

Consultant's Advice Note – Bowden Hall - Tree Safety

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Attention

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Structural Safety Assessment of Residual Sycamore Trees

BACKGROUND – It is understood that Nigel Webb was undertaking measures to protect the listed fabric of the original hall building at Bowden Hall (SK23 0QP) by removing a number of mature sycamore trees close to the building and which were, at the time, unprotected by TPO / TPZ status. These works were then reported to High Peak Borough Council, and subsequently temporary TPOs have been put in place in order to allow a period of review as to what best to do with the remaining trees (see photograph below).



OBSERVATIONS ON SITE – originally there appear to have been a stand of 6 mature sycamore trees, of which only 3 now remain.

As a result of the partial removal of the stand the remaining trees are now more exposed to potential storm damage. Because the trees were closely planted this has affected their individual growth potential and the remaining trees are now unbalanced, in that the canopies are eccentric. Whilst this was the case prior to the removal of the 3 more easterly trees, there is now no effective 'group sheltering' effect.

A calculation-based risk study has been carried out looking at the increased exposure of the remaining trees, their estimated sizes, drag coefficients, etc.

PREDICTED AUTUMN STORM WIND LOADING – even taking into account load reduction factors for a short, sub-annual return period, and assuming realistic drag and porosity coefficients for the residual trees (assumed still foliated) a reasonable autumnal storm event wind load applied to each of the tree canopies can be shown to be in the order of 24kN. This has also been calculated using a directional factor which accounts for lower probability winds blowing from the east. For a 20m lever arm this would give an overturning ('wind throw') basal bending moment in the order of 480kNm.

PREDICTED RESISTANCE – sycamores are renowned for their ability to resist high wind loads, however even under favourable conditions resistances are unlikely to be in excess of 600kNm. An inspection of the sloping and shallow soil structural root zone (SRZ), and knowing that the trees were closely spaced, it could be argued that the actual SRZ overturning resistance could be no more than say 2/3 of an 'ideal scenario', ie in the order of say 400kNm. It should be noted that this is very difficult to estimate accurately, and that load testing is the only way to determine this with any real degree of certainty. The fact that the trees already lean noticeably towards the listed hall building exacerbates this situation by 'taking away' some of the stability resistance which could otherwise be used for wind resistance.

PROBABLE OUTCOMES OF WIND THROW – the weight of each residual tree has been estimated as being in the order of 8Tonnes. With the close proximity to the hall building, and intention for it to be in residential occupancy in the autumn, failure of just one tree could result in significant damage to the roof and walls, and possible serious injury / fatality of one or more occupants, especially if on the upper floor.

CONCLUSIONS & RECOMMENDATIONS – There is significant risk to both listed fabric and human life should the original hall building be occupied during a significant storm event. It would therefore be prudent not to commence permanent residency until the remaining trees have been removed as originally intended.

With regard to the lone mature BEECH TREE to the north, but also in close proximity to the hall, it should be noted that it too poses a significant risk. Wind from the north is about 20% more onerous statistically than from the east (critical for the sycamores), and it was noted that this tree appears weakened where the north and south main trunks bifurcate. It is also a significantly larger tree than the sycamores.



View looking north with the rear (NE corner) of the old hall building visible to the left