

JOINT STATEMENT ARISING FROM EXPERTS' MEETING  
Between Dr David Lonsdale and Julian Forbes-Laird,  
21<sup>st</sup> April 2011

Note

*It was agreed that the Experts would generally proceed by reviewing JFL's report (in order to save meeting time). As such, except where agreement is stated, it should be assumed that JFL disagrees with the contents of DL's report.*

PART ONE: Review of JFL section 2

DL agrees with this section of JFL's report, subject to the amendments and interpretations shown in the following list of items. JFL agrees with these amendments and interpretations, except where indicated by use of DL's initials to show a divergence of opinion.

Note

*Comments below should be taken to cover subsequent occurrences of usage in the text.*

1. 2.1.1, line 4: better expressed with the addition of the word 'somewhere' in front of 'along the length of'
2. 2.1.3, line 1: the term 'VTA method' is better expressed as 'VTA approach'
3. 2.2.1, line 6: 'additional wood' – should also have referred to qualitative enhancement through wood properties
4. 2.2.2, line 8: 'excess of mass over strength' – DL considers this implies an over-defined tendency towards failure
5. 2.2.2, lines 9-10: 'branch unions with the tree stem are over-engineered relative to branch wood' – better expressed with the inclusion of the phrase 'in most respects' in front of 'over-engineered'.
6. 2.2.3, line 1: 'requires an ever more secure' and 'increasing strength' better expressed as: 'there has to be sufficient wood laid down, and of sufficient quality, to maintain secure attachment of the branch'
7. 2.2.4, line 6: 'the same as in humans' better omitted: 'at a cellular level' is adequately self-explanatory
8. 2.2.5, lines 5-6: 'critical point' better expressed as 'most suitable place'
9. 2.2.7, line 7: 'structural deterioration' better expressed as 'structural distress' though DL prefers 'decreasing adequacy of strength' to this latter anyway

10. 2.2.8, lines 1-2: reword (in line with 2.2.7) to read 'In addition to inherent reliance on stiffness, trees of the subject's genus preferentially add wood that is strong in tension to the upper sides of their branches'
11. 2.2.9, line 4: 'repair' is taken to mean 'restore uniform stress'
12. 2.2.10, line 11: 'symptoms of repair' is better expressed as 'signs of structural enhancement to attempt restoration of uniform stress'
13. 2.3.2, line 4: 'bark grows down into' better expressed as 'developing bark becomes confined'
14. 2.3.2, line 6: 'progressive separation' should be qualified with 'in cases where insufficient restoration of uniform stress through successive formation of enclosing annual rings.' (see JFL 2.2.11 and Figure 3 'snub-nose rib')
15. 2.3.2, line 7: text commencing 'and commonly' agreed for deletion
16. 2.3.5, line 10: 'are a primary diagnostic indicator of structural distress' DL considers that this overstates the position, preferring 'should alert the inspector to a need to be aware of the possibility of weakness in the structure'.
17. 2.3.6, line 4: 'forking' intended to indicate any bifurcation or subdivision: terms used by JFL as shorthand. Better expressed as 'union'
18. 2.3.6, line 4: 'predictable' better expressed as 'recognisable' or 'known'
19. 2.4.2, line 2: 'training' should also add 'with follow-up experience'
20. 2.4.3, general: DL notes that whilst the principles are widely accepted, there are differing ways of apportioning the three components of risk, especially in relation to an assessment of consequences.
21. 2.4.5, line 2: 'dangerous' better expressed as set out in JFL3.2, viz. as a relative level of hazard within a continuum

## PART TWO: Tree risk assessment

### Note

*Discussion of this arises from the use by DL of two methods for assessing the risk posed by the incident tree prior to its failure*

22. JFL considers that QTRA cannot and does not work and will provide reasons for this in a separate paper to the court. As such, the Experts agreed that there is no further point in discussing it for the purpose of producing the present Joint Statement.

## THREATS

23. 'Failure Score': the Experts disagree over 'Failure Score' – DL selected '2' when applying THREATS in his report, whereas JFL would have selected '8'.
24. 'Target Score': JFL agrees with DL that '15' is the base Target Score derived from occupancy, but would uplift this to '20' (per THREATS Guidance Note) to take account of the presence of people with a reduced awareness of danger or ability to escape it (ref. OLA 1957 & *Tomlinson v Congleton BC*). DL considers this approach unsound because this is likely to lead to an overstating of occupancy as a factor in the risk assessment.
25. 'Impact Score': It is agreed that DL, who has not been trained in the use of THREATS, should have scored the incident branch '10' as it exceeded 500kg in weight (DL, in his report, misread the intention of the column heading in the relevant section of THREATS). DL has reservations on the utility of size / weight being equated with consequences, but agrees that this also applies, to a greater degree, to QTRA.
26. It is agreed that, if DL had applied the Impact Score that is appropriate for a branch weighing more than 500kg, the 'Risk Sum' would have been 300 (i.e.  $2 \times 15 \times 10$ ). This would have represented a Category 3 risk, requiring inspection annually with work probably scheduled within two years, to be confirmed on further assessment.
27. JFL considers that, starting from a Failure Score of 2 (DL's selection), the Target Score should have been 20, so that the computation would have been:  $2 \times 20 \times 10 = 400$ , or a Category 4 risk requiring intervention within 13 weeks.
28. JFL's own computation would have commenced with a Failure Score of 8 to derive:  $8 \times 20 \times 10 = 1600$  Category 5 risk, requiring intervention within four weeks.
29. DL considers that THREATS, if applied as set out above, would seem likely to lead to an excessive requirement for intervention if applied in the context of mature woodland trees. JFL disagrees, taking account of his experience with the method and of his scrutiny of various large datasets in which trees have been stratified according to their risk categories, as derived under THREATS.

## General

30. Since the NT's risk management at Felbrigg did not use either THREATS or QTRA, the Experts agree that the retrospective application of these methods cannot directly test the adequacy of that management. The Experts further agree that the NT's own risk management system and its implementation at Felbrigg should be appraised on its own merits.
31. The Experts agree that the NT had a system in place (the 1997 system) and that those charged with tree inspection had been trained how to implement it.

32. Regarding JFL5.2.7, the Experts agree that the language and terminology used in the 1997 policy were unclear. DL agrees that the heading of section 4 of the 1997 document was not appropriate, but notes that risk was defined correctly at section 2. DL considers that it was understood by NT staff that assessment of risk in light of tree condition was part of the process. DL also considers that the wording of headings in the policy did not represent a fundamental flaw in the inspection process. JFL considers that the intention of the author is not known, but that if taken as read, he considers the process is flawed, per his (JFL's) Report.

### PART THREE: The incident tree and branch

33. The Experts agree the species and salient dimensions of the incident tree ("the tree") except with regard to the lateral distance between the terminal point of the incident branch and the parent stem of the tree.
34. The Experts agree that the union between the incident branch and the stem of the tree had cracked in the crotch a number of years prior to the accident. The Experts also agree that the crack, in itself, would not have been visible from ground level. The Experts agree that the form of the union would have been visible from ground level.
35. The Experts disagree over the formation of what JFL terms the 'adaptive growth flare' (AGF) adjacent to the crack. JFL considers that the location and form of the AGF correlates well with the location of the crack, and also that the crack is a classical driver for the observed form of the AGF. JFL considers that had he viewed the union prior to the accident, he would have drawn the conclusion that it was seriously defective. Conversely, DL considers that, according to published guidance, the crack that had occurred could not have been equated with the kind of crack that is known to be associated with the 'big ears', as shown in JFL's Figure 4. DL considers that there are two reasons why JFL's correlation does not apply: i) the position of the actual crack cannot readily be equated with the position of the crack in the Figure 4 model; ii) the structure could not have been readily defined as a 'fork' since the two members (i.e. the branch and the parent stem) differed considerably in their diameters. The branch was large in relation to the parent stem but any interpretation of the form of the union was difficult owing to the need to take account of fork form on the one hand and branch union form on the other. JFL considers that the Mattheck Figures reproduced in his (JFL's) Report are clearly intended as illustrative material, and so inevitably require a degree of interpretation when compared to actual features on living trees.
36. DL considers that the form of the union was somewhere intermediate between a compression fork and a branch union. This would have made it difficult for a tree inspector of Mr Daplyn's training and experience to equate the form with either of these structures.
37. JFL considers that such an inspector on being faced with the large (140mm extent as against 500mm branch diameter) AGF should have concluded that they were signs of structural enhancement to attempt restoration of uniform stress (per para. 12, above) and thus that the union was highly likely to fail.

38. DL notes that the form could have been accounted for by a diversion of food materials around an area of reduced growth where these materials could not be utilized. The Experts agree that this is above the presumed level of knowledge of an inspector such as Mr Daplyn. JFL considers that, as such, the correct assumption by such an inspector should have been as above at paragraph 35. DL considers that a craft level inspector would have had no information from training or from available reference sources whereby such an interpretation could reasonably have been made.
39. DL considers that unions with some signs of poorly optimised form are very common and that for this reason any recognition of a serious cause for concern should generally depend on the presence of additional signs (e.g. externally visible cracking or the presence of decay close to the area in question). DL does however consider that a very extreme deviation from an optimised form could, of itself, indicate a cause for concern. JFL considers that the AGF present on the incident branch / tree represented just such an indication.
40. The Experts agree that the 20-25 year-old break-out wound resulted from the failure of a union with a bark inclusion (DL disagrees with JFL4.3.3 that the inclusion was 'severe') between the remaining stem and one of similar or somewhat smaller size. It is further agreed that the wound shows signs (from ground level) of decay and that the usual means of assessing such decay in detail would be by a climbing inspection.
41. The Experts agree that the size and nature of the break-out wound placed the incident tree within the scope of those trees which, at section 6 of the 1997 tree inspection policy, should (JFL) or could (DL) be documented as 'hazardous or potentially hazardous' (JFL6.4.1 also refers). DL considers that the operative word is 'could' rather than 'should' because the assessment as to whether the tree is hazardous or potentially hazardous is dependent on the inspector's opinion. His or her opinion rests partly on the intended meaning of these terms, which is a matter for the NT. JFL considers that it is probable that a reasonable and competent tree inspector would assess the wound as at least potentially hazardous (JFL6.4.3 refers).
42. The Experts agree that tree contractors could have been asked to undertake a climbing inspection to investigate the extent of decay at the break-out wound as part of other instructed tree works, which the Experts understand were put in hand on a regular (annual) basis. However, DL questions whether the (in his view) relatively low usage of the site warranted this expenditure of resources. DL would have been more concerned about the potential extent of decay had other features (e.g. fungal fruitbodies) been present or there had been evidence of decay moving up the stem towards the union of the incident branch. JFL agrees but considers that, with Mr Daplyn's level of knowledge, such advancement of decay might have been a reasonable supposition. The Experts agree that, although the mid-brown discolouration visible in the central wood of the fracture surface in PCS4 appended at JFL7 did not indicate the presence of degraded wood in this area, it is suggestive of decay advancement from the break-out wound, or of aeration of the central wood of the stem.

PART 4: Other substantive points

43. DL requested clarification of JFL3.3 'critical point': JFL explained that he meant a critical point in the structure such that a primary failure in this location was a serious matter for the integrity of the part concerned.
44. DL takes issue with JFL4.2.1 'major path': he considers that it was only 'major' within the context of the woodland path network within which it was located.
45. DL disagrees that the tree stood adjacent to a '*natural glade*' as it was formed by prior tree felling. DL does not consider that the locus of the tree was a place where people would be inclined to linger to a significant extent.
46. DL notes the dimensions and reach of the incident branch described at JFL4.3.6; DL tends to follow the reconstruction of the branch per the diagram exhibited by Richard Daplyn at RD4.
47. In relation to the reach of the incident branch and how this related to the remainder of the crown, the Experts agree that the incident branch extended to form the outer south to east aspect of the tree, though this did not occur so as to leave a gap (refers to JFL4.3.6 and JFL4.4.2).
48. DL does not dispute JFL6.2. However, in relation to JFL6.2.3, if writing now, DL would reword the text quoted by JFL to read 'Failure at such forks and at acute branch attachments is a frequent factor in the failure of old specimens'.
49. DL disagrees with JFL6.3.2 that the number of zones within the estate under the 1997 policy is necessarily a reflection of the adequacy of the tree inspection system. Furthermore, DL does not consider that this led to the application of an 'artificially low target rating for the locality of the subject tree'.
50. DL disagrees with JFL6.3.3 that the confluence of the footpaths necessarily warranted a high target rating; JFL notes that this is driven also by the other factors set out in his report at JFL6.3.3 and JFL6.3.4. DL also disagrees that the tree stood at a 'distinct and popular spot', though agrees that there were certain features that may have led to people lingering to some extent.
51. DL considers that whilst thousands of children did enter the woodland, across a year this can still equate to low usage (ref. 6.3.4); JFL considers that it is erroneous to annualize target occupancy as this fails to allow for accumulations localized to both time and space.
52. DL considers that, whilst the incident branch showed indications of non-optimal formation, these did not represent 'clear telltales that the fatal branch was undergoing progression towards failure' (ref. JFL6.4.2).

Note

*Hard copies of this document were prepared concurrently in the meeting and were signed as drafts by the Experts at that time. Pursuant to this, the Experts have reviewed the text in purdah, corresponding by email prior to exchange on 28<sup>th</sup> April. The agreed method for exchange was print, sign, scan and return by email.*

Signed by the Experts on 28<sup>th</sup> April 2011:



JULIAN FORBES-LAIRD



DAVID LONSDALE