root damage and changes in hydrology in natural course of events. The tree will not 'recover' from the fungal infection but this might be considered structurally tolerable and not unacceptably risky where the remaining sound wood provides a sufficient margin of safety. The tree's ability to accommodate fungal decay will depend on its vigour and the availability of resources. The acceptability of such a strategy will depend on the value of potential targets and the value of the tree. The former is compromised by the changes in root condition, soil condition and hydrology. The latter is affected by the presence of and weighting towards a private residence.

Conclusions

The fungal infection and associated decay does not necessarily present an immediate risk of failure. The significance of any root damage that has occurred is somewhat speculative but it is striking that both that and the fungal decay would be associated with a similar mechanism of failure (i.e. that of the rootplate or root collar). It is therefore reasonable to consider both concurrently as contributory factors to the same ultimate consequence. They may have differing weight or significance but it seems inevitable that the two are compounded with the effect of increased risk.

The extent of actual decay and therefore loss of structural strength is not known since no invasive investigation was undertaken. However, with all factors taken together, the long-term prognosis of the tree seems clear; that the fungal decay is aggressive and will ultimately make the tree unacceptably dangerous, if it is not already. Invasive investigation such as drilling was not considered expedient since the most likely immediate mechanism of tree failure would be by windthrow, exacerbated by root damage and decay of principal roots by the fungal infection. Drilling or tomography would not significantly inform an assessment of this risk because the points of failure are underground.

The value of the tree is high, such that further investigation might have been warranted if the tree had been, say, in the centre of the green. In the best case scenario, such investigation would confirm the extent of the decay and may thereby allow the retention of the tree in the short term with better certainty. However, the cost of such investigations, the low likelihood of a successful outcome, the low but meaningful risk of immediate failure and the exceptionally high target value (the house and surrounding private land) weigh against this course of action and it is not recommended.

The close proximity of a residential house to the tree and the weighting of the canopy towards public and private spaces have the effect of requiring a greater safety margin. That is to say, the burden of proof that the tree is safe is necessarily higher because of the risk to people and property. For this reason; because of the anticipated progress of the decay; and because of the lack of certainty surrounding the current condition of primary roots it is recommended that remedial action is required.

Recommendations

Two options are suggested that would address the safety concerns described above:

1. Remove the tree;
2. Reduce the tree substantially in size.

Removal or pruning of the tree in any form will require a TPO application. Any consent to remove the tree may have conditions attached. It is likely that these would require replacement planting at the same or similar location. It is possible that additional planting in the area would also be required because of the size and value of the tree.

Crown reduction or pollarding would be associated with some residual risk but would preserve some of the value of the tree. If this option is preferred, a minimum 75% reduction is recommended. The tree would thereafter need to be subject to regular inspection and probably deadwooding and formative pruning. The success of this course of action could not be guaranteed and the tree may ultimately need to be felled for safety reasons. Successful retention of the tree in a pollarded form would also increase the crown density close to the adjacent property, which may increase shading and pressure for future pruning. It would also mean that regular TPO applications relating to re-pollarding would be required. This option would mitigate risk but is not considered expedient in the circumstances and is therefore not recommended.

Summary

If any one factor in this case was removed, the recommended course of action would almost certainly be different. If the tree was in the centre of the green; if the decay fungi was not present; or if root damage could be ruled out, crown management would be appropriate. It is the combination of factors that determines the recommendation for removal; particularly because the fungal decay and construction damage are associated with a similar mode of failure. Whilst methods are available by which the health and safety of the tree over the next 5 years or so could be predicted with more certainty, the risk of immediate or very short-term failure cannot be ruled out by any evidence-based approach. This risk is thought to be relatively moderate but there is sufficient uncertainty that a recommendation to retain the tree could not be defended.

Written:	Checked:	Approved:
TDP	PAM	PAM

Photographs

10th August 2012



27th March 2013



27th June 2013



13th August 2013



24th January 2014

