Rebuttal to FLAC 42-1061 EXPERT EVIDENCE (ARBORICULTURE)

Evidence of Tom Popplewell BSc (Hons) MICFor

Brislington Meadows, Bristol

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The conclusions and recommendations contained in this document are based upon information gathered by TEP and provided by third parties. Information provided by third parties and referred to herein has not been independently verified by TEP, unless otherwise expressly stated in the document.

Nothing in this report constitutes legal opinion. If legal opinion is required, the advice of a qualified legal professional should be secured.

THE ENVIRONMENT PARTNERSHIP

Contents Page

Drawings and Appendices

Drawing 1: Candidate Veteran Tree Locations, Dimensions and Buffer Zones (ref TEP D7507.43.004)

Appendix A: Hulton Park Hawthorns

Appendix B: Hedgerow Age Technical Note (Mr Amir Bassir)

Appendix C: Tree Habitat Assessment Summary

1.0 Introduction

Witness and Company Experience

1.1 My name is Tom Popplewell. I am an Associate in TEP's Arboriculture team. I am a Member of the Institute of Chartered Foresters and hold a First-Class Honours Degree in Arboriculture. I have been in professional practice for 13 years.

1.2 I lead TEP's work on veteran trees and am also an expert on tree management strategies for local authorities, large corporate and third sector landholders.

1.3 Of particular relevance to this inquiry is my work on veteran hawthorn identification and management for Hulton Park in Bolton. This is a Registered Park and Garden (RPG) which includes a carriage drive lined with hawthorn planted at a date or dates between 1772 and 1808 by William Emes and John Webb. My Appendix A has a photographic record of the hawthorns because they provide a valuable reference point for the condition of the species at an age of c210 to 240 years.

1.4 The landowners of Hulton Park, Peel Group, have planning consent for creation of a championship standard golf resort, capable of hosting the Ryder Cup. I worked with the golf course designers and historic landscape experts to identify and protect veteran trees and trees with veteran characteristics. I am now overseeing the implementation of the Woodland Management Plan for Hulton Park, including veteran tree management.

1.5 TEP's survey and tree management work gives it access to a bank of data about trees which is useful when making judgements about tree age, size and condition relative to other trees of the same species. Examples are as follows.

1.6 Since 1998, TEP has managed Homes England's tree risk systems, using a bespoke database (Arborcura). The estate portfolio fluctuates as sites are acquired or disposed of, but is the land we typically manage covers around 3,500 hectares and has over 6,500 tree features.

1.7 TEP is a framework consultant to the Forestry Commission to carry out pest and disease surveys, a service we have been providing for 6 years. Under this agreement we frequently undertake sampling surveys for notifiable tree pests and diseases across a range of land types and use.

1.8 TEP manages Land Trust's tree risk system across north-west England, a service we have been providing since 2010, mapping and managing over 1,000 tree features. We also undertake periodic surveys across their

national portfolio, acting as an external auditor for their incumbent tree managers.

1.9 Since 2019, TEP has deployed Tree Plotter on BS5837:2012 tree surveys for developers and landowners. We now have data from over 600 surveys, totalling 40,000 tree features for which we have recorded information on species, size, age and condition. This includes data for about 1,000 individual hawthorn trees and 5,000 individual pedunculate oak.

Summary of Instruction

1.10 Following an indication from the Council at the Case Management Conference on 14th December 2023 that they intended to provide evidence on veteran trees to support Reason for Refusal 3, I was instructed by Homes England to review the evidence provided by the Council, visit the appeal site, carry out my own surveys and assessments, conclude on the presence of veteran trees and provide advice on measures to avoid deterioration or loss of the trees, the latter in consideration of two scenarios; firstly should the trees not be classified as veterans, and secondly should they be classified as veterans and thereby irreplaceable habitat under NPPF 180c.

1.11 TEP had earlier involvement through tree surveys and input to the Illustrative Masterplan, and produced an Arboricultural Impact Assessment[1], although I was not personally involved.

1.12 Without prejudice to my opinion that the alleged trees are not veterans, this includes the outline of a suitable compensation strategy in the event of their loss or deterioration.

1.13 As the Council's evidence on veteran trees was not provided in detail until 10th January, my evidence takes the form of a rebuttal to their evidence, produced by Mr Forbes-Laird (hereafter "FL")[2].

1.14 I am also instructed to provide rebuttal evidence on other Arboricultural matters raised by the Council in their evidence, and to provide assistance to the inquiry in relation to Arboricultural matters. To that end I have read the evidence of Mr Francis Hesketh[3] on behalf of the appellant and adopt it as my own insofar as it relates to Arboricultural matters within my competence.

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[1] CD 2.2

[2] CD 13.1 and 13.2 FLAC Expert Evidence on Arboriculture Vol.1 Proof and Vol. 2 Appendices

[3] CD 12.3, 12.4 and 12.5 Arboricultural and Ecology Evidence of Francis Hesketh. Vol 1 Proof. Vol. 2 Summary and Vol 3 Appendices

Scope of Evidence

1.15 I have structured my evidence as follows:

- Chapter 2 provides a summary of the identification and definition of veteran trees in the context of NPPF. I differ slightly from FL, but in the context of this appeal, the differences are highly relevant.
- Chapter 3 summarises how the alleged veteran trees compare with criteria of size, and I demonstrate they fall short on size criteria, both in terms of girth and biomass of features of interest.
- Chapter 4 rebuts FL's contention that the hedgerows can be confidently dated to 1750. I refer to the evidence of my colleague Mr Amir Bassir (Principal Historic Environment Consultant) at Appendix B.
- Chapter 5 and 6 summarise how the alleged veteran trees compare with criteria of age and condition respectively. I use FL's survey data and my own to show that oak tree T5 meets condition criteria but falls short in respect of age. I demonstrate that the veteran hawthorns fall short on condition criteria. I do not agree with FL's estimation of their ages, which I consider inflated, but agree the hawthorns could meet age criteria by a smaller margin, under a reasonable interpretation of the available evidence.
- Chapter 7 summarises my evidence on veteran status. Recognising the local value of T5, which has always been subject to protection during the evolution of scheme design, and in the interests of avoiding unnecessary debate, I have advised my client that the tree can be provided with a buffer zone concomitant with veteran status and this can be secured through planning condition. However I resist the idea that the hawthorns are veterans; they are mature specimens which have a local value but do not meet the tests of exceptional-ness in NPPF, so NPPF 180c should not be engaged
- Chapter 8 explores issues of loss and deterioration, should the Inspector not agree with my view on hawthorns at Chapter 7. I discuss buffer zones and tree protection measures that can be secured through planning condition in order to avoid deterioration of the oak trees T5 and T6 and the hawthorns said by FL to be at risk of deterioration (VH2,3,7,8,9,11). Using the topographical survey, my Drawing 1 provides an accurate plan of the locations of the alleged veterans, together with crown spreads, Root Protection Areas and buffer zones. I show that, even if the FL opinion on veteran status and irreplaceability is accepted in full, minor amendments to the illustrative layout are possible and technical details of works in or near buffer zones can be conditioned to avoid deterioration at construction stage. I also provide an outline of a suitable compensation strategy, should the Inspector determine loss of irreplaceable habitats is merited in this circumstance.

- Chapter 9 provides commentary on an alternative illustrative masterplan. This is provided on a "without prejudice" basis for the purpose of illustrating that even if the FL opinion is accepted in full, it is possible to satisfactorily retain the four "lost" hawthorns within a residential scheme.
- Chapter 10 provides a rebuttal to allegations of an inadequate tree survey and confirms that the Arboricultural Impact Assessment submitted for determination is reliable. Allegations of inadequacy are based on the alleged presence of veteran hawthorns, which is not accepted for the reasons outlined in chapters 3 to 7.
- Chapter 11 provides my summary and conclusions.

1.16 This evidence is supported by Drawings and Appendices:

- Drawing 1: Candidate Veteran Tree Locations, Dimensions and Buffer Zones
- Appendix A: Information on Hulton Park Hawthorns
- Appendix B: Statement in relation to hedgerow age
- Appendix C: Veteran Tree Survey Data

Summary

1.17 My evidence shows that the alleged veteran trees fall short of veteran status as they do not show exceptional biodiversity value because of age, size and condition. For oak T5 the shortfall is in terms of size and age, but it has always been recognised as an important tree and for the avoidance of unnecessary debate, I confirm it can be provided with a buffer zone concomitant with veteran status.

1.18 None of the alleged veteran hawthorns are ancient. None are veterans. They fall short on size and condition criteria. I also consider FL's evidence on age to be inflated and not subject to a "sense-check". It is extremely difficult to estimate the age of these outgrown hedgerow hawthorns but my best estimate would be between 140 and 180 years. While hawthorns of such age are capable of being veterans, their actual size and relative lack of biodiversity interest puts them in a mature category and they are not irreplaceable habitat and NPPF 180c is not engaged.

1.19 On size and age, a fundamental difference between FL and me relates to the measurements they have taken which I consider are not best practice and greatly overstate the actual size of trees. On condition, the fundamental difference is that FL has not applied Natural England's objective criteria for classification of veterans. When that is applied, it is clear that the hawthorns fall a long way short of supporting the range and scale of microhabitats necessary to demonstrate exceptional biodiversity value, and 180c is not engaged.

1.20 In the event the Inspector prefers FL's evidence and considers the hawthorns to be irreplaceable habitat, I provide commentary on how loss or deterioration can be avoided. This includes wider veteran tree buffer zones and an alternative illustrative masterplan that would safely retain all the veteran hawthorns, thereby meaning NPPF 180c would not be engaged.

1.21 In the event the Inspector engages 180c but considers that loss of veteran hawthorns can be considered as a wholly exceptional case, I summarise what would be included in a suitable compensation strategy.

Statement

1.22 I confirm that this proof of evidence is true and has been prepared and is given in accordance with the guidance of the professional institution of which I am a member. I further confirm that the opinions expressed in my evidence are my true and professional views.

2.0 Veteran Trees – Definition and Identification

2.1 The issue of what constitutes a veteran tree, including evidence about its exceptional value(s) and the irreplaceability of its habitats, is central to my evidence. I set out the four relevant statements from policy and guidance.

NPPF 180c

2.2 Development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists;

NPPF Annex 2 (Glossary) - Ancient or veteran tree

2.3 A tree which, because of its age, size and condition, is of exceptional biodiversity, cultural or heritage value. All ancient trees are veteran trees. Not all veteran trees are old enough to be ancient, but are old relative to other trees of the same species. Very few trees of any species reach the ancient life-stage

NPPF Annex 2 (Glossary) - Irreplaceable habitat:

2.4 Habitats which would be technically very difficult (or take a very significant time) to restore, recreate or replace once destroyed, taking into account their age, uniqueness, species diversity or rarity. They include ancient woodland, ancient and veteran trees, blanket bog, limestone pavement, sand dunes, salt marsh and lowland fen.

Planning Practice Guidance (Standing Advice)

2.5 An extract relating to veteran tree identification is as follows:

2.6 A veteran tree may not be very old, but it has significant decay features, such as branch death and hollowing. These features contribute to its exceptional biodiversity, cultural and heritage value.

2.7 All ancient trees are veteran trees, but not all veteran trees are ancient. The age at which a tree becomes ancient or veteran will vary by species because each species ages at a different rate.

Interpretation of guidance

2.8 In his paragraphs 4.1.1 to 4.1.4, FL sets out his understanding of how NPPF protects veteran trees. Whilst I agree with the direction of his argument, there are some important corrections, emphases, qualifications and additions that must be made.

2.9 At 4.1.1, FL summarises the materiality of veteran trees within the planning system that is in place since the 2018 revision of NPPF. I agree with this summary, but note the following:

2.10 At 4.1.1 ii) FL states a candidate tree must pass four tests to be regarded as a veteran under NPPF. These four tests are said to be "set out below" but I cannot see explicitly where four tests are set out. I assume he means 4.1.3 and 4.1.4 where three tests of age, size, condition are described along with a statement about exceptional value for biodiversity, culture or heritage.

2.11 I agree these tests must be passed and I explore these at Chapters 4 to 6. I am also of the opinion that it is relevant to consider the irreplaceability of the habitat provided by the veteran tree if the reason for veteran classification is exceptional biodiversity value, noting that there are cultural or heritage reasons for veteran classification which are not claimed here. Exceptional biodiversity value which is grounded in tree condition, age and size meets the definition of irreplaceability, on consideration of the uniqueness, diversity or rarity of the habitat and the technical difficulty of replacement. This is of particular consequence to the design of mitigation measures, including buffers which have the purpose of protecting irreplaceable habitats. I explore this at Chapter 8.

2.12 Referring to FL 4.1.2, I agree it is important to have clarity on what constitutes a veteran tree. The definition is at NPPF Annex 2, and is amplified slightly by Standing Guidance which highlights the role of significant decay features that contribute to its exceptional value. Later in my evidence, I state that one reason the hawthorns do not meet NPPF tests is because they do not currently have significant decay features, even when assessed using FL's own criteria. Such decay features as they have, are not exceptional.

2.13 FL concludes paragraph 4.1.3 by stating that "*Trees meeting these tests are held to have exceptional value under at least one heading from biodiversity, culture or heritage*". I disagree with the way this is presented. It is not "held" that they do, rather NPPF requires a veteran tree to be demonstrated to have exceptional value under one of those headings, as a consequence of the characteristics of age, size and condition.

2.14 FL says that trees which satisfy the age, size and condition tests have, by definition, exceptional value. I do not consider this an accurate explanation. Veteran trees are trees which have exceptional value (either in terms of biodiversity, culture or heritage). This is the defining characteristic of such trees. Age, size and condition are the necessary components of this exceptional value under NPPF. It is important to evidence that the trees actually have exceptional value, and the value comes from the age, size and condition of the trees.

Age, size and condition

2.15 At 4.1.3, FL provides his interpretation of the application of NPPF and Planning Practice Guidance to veteran trees. I believe this interpretation is not quite correct and also that additional factors must also come into play.

2.16 At 4.1.3 i) FL's first test is stated as "*The tree exhibits specific characteristics of age, and size, and condition"*

2.17 This is correct insofar as it goes, but I note that NPPF Annex 2 confirms these characteristics must confer exceptional value (NPPF uses the word "because"). It is not enough for the tree simply to have the specific characteristics – the consequential value must be exceptional.[4]

2.18 At 4.1.3 ii) FL's second test is stated as "*The tree must be old relative to other trees of the same species".* This is fully consistent with NPPF Annex 2.

2.19 At 4.1.3 iii) FL's third test is stated as "*The tree must therefore have a relatively large stem size for its kind (age and stem size are indelibly linked at the biological level)."*

2.20 FL goes on to treat age and size similarly on the basis of this 'indelible link'. FL 4.1.8 puts age and size together when observing that guidance should not be interpreted rigidly to either (i.e. that it is appropriate to adjust both age and size to reflect previous events in the life of the tree). I do not agree with this. It is precisely because age and size are *not* perfectly linked that any adjustment is needed. Size is the primary observable condition and should be measured in absolute terms. The measurement of size may benefit from adjustments in order to arrive at an estimate for age, which should also consider any other available evidence.

2.21 The NPPF test is satisfied by a tree having a relatively large stem size for its kind; I say that this test should not take account of former management. The size test must of course take account of the species and the bounds of what it can achieve, but it is not appropriate to evaluate the size of trees, relative to what their species can achieve *under the circumstances*. Size should be measured and reported in absolute terms; it is not a measure of all that a tree has ever achieved, it is a measure of what a tree is now.

[4] A tree may have exceptional value for other reasons, and under other definitions, and not be a veteran.

2.22 The hawthorns were managed within hedges at least up to 1946 and thus have a much lower biomass than they might have had under a different regime.

Significance of size in veteran classification

2.23 NPPF Annex 2 simply states that "size" must confer the exceptional value. Unlike age, Annex 2 does not explicitly require that size should be determined in relative terms. NPPF does not even state that a *large* size is required to meet the definition, although that can reasonably be inferred.

2.24 In the context of biodiversity, it is the total biomass of wood (in root, trunk and crown) that provides the resource for flora and/or fauna to use as habitat. A large wood biomass supports exceptional value, because a) it offers the potential for a greater biomass of associated fauna than a tree of ordinary size and b) it can decay over a long period, thus providing a more resilient habitat than a smaller volume of wood.

2.25 Later in my evidence, I state that one of the reasons the hawthorns do not meet the NPPF test of condition, is that the veteran characteristics they have are few in number and small in scale. This is partly because they are confined to the lower stems (or "boles") of the trees. It is only the boles (up to a maximum height of c1.5m), and the central portion of the rootstocks that were growing before 1946. The upper crown is younger, and its biomass has no significant decay features. As hawthorn is inherently a tree with a small-diameter stem, there is actually little biomass in the boles of the trees in question.

Irreplaceable Habitat

2.26 The purpose of NPPF 180c is the protection of irreplaceable habitats from loss or deterioration (except within relatively tightly circumstances). Veteran or ancient trees are given as one example of an irreplaceable habitat.

2.27 FL 2.2.1 states that the veteran trees on this site are an irreplaceable habitat. None of the evidence offered is specifically framed in terms of habitat assessment. It is taken as read throughout that veteran trees meet this definition (see also FL 4.1.1 iii). It is presumed on this basis, and because of the claimed engagement of NPPF 180c (FL 5.6.2) that the claimed justification for veteran classification of trees on this site lies in exceptional biodiversity value (rather than heritage or cultural values, which do not necessarily imply habitats but may be 'irreplaceable' for other reasons[5]). It is not entirely clear from FL whether any other justification is also claimed.

[5] See NPPF 189, which describes irreplaceable heritage assets

2.28 Trees that do not satisfy one or more of the age, size or condition criteria of NPPF Annex 2 are not veterans and not capable of being irreplaceable habitats in their own right (although they may be within another type of habitats). For example, veteran characteristics on a middle-aged tree are inherently 'replaceable' by contrast to those which are a product of significant age.

2.29 The other cited examples of irreplaceable habitat in NPPF Annex 2 are area habitats which have a diversity of flora and fauna supported by the habitat. This is important because the definition of irreplaceable habitat focusses attention on the habitat provided by the tree, not the tree in its own right. This is instructive in the evaluation of biodiversity and the design of mitigation measures (to which I return in Chapters 6 and 8). Consideration should be given to whether biodiversity is actually present or merely an opportunity or potential (i.e. is the habitat being used?); whether biodiversity and habitats are reliant on the tree and its characteristics, or merely near to it and/or incidentally associated; and to possible harmful effects on the habitats or biodiversity, (which may be different to the scope of possible harmful effects on the tree), and how these may be controlled.

2.30 I interpret the intent of NPPF 180c as being the protection of irreplaceable habitats and, in the case of veteran trees (so far as in issue in this case), the exceptional biodiversity that they have been shown to support. Protection of the tree is a means to this end, via the use of buffer zones to control activities around the tree. Importantly, effects on a tree and effects on associated habitat are not inextricable. If the particular biodiversity and/or habitat in question suffers no loss or deterioration, 180c is disengaged.

2.31 FL has not made any systematic evaluation of habitats or their replaceability, rather he has inferred biodiversity from a simple count of features on trees. This is not a reliable approach because NPPF 180c is concerned with habitats, not merely with trees. Where evidence from ecological surveys is available, such as here, that should be considered when evaluating whether a tree supports irreplaceable habitats.

2.32 The definition of irreplaceability requires interpretation on a case-specific basis. Government signalled that it will be producing guidance as part of the implementation of the Environment Act 2021, as follows[6]:

"The UK Government will set out in secondary legislation a list of habitats considered to be irreplaceable for the purposes of mandatory biodiversity net gain. This list will be accompanied by short supporting guidance on

6 From the Defra Consultation on Biodiversity Net Gain Regulations and Implementation (Jan 2022) *Consultation on Biodiversity Net Gain Regulations and Implementation_January2022.pdf (defra.gov.uk)* – see pages 30 and 31

what constitutes irreplaceability and a set of principles to guide the implementation of bespoke compensation approaches. This compensation should be informed by appropriate ecological expertise and we expect that this would typically exceed the requirements that would be set through biodiversity net gain. We will work with Natural England and a range of external stakeholders to draft the definitions and guidance."

2.33 I set out overleaf at Table 1 my interpretation of the decision framework imposed by NPPF where development might affect trees of potential veteran status.

Table 1: NPPF Decision Framework for veteran trees

Is the candidate tree of….				
Exceptional Biodiversity Value?	or	Exceptional Cultural Value?	or	Exceptional Heritage Value?
Because of its….				
Age *Relative to others of same species*	and	**Size** *Being large*	and	**Condition** *Having significant decay and other features that support a diversity of fauna or flora dependent on such features*
If Yes, then NPPF 180c is engaged.				
Application of policy and consideration of loss or deterioration should be informed by the definition of irreplaceability e.g. what is the actual tree-related habitat that is under threat? Are there any available measures to maintain or restore or re-create or replace it in a period of time that is not significant to the conservation of the habitat, taking account of the age, uniqueness, species diversity or rarity of the habitat?				
If No, then the strict protections of NPPF 180c do[7] not apply. Nevertheless the candidate tree may still have local biodiversity value and the mitigation hierarchy under NPPF 180a will still apply.				

[7] Trees with exceptional culture or heritage value need not be irreplaceable habitats to qualify as veterans and do not engage 180c

3.0 Assessment of Size

The role of size in veteran tree identification

3.1 Size is a gateway characteristic for veteran trees. That is to say, trees that fail to meet the relevant minimum size threshold cannot be veterans within the NPPF definition. FL evidence summarises this point well at 4.1.4.

3.2 Size can refer to the total biomass of a tree, as well as the spread of its aerial and underground parts. For the purposes of evaluating candidate veteran trees, both may be relevant. However, it is not straightforward, or always reliable, to make an assessment on these factors. Therefore, the size of the stem is used as the primary metric. John White[8] says of this matter,

"There are several features of a tree that can be measured. Height and crown spread are perhaps the most apparent. Unfortunately, after middle age these dimensions are an unrealistic guide to age. Thickness of the stem is a constant non-reversible feature of tree growth in so far as it has to increase each year that the tree lives."

3.3 For the hawthorn trees on this site, this observation holds particularly true. They have relatively small, compact crowns, arising since the cessation of hedge cutting during the latter part of the 20th century. The only parts of the hawthorn trees that hold any interest in terms of size are the stems. The trees are not particularly tall, not particularly broad spreading, and do not have particularly substantial biomass, having been hedged for much of their lives.

How should size be measured?

3.4 FL measures tree sizes inconsistently and (in the case of hawthorn trees) incorrectly, resulting in figures that are too high. As a consequence, the conclusions FL draws regarding the gateway conditions of size and age are overstated.

3.5 The White Method for Estimating the Age of Large and Veteran Trees in Britain was published (CD8.8) by the Forestry Commission in 1998 and is referenced by FL. British Standard 5837 was last updated in 2012 (CD8.9) and is also referenced by FL. I agree that these are useful and reliable reference texts.

[8] CD8.8. Estimating the age of large and veteran trees in Britain, White, Dr J, Forestry Commission 1998 – see paragraph 6

3.6 I would add to the above, the Veteran Trees Initiative Specialist Survey Method (SSM)[9] published by English Nature in 1997. I will add this to the Inquiry's Core Document Library. This is relied on by Natural England for the classification of veteran trees in its Biodiversity Metric 3.0 Technical Supplement (CD11.6f)[10]. I return to this in more detail in relation to condition assessment at Chapter 6.

3.7 There are also similarities between the SSM and FL's own assessment method, such as the diameter of significant dead wood (150mm), and it may be that he also relies on this publication but does not cite it in evidence.

3.8 It is common to the above methodologies that girth should be derived from stem diameter(s), measured at breast height. It is also common to them that measurement should seek out a representative 'clean' cross section that avoids distortions that would inflate the result.

3.9 *White*, paragraph 7: *'Provided there are no branches, swellings, buttresses or abnormal lumps, girth should be measured with a tape at breast height (1.3 m or 4 ft 3 in above ground level). Girth is the single parameter which sums the infinite number of diameters in an irregular cross section (Mitchell et al., 1994). Diameter at breast height (dbh) is the measurement on which the estimation of age suggested here depends.'*

3.10 SSM, paragraph 4.1: '*The girth (circumference) of the tree is measured at 1.3m height above ground level*' and 4.2 '*If there are swellings, burrs, branches or other irregular features which occur at 1.3m height, then measure at the nearest point below, where the trunk is more regular.'*[11]

3.11 BS5837, paragraph 4.4.2.5 '*A schedule to the survey should list all the trees or groups of trees. The following information should be recorded… d) stem diameter, measured in accordance with Annex C*.

[9] Fay N. and de Berker N. (1997) English Nature Veteran Tree Initiative Specialist Survey Method, downloadable from *(PDF) Veteran Trees - Specialist Survey Method (researchgate.net)*

[10] See for example Footnote 2 on page 180/181 which has guidance on qualifying characteristics for classifying veteran trees

[11] In the case of multi-stemmed hedgerow trees, there is no regular point below these features, of which the bole is largely comprised, therefore follow SSM 4.2.2

Figure C.1 **Measurement of tree stems**

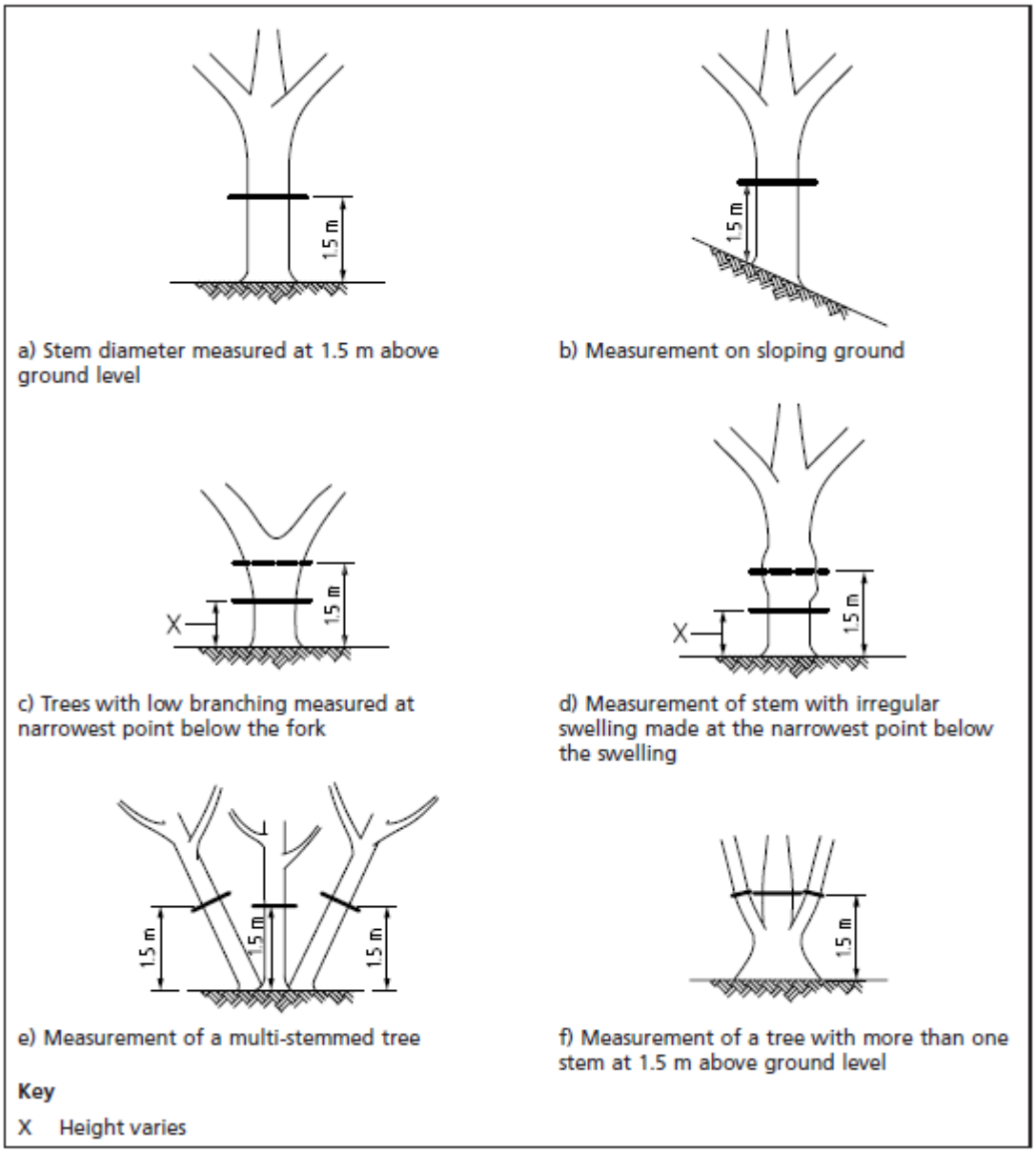

Figure 1: BS5837:2012 extract from Annex C – hawthorn trees at the site are generally as per (e) or (f)

3.12 The objective of DBH measurement is a reliable estimate of the accumulated cross-sectional area of the tree at the point which best represents the tree's size in a way that can be compared to other trees of the same, or different species.

3.13 SSM is more conservative at 4.2.2. It directs the surveyor to measure only the largest remaining stem of a multi-stemmed tree where the union of stems is below 1.3m. Since the White and BS5837 methodologies both measure all stems, and this is a more generous approach, giving the larger result, it is what I have done.

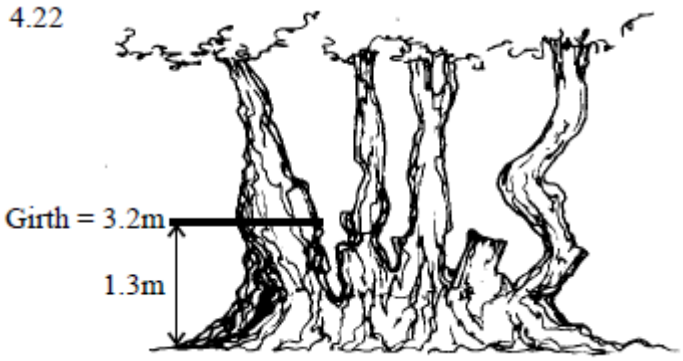

Figure 2: Specialist Survey Method 4.2.2 - girth measurement for trees that are multi-stemmed below 1.3m

Figure 2. The correct positions at which to take measurements

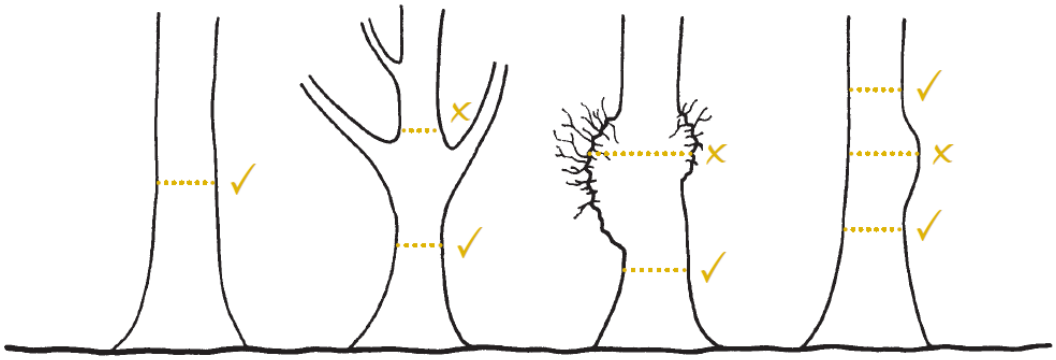

Figure 3: Extract from White J. Estimating the age

3.14 While Figure 3 illustrates single stemmed trees, the key principles it espouses also apply to trees with more than one stem. Measurement should avoid the basal flare (both stem taper and buttress roots); it should avoid branch unions that would give an inflated measurement; it should avoid any other burring or swelling that would give an inflated measurement; and it should not increase the height of measurement to give an unduly small measurement. In short, measurement should comprise the 'cleanest' cross sectional area of the tree at 1.3m or as close to this point as possible. Where it is not possible to achieve this (e.g. because of thick ivy) it may be appropriate to adjust the field measurement to correct for this.

3.15 In this context, girth should be derived from DBH and not the other way around. In some other contexts, such as the 'citizen science' Ancient Tree Inventory, a 'simple' girth is sometimes as a metric to describe size. It appears that this is what FL has done but this approach is not appropriate here. The White Method makes clear at 16.1.c that the measurement of girth should be derived from the measurement of DBH.

The calculations at 16.2.c and 16.3.a also use DBH as the currency of large and veteran tree size.

3.16 'Simple girth' measurements may be appropriate, and are often equivalent to DBH-derived measurements for open grown trees, provided they are above the buttresses and observe the principles of avoiding swellings etc. Internal hollowing would affect neither measurement approach. However, in the case of multi-stemmed trees, the arrangement of individual stems may incorporate empty space that has never been part of the tree. Hedgerow trees are particularly vulnerable to this type of measuring error because their stems tend to be in a linear arrangement rather than clustered around a single point. These latter two matters are particularly relevant to the consideration of trees in this case.

3.17 Measurement of 'simple girth' for hedgerow hawthorn trees tends to materially overestimate their size because it improperly includes some or all of the following:

- Buttresses (as in VH3)
- Stem fluting (which is a feature of mature hawthorn) (as in VH5)
- Stem taper (all trees)
- Enclosed voids between stems (as in VH1)
- Space adjacent to stems that is geometrically within the outer perimeter around all stems (i.e. open ground within a 'simple girth' but not within the tree) (as in VH2)
- Space between parts of a multi-stemmed tree where the stem union is undergoing progressive failure (i.e. widening though failure rather than growth), (as in VH8).

FL Evidence on Size

3.18 The FL evidence falls foul of the above methodological errors and is, at best, unsystematic. The dimensions it presents at JFL5 and JFL6 are too large (except where he relies on the TEP measurement for T6). They may describe the girth around the bases of the trees accurately (I have not measured this), but that is not the proper measurement or reliable for the purpose to which the data is then put.

3.19 Tree size is introduced by FL at 4.1.6 by reference to girth. Single figure dimensions for stem diameter are presented at Appendix JFL5 with the epithet 'base' to indicate a basal dimension rather than a DBH in all but two instances. All diameters are in round numbers, indicating that they may be the product of a rounded calculation rather than a direct

measurement. These dimensions are repeated at JFL6 and used as the basis for estimating age and recommending buffer zone sizes. FL's Tables 1 and 2 present girth dimensions with rounded 'equivalent' diameter. All of these observations demonstrate a 'girth first' approach to measurement. Such an approach would be proper for a veteran chestnut in parkland or wood pasture where it would not change the outcome, but it is not appropriate in this hedgerow context for the reasons set out at 3.17.

3.20 Where JFL5 does give individual stem measurements (which it does for VH3, VH4 and VH7), these bear no clear relationship with the much higher 'base' figures that are then used throughout the evidence. The base figures are neither the aggregated total of the stem diameters, a product of a BS5837 Annex C calculation, or the equivalent diameter of the aggregated stem areas. They are not derived according to an apparent (or declared) methodology and are clearly unsystematic, even in their own terms because they are presented in three different ways. VH2 is presented as an average stem diameter; other hawthorns are presented as a basal diameter, and it is apparently random whether measurements of the individual stems have been taken.

3.21 My measurements follow the White Method, BS5837 and English Nature Specialist Survey Method approach. They aggregate all stem diameters (with measurements of up to eleven stems, in the case of VH2) and are therefore both more accurate and more reliable. I found no practical impediment to measuring all stems of trees for which FL presents measurement data. Table 2 below demonstrates a consistent pattern of discrepancy between my measurements and those of FL, which I regard as inflated.

Table 2: Stem diameters of alleged veterans

Tree	TEP diameter (mm)	FL diameter (mm)
T5 (oak)	1,120	1,140
T6 (oak)	1,450	1,450[12]
VH1	474	650
VH2	520	680
VH3	457	740
VH4	400	620

[12] Not remeasured by FLAC, TEP measurement used.

Tree	TEP diameter (mm)	FL diameter (mm)
VH5	410	510
VH6	474	700
VH7	351	660
VH8	297	560
VH9	368	550
VH10	349	620
VH11	406	570

3.22 The TEP measurements have not been minimised; they are conservative. Where there is more than one available measurement point, the larger figure has been used. For example, I measured VH6 as 10 stems at 1.5m, and also as 3 stems at a lower point that was still compliant with White and BS5837. The latter gave the higher figure, so that has been used. A similar approach was taken to VH2. Measurement of VH4 includes dead stubs to give the largest possible cross-sectional measurement. Measurement of a number of trees, including VH11 and VH4 included lateral/horizontal parts that could conceivably be described as branches rather than stems, but which were included for completeness and methodological robustness.

3.23 The TEP measurements for the oak trees are either accepted by FL, or differ by less than 2% (presumably a simple measuring tolerance rather than methodological difference). It is not clear why the TEP methodology, which has been applied consistently to all trees, is accepted for the oaks but not the hawthorns.

3.24 Given the foregoing matters, I am of the view that the TEP measurements in Table 2 should be preferred, and that the FL measurements at Appendix JFL5 (Column 5) should not be used. The TEP measurements provide the more appropriate, reliable and accurate basis for estimation of tree age and evaluation of tree size. Where any adjustment is to be made to reflect historic management practices, which I agree in principle that they may be when calculating age, it should be made to the TEP data, not to the FL data.

Adjustments to measured size

3.25 Size is an important consideration in the identification of veteran trees for two reasons. First, it is the primary means of estimating age (primarily because it is always available for inspection, whereas historical evidence such as maps and other records may not be). Second, because the size

of a tree provides the capacity and the biomass for the development of veteran condition. A very small tree has inherently less capacity to become a veteran than a very large tree because it simply does not possess the volume to sustain the requisite assemblage of veteran characteristics such as significant decay fungi and dry habitat spaces.

3.26 An important distinction arises, between size informing age, and size informing condition. The former is relative (i.e. size must be interpreted in context in order to estimate age), the latter is absolute (i.e. the physical attributes of the tree are what they are).

3.27 FL 4.1.5 and 4.3.6 speak to the capacity of previous management to influence the size of a tree today. I agree with the broad thrust of this argument; pruning a tree can slow its rate of growth for a period of time.

3.28 FL 4.3.7 coins the notion of a 'true' stem diameter; the diameter a tree would have now, had it been managed differently in the past. The underlying principle here is that the stem diameter and age are not perfectly correlated, and adjustments to the input data (size) may be necessary to reach an output (age). Whilst I agree with this in principle, I would note that the same principle does not apply to the assessment of size itself as a gateway criterion. The size of a tree is what it is. Insofar as size informs possible exceptional value, it should be measured in absolute terms. Insofar as size informs age, it may be manipulated where a sound justification is available.

3.29 FL contends at 4.3.5 that T5 is an outgrown pollard, and that its 'true diameter' should be at least 160mm larger. I return to whether a larger 'true diameter' would be of any consequence in this case in Chapter 5.

3.30 Notwithstanding, I do not agree with this assessment. The form of T5 is more suggestive of a previous stem failure than a pollard. The failure point, with a fractured rather than cut surface, is visible from ground level. TEP has undertaken aerial inspection of this tree to inspect aerial cavities and evaluate habitats, and has good familiarity with the form and characteristics of the tree. Furthermore, aerial photographs from 1938 to the present all show a full canopy, either directly or in shadow silhouette. Whatever happened to it, happened at least 120 years ago. I think it probable that the main stem failed naturally. This may have been around the same time as a failure of the adjacent tree T6, either because of increased exposure thereby arising, or during the same weather event. T6 also has a fracture point rather than a cut pollard point. Neither tree has any swelling to indicate formation of a pollard head via repeated operations.

Figure 4: Tree T5 main branch union showing jagged upward facing fracture

3.31 At the very least, pollard form via failure rather than via human pollarding means that the event only occurred once. Further to this, pollarding typically removes all foliage, whereas a stem failure would typically not. The human pollarding narrative therefore overestimates the 'lost diameter' associated with the event.

3.32 The lost diameter concept is inherently somewhat speculative, which 4.3.7 accepts, but insofar as the reasoning and conclusions presented at 4.3.7 go, it would be reasonable to halve the theorised lost diameter for a natural failure event (i.e. compared to a pollard event). The resultant 80mm 'lost diameter' is approaching a rounding error at this scale, particularly for a tree with a claimed 'substantial internal void' (4.3.2), the primary external indicator for which would be an increased stem diameter resulting from adaptive and compensatory growth. To claim an internal void without access to it is tantamount to observing changes to the natural stem taper, (i.e. stem thickening) which could certainly cancel out any lost increment in the order of 80mm on a tree of this size (1,140mm).

3.33 In the case of T5, the form of the crown is not likely to have made a material difference to the stem diameter. To claim that it has, and adjust assessments of age on this basis, is to stretch the available evidence beyond a point that I consider robust and appropriate. Measuring this tree should simply be done by putting a tape around it.

What size thresholds apply

3.34 Having established tree sizes, in this case based on their respective stem diameter, we must compare them to some threshold to determine whether they are sufficiently large to be capable of veteran status. This amounts to a question: is the tree large for its species, and if so, to what extent? In this, it is not sufficient for a tree to simply be a typical mature example of the species. Exceptional value can only be derived from a combination of age, size and condition. Trees must therefore be in a small percentile at the upper end of what is possible for the species to achieve. If not exceptionally large for the species, veteran trees must at least be unusually large.

3.35 FL uses thresholds that are too high, due to a number of errors, and also a lack of 'sense check' on results.

3.36 I agree with FL that Lonsdale (Ancient Tree Forum) 2013[13] Figure 1.3 is of assistance with respect to thresholds for size, as an indicator of life stage. It presents a graphical representation of both hawthorn and oak (the species alleged to be veterans at this site) as they pass through the Locally Notable, Veteran/Notable[14], and Ancient life stages as a function of their size.

3.37 FL Table 1 proposes size thresholds for *Veteran* status in hawthorn and oak based on Lonsdale. FL Table 2 proposes size thresholds for *Ancient* status in hawthorn and oak, also from Lonsdale. Both tables contain errors, which have the effect of lowering the minimum size condition for veteran and ancient trees. In other words, FL's Table 1 and Table 2 permit smaller trees through the assessment criteria than I think is proper.

Three errors in interpretation of Lonsdale 2013

3.38 **FL Table 1 Oak** An error has been made by FL in respect of oak, resulting in an underestimate of 'veteran state' girth by at least a metre. It is easy to see how this mistake could arise; the graph does not

[13] CD8.20 Ancient and Other Veteran Trees: Further Guidance on Management, Lonsdale, Dr D, Ancient Tree Forum 2013

[14] Veteran/Notable here meaning that a tree in the range may or may not be a veteran, depending on its condition. Notable trees in this context are those which meet only the age and size criteria for veteran classification, but not condition criteria.

delineate the X-axis in the normal way; it starts at 1m, not zero. However, FL reads the graph correctly for the ancient state girth of oak in Table 2, so this appears to be an inadvertent mistake rather than a considered position.

3.39 By my reading, the correct threshold figure for veteran/notable state girth in oak according to Lonsdale 2013 is 4.8m, not 3.7m. Consequentially, the diameter threshold for veteran/notable status should be 1,530mm.

3.40 Lonsdale 2013 gives a figure of 1.5m girth at page 27 (see 'Size-based attributes' for oak trees that are especially valuable with respect to conservation (i.e. candidate veterans). This supports my reading of Figure 1.3 and contradicts the FL reading of it.

3.41 **FL Table 2 Oak** The FL figure of 5.8m for 'ancient state' girth is agreed. It is based on a different reading of Lonsdale 2013 than the veteran oak girth threshold given in Table 1. This supports my preferred figure for 'veteran/notable state' girth.

3.42 **FL Table 2 Hawthorn** FL presents 2.3m as the girth threshold for ancient state in hawthorn. The reference text (Lonsdale, 2013) explicitly states this figure should be 2.5m at its Fig 1.4 (see my Figure 5 below). The diameter equivalent for ancient hawthorn based on Lonsdale 2013 should therefore be 800mm, (not 730mm as per FL).[15]

[15] The photograph of an ancient hawthorn in Lonsdale at Fig 1.4 - the context of this tree is not known, but it is remarkably different to the alleged ancient and veteran hawthorns on this site, of which FLAC claims one (VH3) is of equivalent age and size. In its form, structural state, and the obvious richness of epiphytes and biodiversity it supports, the tree in Lonsdale is head and shoulders beyond anything on this site.

Fig. 1.4: Ancient hawthorn. Hawthorn can be considered ancient where its girth exceeds about 2.5 metres, as shown on the girth age chart on page 5. Girth at this stage can vary considerably between upland and lowland situations

Figure 5: Extract from Lonsdale D (2013) indicating an ancient hawthorn and the minimum girth criterion of 2.5m in its caption

3.43 **FL Table 1 Hawthorn** The ATF Figure 1.3 is a graphic device designed to blur the line between notable, veteran and ancient and present them as adjacent stages within a longer transition. I consider the graphic does not imply that all trees in the "Veteran/Notable" sector are de facto veterans; rather this threshold is a point where the classification of veteran may begin to be reasonable, on consideration of their condition.

3.44 'Locally Notable' is indicated by a dashed line that becomes a solid line to indicate the point at which size is sufficient to make "Veteran/Notable" classification available.

3.45 It is possible to misread the graphic by reading the final part of the dashed line as the first part of the solid. This is what FL has done, which has the effect of reducing his threshold figures by c.100-200mm (i.e. the width of one dash). This effect influences his position on both oak and hawthorn.

3.46 Insofar as the graph at Lonsdale 2013 is intended to be used to derive definitive size thresholds, which is how FL uses it, and given that we

agree the usefulness of this reference document, my preferred reading of Lonsdale Figure 1.3 is 1.95m girth for hawthorn to enter veteran/notable state. The diameter equivalent for a veteran/notable hawthorn should therefore be 620mm, not 570mm as proposed by FL.

3.47 On very close inspection, there is a small change in the width and symbology used on the figure at the interface between the dashed and solid lines. The position of this change on the X axis is the true interface between Locally Notable and Veteran/Notable in Lonsdale.

3.48 This graphical 'tell' is a feature of other species within the graphic. It is not an oddity relating to Hawthorn, it is how the graphic was constructed. It is difficult to reproduce this relatively small feature within a portrait text document; it is best viewed on a PDF at full zoom. This can clearly be seen reproduced in Figure 8 in the FL evidence by increasing the zoom on the PDF.

3.49 The images below at Figures 6, 7 and 8 are screengrabs taken directly from Lonsdale 2013, in this case for oak[16].

[16] The same effect is visible in Lonsdale for Hawthorn, Sycamore, Lime, Sweet chestnut and Yew

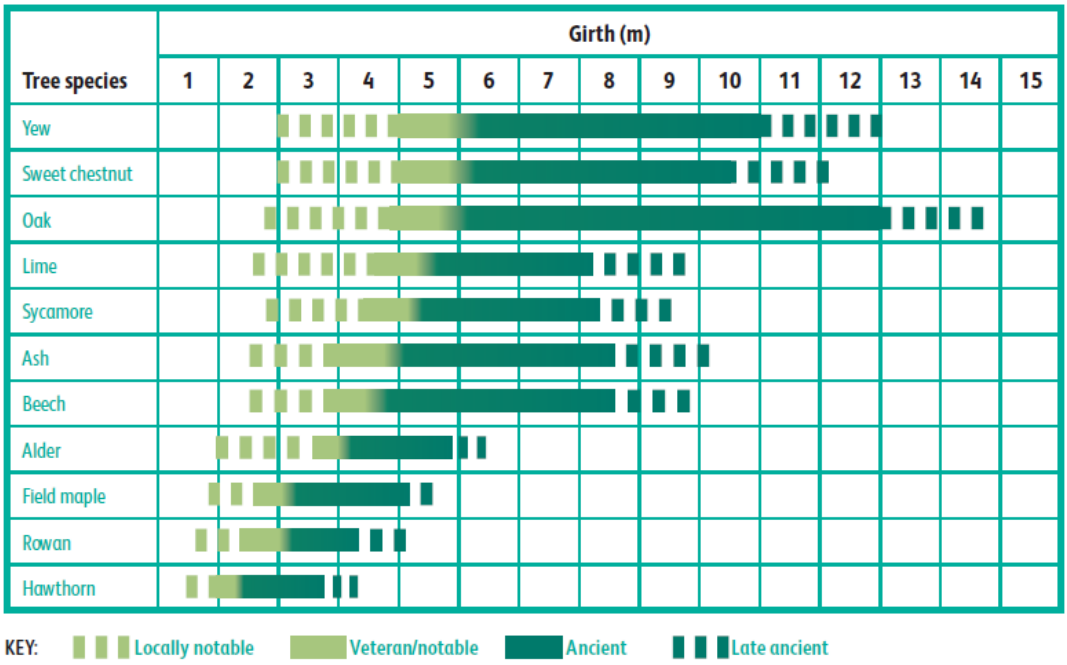

Fig 1.3: Chart of girth in relation to age and developmental classification of trees*

Figure 6: Reproduction of Lonsdale 2013 Figure 1.3 (note oak veteran/notable threshold lies within the 4 to 5m range of girth)

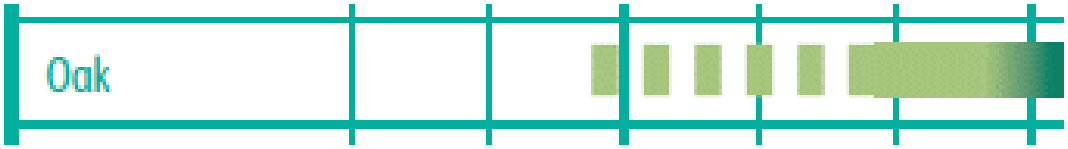

Figure 7: Focus on Oak - note change in line width at 4.8m

Figure 8: Oak veteran state threshold (as Figure 5, at increased scale)

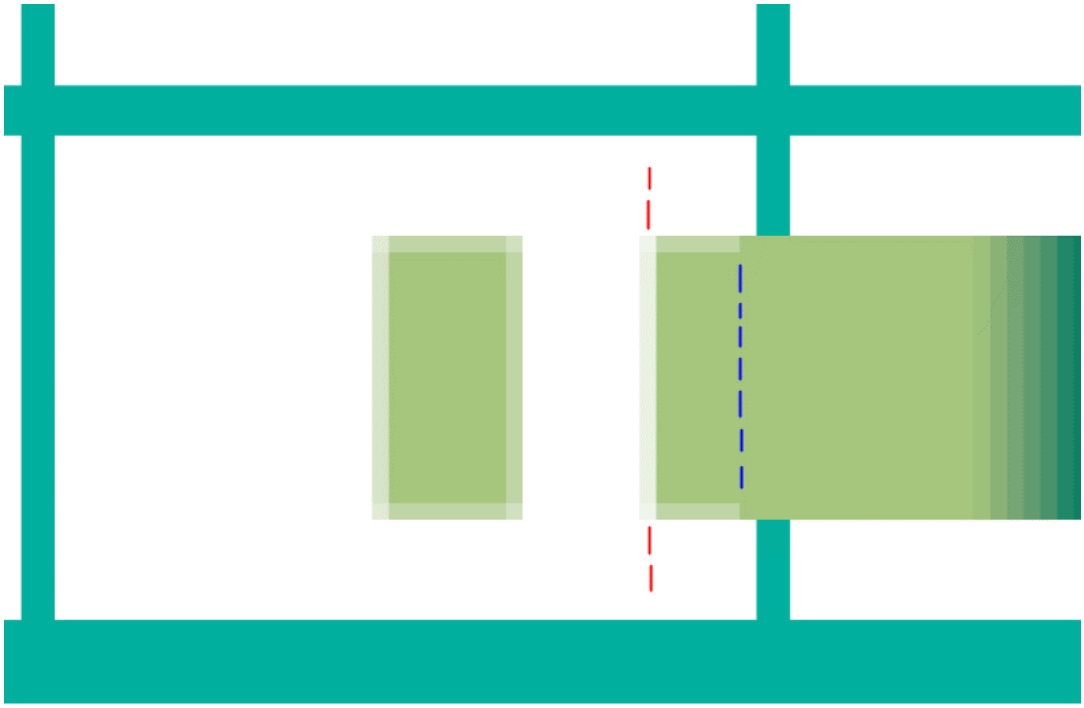

Figure 9: Large scale extract of FL Figure 8 Hawthorn, annotations added showing (red) proposed FL threshold of 1.8m and (blue) my preferred threshold at 1.95m based on clear change in symbology at this point. This change is also replicated for other species.

3.50 The FL evidence systemically prefers the most conservative, rather than what I consider the most reasonable interpretation of Lonsdale. Lonsdale Figure 1.4 (see my Figure 5) contradicts his interpretation; close study of Lonsdale Figure 1.3 contradicts his interpretation; Lonsdale page 27 contradicts his interpretation. FL underrepresents veteran size thresholds by something in the order of 100-200mm girth. For oak, this is compounded by a further metre due to the reading error mentioned previously.

Interpretation of data

3.51 The thresholds I read in Lonsdale are as follows (Table 3):

Table 3: TEP Size Thresholds for Veteran and Ancient Status (based on Lonsdale 2013 Figure 1.3)

	Veteran/Notable	Ancient
Hawthorn	>620mm dbh (1.95m girth)	>800mm dbh (2.5m girth)
Oak	>1,530mm dbh (4.8m girth)	>1,850mm dbh (5.8m girth)

3.52 According to my reading of Lonsdale 2013 Figure 1.3, a hawthorn must be at least 620mm in diameter to be a veteran. In my opinion, using a single figure implies greater precision than is reasonable in this context and I would prefer a range, say of 600-650mm. However, the figure 620mm is reasonable in my experience and I am content to use it for the purposes of illustration.

3.53 If a veteran hawthorn threshold of 620mm is applied, the TEP diameters in Table 2 (page 20/21) demonstrate that none of the hawthorn trees passes the veteran/notable threshold. Therefore they are not veteran trees. Only by using the disputed higher FL dimensions do any of the trees become capable of veteran/notable classification. In fact, only four trees (VH1, VH3, VH6 and VH7) pass this threshold using FL measurements. A further two trees (VH4 and VH10) sit on the threshold. Only by adopting both the lower thresholds and the higher measurements is it possible to arrive at the FL conclusion regarding veteran hawthorn.

3.54 Even if my preferred threshold for veteran/notable hawthorn is not used, the TEP diameters in Table 2 demonstrate that all hawthorns still fail to meet the FL preferred veteran/notable threshold of 570mm.

3.55 According to Lonsdale 2013 Figure 1.3, an oak must be 1,530mm in diameter to be a veteran. The diameters in Table 1 demonstrate that T5 does not meet this threshold. Further to this, FL JFL5 has the diameter of T5 as 1140mm, which is also below both my threshold and the threshold FL proposes at his Table 1 (1,180mm). Therefore some further justification for a more generous assessment is required in order to claim veteran status for this tree even in terms of the FL assessment itself. FL suggests at 4.1.8 that thresholds should not be applied 'too rigidly'. It appears that this principle has been consistently applied in favour of a more generous treatment of the candidate trees, to the material benefit of a lot of doubt. For example, he claims veteran status for trees which do not meet his own minimum size thresholds.

3.56 In fact, in five[17] out of thirteen cases, the stem diameters at JFL5 (see 'Required Primary Feature') do not exceed even the minimum veteran/notable size threshold presented in his evidence (see FL Table 1). Whilst I do not agree with the FL measurements or the FL thresholds, it is remarkable that even they describe a tree population that is rather 'borderline', at or even below the lower threshold for veteran/notable size. It is only by stretching methodology and interpretation at every opportunity, and by providing further justification for 'adjusting' the data that it is possible to arrive at the position he does. Table 4 summarises my position on this matter.

Table 4: Number of hawthorn trees meeting minimum veteran/notable size (FL and TEP)

	FL stem measurements	My stem measurements
FL threshold (570mm)	6 trees (+1 on threshold)	0 trees
My threshold (620mm)	4 trees (+2 on threshold)	0 trees

3.57 Finally I remind the inquiry that the minimum veteran/notable size threshold does not imply the tree is automatically a veteran tree in terms of size – it is the point at which it starts to move from notable to veteran status. Lonsdale demonstrates this at Figure 1.3 by the definition Veteran/Notable (i.e. trees which may be either veteran, or notable, depending on their *condition*).

Relative size against TEP dataset

3.58 During 2018 and 2019 I led the arboricultural design of a new software system for data capture and mapping of trees. The system – Tree Plotter - is now in use by multiple consultants[18] and TEP has been using the system since August 2019 for a proportion of its tree surveys. This includes both trees on potential development sites and surveys for tree risk management[19]. As a result, I have access to recent survey data for a reasonably representative cross section of trees (i.e. trees on candidate development sites), all produced by qualified arboriculturists, subject to quality control, produced according to a standardised methodology that is the same as I have used here, showing tree locations across the country.

[17] T5, VH5, VH8, VH9, VH11

[18] Tree Plotter is produced by Planit Geo and distributed in the UK by Geotre Villa.

[19] Using a module of the software that is not commercially available.

3.59 All data in this set was produced by following the same methodology as I have on this site with regards to stem diameter measurement. They are therefore available for comparison to my dimensions in Table 2. If the data in this set had been produced according to the FL measurement methodology, presumably they would be similarly increased. Therefore it is appropriate to compare the survey data held in Tree Plotter to my measurements on this site, but not to the FL measurements, irrespective of which methodology is accepted).

3.60 At the time of writing, the comparable dataset includes 23,208 individual trees (of which 763 - 3.3% - are hawthorn). This does not include trees in groups, woodland and hedges, only those mapped and measured individually. This omits a significant proportion of all survey data, but gives absolute clarity and certainty when correlating species with other attributes

3.61 The size range of the alleged veteran hawthorn at the appeal site captures 161 hawthorn trees in my dataset (of 763 trees in total). That places these 11 trees within the top 21% of hawthorns in this set, i.e. they are large, but not exceptional. These 161 trees of similar size were measured by 14 different qualified surveyors. The largest hawthorn in my data is 740mm on a single stem. That was classified as a veteran tree.

3.62 Within my available tree risk management survey data, hawthorn is much less likely to be recorded as an individual tree due to its typical hedgerow context, the relatively small size of the species and relatively low risk. These lead to more frequent recording of hawthorn within groups and woodland, and accordingly, a smaller dataset. Of 110 hawthorn entries, 15 are in the same range as those on the site (i.e. the appeal site alleged veterans would be within the top 14%). Again, this indicates a population of large trees, but not exceptionally large trees.

3.63 Size is a gateway condition to veteran status and it significantly underpins both assessment of age and condition. It is not credible to suggest that 15-20% of a species' population would be within the range of veteran size, particularly because hawthorn will only begin to be measured as individuals when they are at least semi-mature. That is where the Tree Plotter data would place the hawthorns on this site; again illustrating these are notable but not exceptional trees.

Size and Biomass of Lower Stem

3.64 These hedgerow hawthorns were managed by cutting to a height of around 1.5m above ground until at least 1946. Regular cutting ceased later and branches sprouted to form a crown now typically 6-7m high. These are all multi-stemmed trees, with between 3 and 11 stems at the point of measurement (1.3m above ground). The only mature wood that

could display veteran characteristics is only below 1.5m (the "bole") and associated rootstock.

3.65 The collective biomass of all the 13 hawthorns' boles is estimated as 3.66m^3, averaging 0.33m^3 per tree. This compares to the biomass of wood in the main stem of oak T6 which is estimated at 9.9m^3. I submit that when considering whether exceptional biodiversity value is conferred by size, the fact that these hedgerow hawthorns have a lower timber volume than an open-grown hawthorn should also be taken into account, and that this again emphasises that these hawthorns do not meet size criteria.

Conclusions on tree size

3.66 I agree that some of these hawthorns are, as FL claims, somewhat older than their size suggests. Conversely, they are also therefore somewhat smaller than other trees of the same species would be, had they grown under different conditions.

3.67 None of the trees is sufficiently large to qualify as a veteran. T6 has a diameter of 1,450mm, which is relatively close to the required 1,530mm threshold for oak. Therefore treating this tree as a veteran represents a precautionary approach by the appellant, on consideration of its veteran characteristics.

3.68 The twelve trees in dispute are certainly mature, and not without merit. However, they fall short of the minimum size for veteran status. They are, by size, on the way towards the requisite threshold but not there yet. Based on this evidence alone, it would be anticipated that the trees would have some emerging veteran characteristics, but in numbers, or in a state of development that is also some way short of veteran. In short, this is precisely what the tree and habitat surveys have found. Multiple study angles have consistently found trees that are interesting, but not exceptional.

3.69 A reasonable interpretation of the Tree Plotter data is that these trees are large, but not of a sufficient size to be a veteran. This is entirely consistent with, and supported by my preferred interpretation of Lonsdale and my preferred approach to measurement.

3.70 If the FL thresholds for "veteran/notable" status are preferred, my measurement of the trees finds that none are sufficiently large to quality. Both the higher FL measurements and the lower FL thresholds are required to classify the hawthorns as veteran/notable using Lonsdale. A more balanced and reasonable assessment finds that the trees are some way short of meeting the size criterion necessary to demonstrate exceptional value.

3.71 I also note that the potential veteran interest relates to mature wood which is commencing the decay process. On this site, and in these hawthorns, this is only found in the boles i.e. the lower 1.5m of stem. This is a very low biomass individually and collectively, and thus, in my opinion, further undermines the argument of compliance with the "size" criterion.

4.0 Hedgerow Age

4.1 FL alleges the hedgerows on site are highly likely to have been established by 1750AD.

4.2 I refer to the evidence of TEP's Principal Heritage Consultant, Mr Amir Bassir, at Appendix B which reinforces his position, first expressed at Appendix D of Mr Hesketh's proof of evidence that the hedges on site are enclosure period plantings but that a firm date of 1750 cannot be confidently asserted.

5.0 Assessment of Tree Age

5.1 FL's Appendix JFL5 sets out age estimates derived from girth measurements and the method of derivation is very briefly summarised at Paragraphs 4.1.5 to 4.1.9. He concludes three of the hawthorns (VH2, VH3 and VH10) are "ancient" and all eleven are "veteran".

Rebuttal of FL Evidence on Hawthorn Age

5.2 I do not accept any of the age estimates provided, for the following reasons.

Inappropriate Method of Measurement

5.3 I present my evidence about the way girth has been wrongly estimated in detail at Chapter 3. FL's point of girth measurement for hawthorns (at the base) is not best practice as basal measurement is inflated by swelling, buttressing and inclusion of void space between multiple stems.

5.4 Although the hawthorns are multi-stemmed, I was able to take measurements at or around 1.3m and calculate the appropriate girth. Even if FL was unable to take accurate measurements at 1.3m, at the least he should have applied a correction or margin of error to the basal measurement, before carrying it through to an age estimate.

5.5 The White Method says at paragraph 7, '*Diameter at breast height (dbh) is the measurement on which the estimation of age suggested here depends*.' This presents a problem in the current situation, because the White Method relies on input data that is not available on this site for all trees. Dating the oldest parts of the trees (the boles) requires clean and representative stem diameters for them, which are not generally available due to form.

5.6 Furthermore, the White Method anticipates input data for open grown trees (the growing conditions available for the analogue species used by FL include 'open grown' 'garden' and 'parkland'). Whilst it is a suitable method for estimating age, the reliability of the method is therefore quite stretched in this case.

5.7 FL estimates age using larger basal dimensions. This overestimates tree age significantly. No corrections were applied to account for the larger size at the base, and to derive a more representative dimension to take forward to an estimation of age.

5.8 Table 2, at pages 20 and 21, sets out my calculation of diameter, comparing this to the FL calculation. It is clear there is a significant difference between the two, and I am of the view that my measurements

should be preferred. This would result in a much lower age estimate, whatever method is used to derive age from size.

5.9 Appendix C contains my detailed measurements of stem diameters and derived girth, based on the techniques proposed by White.

5.10 Using my preferred stem diameter measurements, and replicating the FL approach to the use of White (i.e. making the same assumptions that he does and using the same analogue species) I achieve the ages in Table 5.

Table 5: Tree Age based on FL White method, using TEP input data

Tree	Age (years)
T5 (oak)	218
T6 (oak)	285
VH1	161
VH2	182
VH3	153
VH4	130
VH5	134
VH6	160
VH7	113
VH8	96
VH9	119
VH10	112
VH11	132

5.11 I do not claim certainty or reliability in respect of the above age estimations. If anything, some of these appear a little low. This demonstrates the aggregated unreliability of conclusions based on a method that is designed for trees in a different context, using the wrong species, and receiving input data produced differently than it anticipates.

5.12 *"There is much discussion about the accuracy and usefulness of the relationship between tree girth and age, and without dendrochronological*

sampling a tree's age is often over or under-estimated (Hartesveldt et al. 1975; White 1998; Moir 2013)"[20]

5.13 The table and ages above do tell me that my method groups the hawthorn trees more closely in age than the FL approach. This would be consistent with the hawthorn representing the oldest cohort still present within the hedges, which I understand to be the FL position.

5.14 Insofar as it goes, the above table places the hawthorn trees broadly in contention for veteran age. However, given the lack of methodological reliability, I would not rely on this conclusion without further corroborating evidence.

Use of an analogue requires a caveat

5.15 The use of an analogue species (black mulberry) to derive an age is tenuous, especially given the hedgerow origins of the hawthorns. Mulberry is usually a maiden tree (i.e. a tree grown to natural form without hedge cutting or coppicing), and not prone to becoming multi-stemmed. While black mulberry is agreed to be the best available analogue species, it is taken from a limited list of options. FL should therefore apply a margin of error or a caveat to the age estimate derived from its use to reflect the reduced confidence thereby arising.

5.16 With reference to the dataset available to me via the Tree Plotter software, which I described previously. Three black mulberries have been surveyed on development sites and a further four that have been surveyed as part of tree population and risk management. The former three are all beyond the 75th percentile of hawthorn size within the parent dataset, and therefore larger than both the mean and median average for hawthorn based on stem diameter. The latter four are all as large or larger than the biggest hawthorn within the parent dataset.

5.17 This finding suggests that, notwithstanding species potential, in the real world black mulberry is a larger species by stem diameter than hawthorn. On this basis, I would caution against unqualified reliance on mulberry data for age estimation of hawthorn.

Tree Intertwining

5.18 In two cases (VH2 and VH11), I suspect the candidate veterans are actually two intertwined trees, hence resulting in an overestimate of girth and age.

[20] Nolan, V. Reader, T. Gilbert, F and Atkinson, N (2020) The Ancient Tree Inventory: a summary of the results of a 15 year citizen science project recording ancient, veteran and notable trees across the UK. Biodiversity and Conservation 29, 3103-3129

5.19 Both VH2 and VH11 are growing from points that are separated by clear ground, and which lead to aerial parts that are not connected in any way. The stems of VH2 (see Figure 11) have grown so that they are now touching, albeit with no evidence of vascular connectivity (fusing) between them. Those of VH11 (see Figure 10) are growing separately and support canopies with markedly different vigour. The space between the stems at ground level is smaller now than it would have been at any point in the past, due to incremental increases in radius. In the case of VH11, the remaining gap is 300mm. Measurement of the gap within VH2 is frustrated by a branch but it is at least an arms width.

Figure 10: VH11 has two stems, separated by 300mm at ground level and with notably different vigour in the respective canopies

5.20 It is possible that VH2 has grown from an earlier layered stem, which could explain the linear arrangement of its current stems. However, this would effectively produce a row of clones and the doubt around whether it is one or more trees would remain.

Figure 11: VH2 is a row of stems with a gap at ground level that is obscured by burring on the adjacent stem but would have been larger when the stems were smaller. There appears to be included bark from this point upwards and no connected tissue between the two halves, suggesting two trees of a similar age.

5.21 By measuring all stems associated with a *visually* singular tree canopy, the resultant dimensions, and therefore age estimates thereby derived are unavoidably inflated in the case of any canopy that is supported by more than one tree. This should have at least been noted and caveated in the assessment. It appears that it may simply have been missed.

Lack of Critical Review

5.22 The FL evidence runs an age calculation derived from the White Method (although it does not actually present or declare what inputs, assumptions and adjustments are used) and takes the result at face value. An objective approach would weight the results of the White Method against other contextual, and circumstantial evidence in order to critically appraise its reliability. This is particularly important where there are pressures on the reliability through the use of an analogue species and the non-standard growth pattern of the trees, particularly the hawthorns, due to former management.

5.23 There is little evidence to suggest that such an objective review was undertaken. There are points that cast material doubt over the FL age estimations. All of these suggest that they are too high. I can find no evidence to suggest that they are too low. FL does not caveat any of his conclusions with any margin of error.

Hedgerow vs tree age

5.24 The "*firm youngest probable age*" for hedgerow on the site that is claimed in the FL evidence is 250 years. Even if this is accepted, it does not follow that all or indeed any individual tree within those hedges is an 'original' tree that was planted when the hedge was first established.

5.25 Hawthorn can layer or self-seed readily within hedgerows. The evidence of former management both in the trees and on aerial images and maps demonstrates that the hedges were in functional use as boundaries between pasture and/or arable land in 1791[21] and 1946[22], and thus probably at all dates in between. To perform this function, they would have needed to be stock proof, and therefore would have been managed to infill any gaps. It is inconceivable that a hedgerow could be maintained in a serviceable condition for 150 years without any additional planting, layering or laying. This would probably have occurred throughout the functional life of the hedges, at least until the invention of galvanised wire fencing in the late 1800s, (which I observed to be included within some trees). Given the high confidence that non-original trees are present, it is highly speculative to suppose these particular trees and the laying out of the hedge arrangement to be contemporary.

5.26 FL does not go this far, but at 3.7 he does link the hedgerow age and tree age. In fact, hedgerow age does nothing more than establish a theoretical maximum tree age. In 3023, a hedge established today would be 1000 years old; a hawthorn tree within it at that time clearly need not be.

Product of FL White Method not consistent with site history

5.27 Before reaching a final conclusion, a critical review should have been applied to the postulated current ages of 197 to 312. Given aerial photos show all the hedges were typical farm hedges in the period 1938-1946, on the basis of FL's evidence, the hawthorn trees would have been 121 to 236 years old in 1946.

5.28 The aerial photographs in FL evidence at Figure 4 and at Francis Hesketh's Appendix J show hedges that are tightly managed. The boles that are present today would have all but filled the cross-sectional dimensions of the hedge. To survive in this form, the hawthorn would have needed to be laid (cut almost entirely through the stems and bent over) or would have required numerous lateral stubs to support foliage at lower levels. The evidence of either would be evident today but it is not present.

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[21] Refer to Appendix D of Francis Hesketh's proof of evidence on ecology and arboriculture

[22] Refer to Appendix J of Francis Hesketh's proof of evidence on ecology and arboriculture

5.29 I contend it is highly improbable that a 150–200-year-old hawthorn stem would have been capable of survival under a hedgerow cutting regime from the mid-1700s until at least 1946. It is far more likely that the current stems are later regrowth from coppice stools or germination of seedlings.

5.30 Therefore the most likely sequence leading to the extant form is that the trees were planted, self-seeded, or layered from other hedgerow hawthorn at some time after the hedge lines were originally established. At the cessation of hedge management, the boles were present and were at that time, typical well-established middle aged hedgerow hawthorn. During the subsequent <76 years, the boles matured and developed early veteran characteristics, largely as a product of their previous management, and also they grew new canopies, which are now themselves middle-aged.

Lack of significant crown retrenchment

5.31 I discuss this at Chapter 7 in relation to condition.

5.32 The hawthorns are not displaying significant crown retrenchment, again suggesting they are not of the great age postulated, even accounting for the historic hedgerow management which will have prolonged early vigorous growth.

5.33 The hawthorns on the appeal site are outgrown hedgerow plants and need to be considered in two parts:

5.34 First, the bole and rootstock, up to a height of around 1.5m, which until at least 1946 AD, was maintained as part of a low hedge in a grazed field system; and

5.35 Secondly, the upper crown which has developed from shoots that started growing from the bole when hedge-cutting was abandoned at some date post 1946.

5.36 Retrenchment is principally a characteristic of veteran maiden trees. It is a process by which the tree corrects its own static to dynamic mass ratio and manages the risk of catastrophic structural collapse. Hedgerow trees (and pollards) do not have a typical decurrent branch structure of primary, secondary and tertiary branches because they grow to a smaller size from fewer centralised points of branch connection. These branches tend to be lighter and, if they fail, fail at the point of attachment rather than by progressive failure leading to stag heading. Retrenchment is therefore less likely to be observed in a hedgerow tree than in a maiden tree of the same age. Because of the management history, retrenchment is less available and useful on this site as an indicator of age than it might otherwise be. As a feature of biodiversity interest in its own right, it is largely absent.

5.37 It is accepted the crown consists of up to 75 years of growth, so would not be retrenching if it were a maiden hawthorn. However, if the bole genuinely were 250 years old, it would be highly unlikely to sustain the relatively vigorous crown growth observed on the appeal site. I refer to my experience of hawthorns at Hulton Park (Appendix A) wherein genuine retrenchment of hawthorns is seen in trees that are known to be a similar age to that claimed by FL on the appeal site. Figures 12,13 and 14 show retrenchment in the Hulton Park hawthorns.

Figure 12: Hawthorn main stem has largely collapsed and regrown from the base with crown in advanced stages of retrenchment (note internal foliage within tree

canopy volume to ground level and overall sparse leaf cover. (Hulton Park T74 – planted between 1772 and 1808)

Figure 13: Hawthorn, with significant retrenchment of the crown and very low vigour. Note dead branches around perimeter and foliage contained within living core towards centre of canopy (Hulton Park T75).

Figure 14: Hawthorn in advanced stage of senescence. Only one of its stems remains alive, although it retains a substantial volume of exposed heartwood and has extensive splits, holes and decay. The canopy is in advanced stages of retrenchment with almost 50% of the canopy outline comprising stem or primary branches (Hulton Park T84).

5.38 It is clear from Hulton Park that hawthorns which are between 210 and 240 years are in a much more advanced state of ageing than any of the hawthorns at Brislington Meadows, which are considered by FL to be between 197 and 312 years old (Appendix JFL5).

5.39 By comparison to the hawthorns at Hulton Park, the Brislington Meadows hawthorns:

- Exhibit reasonably vigorous crown growth on all axes;
- At most, are in the earliest stages of crown retrenchment;
- Have very little dead wood and very few decay sites;
- Have no splits between main stems (apart from VH8 and VH9);
- Have very little bark damage.

5.40 In layperson's terms, the hawthorns at Brislington Meadows do not bear "the scars of great age".

My Conclusions on Age

5.41 I conclude that FL's age estimates for the hawthorns on the appeal site are greatly over-estimated. I appreciate that the age estimates are a "read-across" from dimension data so cannot be read in a precise sense. Nevertheless FL makes a claim that the hedges may date to 1750 and imply the current hawthorns were established then. I think this is highly unlikely. I believe FL should have inserted a significant caveat on their age estimate, recognising it is based on a measurement of basal girth (hence over-estimating) and should also have tempered their estimate by comparison with reference data from other aged hawthorns, and also considered the potential age in light of the likely history of hedgerow management at Brislington Meadows.

5.42 Whilst I recognise the difficulties of providing a precise estimate of the age of the hawthorns at the appeal site because of the number of variables involved and the unknown history of hedgerow management before 1938, I consider that the hawthorns in question are at the very least, 50 years away from becoming of similar condition to the Hulton Park hawthorns which are c.240 years old.

5.43 My estimate, for the purpose of the inquiry, is given with significant caveats, but is that the hawthorns in question are somewhere between 140 and 180 years old.

5.44 In regard to the oak trees, FL states that T5 was subject to regular pollarding by humans, hence slowing down their stem growth, so they may be older than their girth suggests. I examine this in detail at Chapter 6.

5.45 In summary, we cannot know the oak trees were regularly pollarded. Indeed, there is evidence to suggest they failed naturally, (stubs of dead heartwood remain visible at Figure 16). Although the effect of a natural failure is also to slow stem growth, this would be a one-off rather than a repeated event. This in turn would weigh against FL assertions that the trees are older than they appear based on their stem diameter. I prefer an adjustment to the White Method of 20 years (rather than the FL 40 years) to reflect the 'lost time' recovering from a significant loss of foliage.

Figure 15: Natural fracture point with remaining jagged heartwood visible from ground level on oak tree T6

5.46 Also for the oak trees, the presence of internal decay at the base would have the effect of increasing stem diameter rather than decreasing it. This would counter the effect of pollarding (slowing down incremental increases in girth).

5.47 My estimate, for the purpose of the inquiry, is given with significant caveats, but is that the White Method dates the oak trees in question to 198 (T5) and 265 (T6) years old, and then I add a 20 year correction for the natural "pollarding" event.

6.0 Assessment of Condition

Veteran tree condition

6.1 For the purposes of assessing trees against the NPPF definition for 'veteran', condition refers to the physical attributes of a tree other than size and age. These attributes are often described collectively, or individually, by the term Veteran Characteristics. These characteristics include both the physical state of the tree, and associations or relationships with other organisms, such as fungi.

6.2 The condition of the tree, and veteran characteristics, are almost exclusively a subset of biodiversity value. That is to say, where exceptional biodiversity value is the reason for veteran status, it must rest on the number, type and quality of veteran characteristics.[23] Veteran characteristics are principally interesting and valuable because of their ecology, which can be particular to very old trees and therefore rare.

6.3 A reliable assessment of veteran characteristics should consider what features of each type are present, their size or number, and their function. In other words: Is the feature present? How large and/or numerous is it? What biodiversity is it actually supporting?

Development of veteran characteristics

6.4 Veteran characteristics do not suddenly appear overnight as a tree passes the theoretical age and size threshold for veterans of its species. They develop over time and must, by definition, be present well before a tree becomes a veteran; a tree without them cannot be a veteran and they take time to develop.

6.5 Emerging and simple veteran characteristics are found on mature and middle-aged trees. It is the size, quantity, quality, complexity and functionality of the assemblage of features that marks a tree as a veteran.

6.6 Some characteristics, such as retrenchment and lichen growth are strongly associated with age and growth rate. However, most[24] can occur on much younger trees. Individually, the presence of these features is not instructive. Veteran trees are those which have persisted for long enough with such features that they in turn have matured, grown in number, and now provide exceptional biodiversity value.

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[23] Trees with exceptional cultural or heritage value may also have significant assemblages of veteran characteristics with biodiversity value, but the definition does not rely on them

[24] Including hollowing, fungi, decay, storm damage, exposed heartwood, dead wood, dry habitat spaces, water pools, and bark loss

6.7 The ability to persist alongside structural defects or changes is not shared equally by all tree species. This is one reason why some tree species are less likely to become veterans than others. Hawthorn has a good capacity to survive structural damage, including by browsing, and has resilient wood. However, it is not a large species. A hawthorn is therefore less likely than a tree from larger species such as oak, ash or sweet chestnut to develop a substantial and highly functional assemblage of veteran characteristics.

Evaluating veteran characteristics

6.8 The reason we assess veteran characteristics is that they are what provides the potential for greater biodiversity in a veteran tree than in an ordinary tree. This is a function of the habitats they create, and the living things that are actually present within, or using them.

6.9 For biodiversity value to be exceptional, those living things must be present rather than postulated. They must also be at least more numerous, diverse, and/or otherwise significant (e.g. by virtue of rarity) than could reasonably be the case in an ordinary tree.

6.10 Assessment of condition should consider the size or scale of habitat present in or on the tree; small or scattered features carry less weight than large or multiple features. This is a simple function of biomass – the greater the mass of dead or rotting wood, the greater the number of species that are capable of being supported by the feature.

6.11 Natural England Biodiversity Metric 3.1 is a helpful tool for the assessment of biodiversity in the context of planning applications. For veteran trees, Natural England's guidance on classification in metric 3.1 is exactly the same as in metric 3.0 which is being used for this appeal. The guidance is set out in footnote 2 of pages 180/181 of the Technical Supplement[25] as follows:

Veteran trees can be classified if they have four out of the five following features:

1. Rot sites associated with wounds which are decaying >400cm^2

2. Holes and water pockets in the trunk and mature crown >5cm diameter

3. Dead branches or stems >15cm diameter

4. Any hollowing in the trunk or major limbs

5. Fruit bodies of fungi known to cause wood decay

[25] CD11.6f

6.12 The source material, from which these veteran characteristics and their respective dimensions are derived, is the English Nature Specialist Survey Method[26]. In short, SSM tells us how to measure and record veteran characteristics, and Natural England Metric 3.0/3.1 tells us how to aggregate them to evaluate biodiversity.

6.13 The Natural England metric should be supported by data taken in accordance with SSM. It is not intended to be a comprehensive account of all possible veteran characteristics. However, it tells me two important things. Firstly, that the five characteristics it lists are those considered to be of primary importance in this classification. Secondly, that their scale and diversity is also fundamental to achieving the requisite biodiversity value. The guidance is not satisfied with just one, it requires four out of five, and it says what each of them should be like.

6.14 The Natural England Metric is, unsurprisingly, consistent with the NPPF definition of veteran tree, which provides the exceptional biodiversity value route to veteran classification but does not specify how this should be assessed. It is also consistent with Natural England and Forestry Commission standing advice on the subject, which describes the creation of habitat via the ageing process and the contribution of multiple features (such as branch death and hollowing) to exceptional biodiversity. An example of a hawthorn from a different site, exhibiting sufficient condition criteria is at Figure 16.

[26] FAY, N. AND DE BERKER, N. (1997) Specialist Survey Method. Veteran Trees Initiative, English Nature.

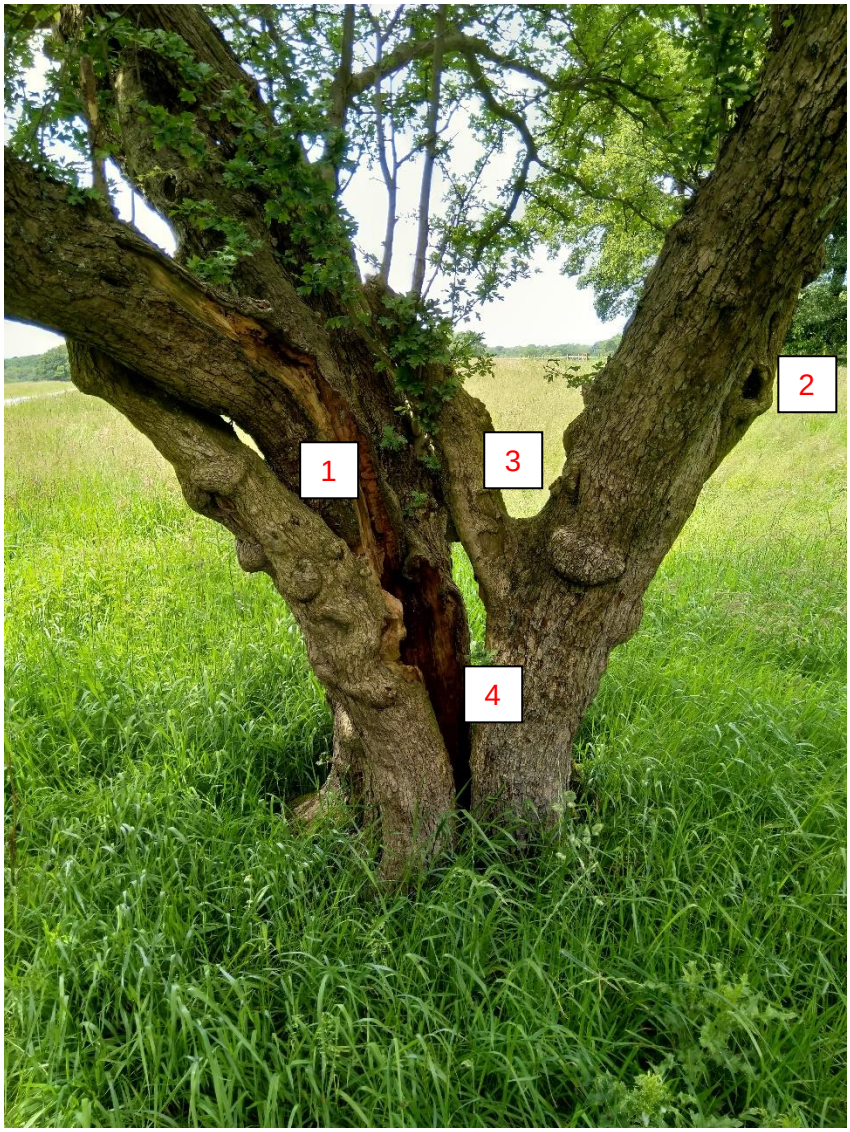

Figure 16: Veteran Hawthorn (not on the appeal site) showing 1-extensive rot >400cm2, 2-hole>5cm, 3-dead wood >15cm, 4-hollowing.

Condition Assessment against Natural England tests

6.15 For the purposes of Natural England's biodiversity metric, assessment of candidate veteran trees should be made against the five primary criteria. Veterans should meet at least four of the five criteria. In seeking to understand the nature and qualities of a veteran tree, all observed veteran features and identifiable features of biodiversity and habitat interest should be recorded. These may both strengthen the classification, and also inform the design of buffer zones and future management.

6.16 The five criteria and thresholds are used in Metric 3.0 and 3.1 because they provide evidence of diversity and scale of arboreal habitat, as follows:

Rot Sites associated with wounds that are decaying >400cm^2

6.17 Active decay is evidence of an actual and future habitat resource for fungi and specialist invertebrates. A minimum threshold of 400cm^2 is chosen to reflect that the habitat has already developed to a functional condition and is of a scale likely to be able to continue functioning. This threshold relates to Natural England's Specialist Survey Method which records rot sites of "*Rot areas up to 2 hand spans 30cm (12") x 15cm (6")*". The RAVEN assessment records this at columns 6,7 and 8 titled "Extensive Decay".

6.18 On this site, hawthorns tend to support decay in three main forms.

- Decay of dead small branches by fungi such as *Stereum hirsutum* or *Stereum rugosum* is widespread and common on hawthorn, which can hold small and medium diameter dead wood, particularly where branches or stems are fractured and therefore support limited end weight. This is found in small quantities and is not particular to veteran, or even mature trees.

- Decay at points of wood exposure due to wounding is a feature of hedgerow hawthorn because of mechanical damage via management. Here, there are a small number of laid stems and a larger number of cut stubs whose previous wounding presents an opportunity for decay. These tend to be exposed and upward facing, and weathering prevents significant decay depth. The small diameter of the material prevents significant spread.

- The larger opportunities for decay are in the main stems of trees. In one case (VH11) there is a decay cavity within the main stem, and in one case (VH4) there is a decaying remnant stem, but in most instances of decay it is at the base of the tree on exposed surfaces within a union. These tend to begin as decay of newly exposed surfaces as the union undergoes progressive failure and the stems move apart, especially along unions with included bark. This decay tends to be limited to the surface only and to colonise the area of existing damage rather than spreading into the stem; the decaying stem has little capacity for reaction growth in the tension wood and more extensive decay results in stem failure. There is evidence of stems failing entirely, including at VH2 and VH4. This limits the extent to which this mechanism can produce large volumes of brown rot, of the type that is most valuable, including for invertebrate habitat.

6.19 The best example of brown rot decay and associated invertebrate activity in a hawthorn on the site is VH4. This tree is unique on the site in that the decay is the result of significant damage to the main stem providing a large point of ingress. As a result, the entire stem was colonised, resulting in its collapse. What remains is a decaying relic with newer

surrounding growth. This feature has limited prospects for survival because no new material is being laid down around the decay and this is eroding. This tree is not functionally very different to a middle-aged coppice alongside a small lump of standing dead wood. It has biodiversity interest, but also demonstrates that a non-natural intervention may lead to veteran characteristics that surpass the size and/or quality those developing naturally on adjacent trees.

6.20 FL's photographic evidence in terms of extensive decay falls short. His Figure 12 shows a rot site on VH3, but the single rot site in the picture is less than 400cm^2; it is roughly palm sized, as can be seen from my own photograph at Figure 19, which includes ivy leaves to indicate scale. FL Figure 14 does show a qualifying rot site on VH8, albeit this tree is retained on parameters plans.

6.21 In some cases, FL report decay >400cm2, but on closer probing the actual extent of decay is neither deep nor does it cover the full extent of the wound – for example, see Figure 17.

Figure 17: Wound site on VH1 probed to assess extent of decay

Holes and Water Pockets in the trunk and mature crown >5cm diameter

6.22 Holes are apertures which may be used by birds, small mammals and bats. Typically water pockets are found at the union of major stems, at

buttress depressions of major stems and may have intact bark. They can provide niches for specialist invertebrates or fungi. The minimum dimension of 5cm relates to the SSM. To meet the Metric 3.1 criterion, there should be more than one hole and/or water pocket. RAVEN records this at column 17.

6.23 On this site the small stem size and the form of trees makes it unlikely that holes of this type will develop. Hedgerow trees tend not to develop socket failures, which are often the starting point for holes. This is because of small branch weight and good levels of light on all sides. This is not to say that hawthorn cannot develop holes; my experience from Hulton Park is that holes are found.

6.24 FL do not record any holes or water pockets.

Dead branches or stems >15cm diameter

6.25 Dead branches or stems should be attached to the tree. The minimum dimension of 15cm diameter relates to SSM. Dead wood of this dimension will provide a sustainable resource for saproxylic invertebrates. A smaller diameter piece of deadwood may sustain invertebrates but will rapidly disintegrate and so cannot be considered as long-term habitat. RAVEN records this at column 12.

6.26 On this site there are many small diameter dead branches on hawthorn, which is typical of mature trees of the species. However, hawthorn does not commonly produce dead wood of large diameter. Principally this is because it would amount to most of the tree. There are few live branches of this size. Stems of this size that die, tend to fracture and then rot away in the wetter conditions on the ground. There are none currently present.

6.27 FL's photographic evidence on this point falls short. Their Figure 13 is the only visual evidence of dead wood, but no scale is provided; it appears to me that the branch is less than 15cm diameter. My own site visit confirms that the largest pieces of attached dead wood are less than 10cm – see my Figure 18 below.

Figure 18: Image showing the same dead branch stub as shown in FL Figure 13. The wider context in this image, bramble stems, and ivy leaves illustrate that this branch is much less than 15cm in diameter

Hollowing in the trunk or major limbs

6.28 SSM states that hollowing occurs through a combination of wounding and progressive decay which may develop into enlarged cavities. Hollowing may become continuous, leading to an entirely hollow stem or partial shell, providing a wide range of habitat. Hollowing may be readily visible or may be concealed within an apparently intact trunk or limb. Hollowing provides shelter and potential reproduction sites for fauna. RAVEN records this at column 9.

6.29 On this site there is very little hollowing that is larger than a few centimetres in diameter. Generally, where it occurs in hawthorn, hollowing is in the form of a remnant trunk (see SSM 16), often beginning at a seat of damage or a union failure. This quickly progresses and results in exposure of heartwood and subsequent erosion of the parent stem. It is not common for hawthorn to achieve and persist with a hollow or partially solid trunk so sheltered voids are also not common in the species.

6.30 The most impressive example of hollowing on the site is within oak T5, which has a hollow trunk for the uppermost 2m. This is entirely open to the sky at the top and through a branch wound at the bottom. It is structurally interesting, but unfortunately it is also entirely exposed and therefore of limited habitat use for roosting, and too wet for significant brown rot or invertebrates to thrive.

6.31 FL Figure 14 is a photograph of hollowing on VH8 which is not agreed. Instead this shows progressive union failure. The resultant opening is principally a result of stem movement and space within a multi-stem union and not decay and hollowing of a previously larger stem. The same is true of VH10. Significant decay (of the exposed surfaces) is agreed for both trees. VH7 and VH11 are the only other hawthorns with agreed hollowing. VH7, VH8, VH10 and VH11 are all retained in the parameters plans. The distinction between decay and hollowing is important because hollowing leads to different, typically drier, internal conditions and therefore supports a different range of biodiversity, including fungi and invertebrates.

Fruit bodies of fungi known to cause wood decay

6.32 SSM notes there are different types of fungi that may be attached to the tree or its roots (brackets, skin-like covering, cap and stalk or slime). The Natural England method requires only those that cause wood decay to be recorded, since it is these that are specific to, and dependent on, a veteran tree and play a part in its role as habitat. RAVEN records fungi at columns 19 and 20, although for those in column 20, it does not explicitly note whether the fungi are known to cause wood decay.

6.33 On this site oak T6 is known to have *Fistulina hepatica* in the main stem. The hawthorns generally have small volumes of brown rot, which indicates the presence of fungi but no fruiting bodies were observed to corroborate this. Saproxylic fungi including *Stereum* and *Marasmiellus* species were observed very occasionally. These are widespread and common species and were found in very low numbers.

6.34 FL's photographic evidence on this point is limited to Figure 12 which shows a fungal fruiting body on VH3. This is not positively identified. I note that the figure caption describes a large decaying wound. It is not clear that 'large' is intended to be equated to 'extensive'; defined at JFL5 as exceeding 400cm^2. In any event, my image below (Figure 19) gives wider context than FL Figure 12. In it, surrounding ivy leaves (which are 8-10cm) show that that the size of the wound is considerably smaller than 400cm^2.

Figure 19: Decay Site on Hawthorn VH3 (same site as FL Figure 12)

Conclusion against Natural England Metric 3.0/3.1 criteria

6.35 I agree oak trees T5 and T6 meet the Natural England condition criteria.

6.36 However, Table 6 below shows that, even on FL's own evidence, the hawthorns fall short of the above criteria. The alleged veteran hawthorns pass 1,2 or 3 of the Natural England thresholds, whereas Natural England require 4 of the thresholds to be passed. I do not agree all of the criteria claimed by the FL assessment, but in its own terms it does not satisfy Natural England.

6.37 The RAVEN system records data against the Natural England criteria, although it does not group the data in the same way. When RAVEN data

from the site (shown at Appendix JFL5) is grouped in this way, it is clear that the hawthorns do not meet Natural England condition criteria. VH7 and VH8 meet 3 of the criteria, whereas the others meet 1 or 2 criteria respectively. None of the trees meet the minimum 4 criteria.

Table 6: Assessment of alleged veteran hawthorns against Biodiversity Metric 3.0/3.1 criteria for classification of veterans (4 criteria must be met). (Data from RAVEN Table at Appendix JFL5) (1 = claimed by FL, 0 = not claimed by FL)

	VH1	VH2	VH3	VH4	VH5	VH6	VH7	VH8	VH9	VH10	VH11
Rot Sites associated with wounds that are decaying >400cm2 *RAVEN col. 6,7,8*	1	1	1	1	1	1	1	1	1	1	1
Holes and Water Pockets in the trunk and mature crown >5cm diameter *RAVEN col.17*	0	0	0	0	0	0	0	0	0	0	0
Dead branches or stems >15cm diameter *RAVEN col.12*	0	0	0	0	0	0	0	1	0	0	0
Any hollowing in the trunk or major limbs *RAVEN col.9*	0	0	0	0	0	0	1	1	0	1	1
Fruit bodies of fungi known to cause wood decay *RAVEN col.19,20*	0	1	1	1	0	1	1	0	1	0	0
Total (4 needed)	1	2	2	2	1	2	3	3	2	2	2

6.38 In making this assessment, I have applied a precautionary approach by assuming all fungi recorded on the RAVEN forms cause wood decay, although this may not be the case; some may not cause decay.

6.39 I have previously noted that I have reservations about some FL findings of hollowing, dead wood and size of rot sites. For the purposes of this comparison, I have included all of these, irrespective of whether I recognise them. The above table is based on the FL data.

6.40 My own assessment would present lower totals for some trees. These are summarised at Appendix C.

6.41 In conclusion, the hawthorns do not have significant actual current habitat value when assessed against Natural England's condition criteria most relevant to biodiversity. This is not to say the hawthorns cannot develop these in future, but at present, there is nothing exceptional, diverse or rare about their habitat value.

6.42 FL states at his 4.3.16 *"these large, old hawthorns exhibit many classic indicators of veteran status (please refer to the RAVEN data at JFL5 for details). Frequent examples of such indicators include the presence of fungi, extensive decay, hollow stems, brown rot, and saproxylic invertebrate activity."* However FL's own RAVEN data and the photographic evidence supplied do not demonstrate these features are frequent or extensive, particularly when assessed against Natural England criteria.

FL condition assessment

6.43 I do not recognise the characterisation of the FL methodology described at 4.2 and presented at JFL4 and JFL5. I do not wish to attack the RAVEN system itself, but it appears that FL's view is that it is universally adopted and celebrated. Notwithstanding the merits or otherwise of the system, it has not yet been peer reviewed.

6.44 Having been in arboricultural consultancy with a team of about a dozen consultants, operating nationally, since the FL methodology was developed, and having worked on many hundreds of projects during this time, I do not recognise RAVEN as a methodology that is in use widely. It has never been required, suggested or recommended to me by any local planning authority. I have engaged professionally with Natural England, the Woodland Trust and the Forestry Commission on the subject of veteran trees (including at examination and appeal) and none of them used it. I am aware of the system, and that it has been promoted within the industry, but I have not encountered it in widespread professional use.

6.45 I do not think it constructive to the purpose of this Inquiry to interrogate the quality or intended function of this methodology. In my view, it is in the gift of any competent arboriculturist to interpret and apply the published definitions, mindful of all relevant guidance. In so doing, they may devise whatever tools and recording systems they see fit. No methodology can be invulnerable to inadvertent misuse or be wholly reliable, except though the objectivity and judgement of the user. The efficacy of any such system should be tested through the quality of its conclusions.

6.46 I do not say that RAVEN could never be used to collect data for veteran tree classification. I say that insofar as veteran characteristics and biodiversity go, the Natural England criteria are more recent and more authoritative and in my view preferable. When it is used, RAVEN should take account of the Natural England criteria (especially bearing in mind that they are more recent in origin).

What veteran features are claimed

6.47 In its own terms, the RAVEN system requires a tree to meet a minimum size (large stem diameter), which is also the basis for age estimation, and then to also have at least one Primary Feature or at least four Secondary Features.

Table 7: JFL5 number of Features claimed - oaks

Tree	Size (1,180mm required)[27]	Primary (FL requires 1)	Or, Secondary (FL requires 4)
T5	1,140	2	3
T6	1,450	2	2

Table 8: JFL5 number of Features claimed - hawthorns

Tree	Size (>570mm required)[28]	Primary (FL requires 1)	Or, Secondary (FL requires 4)
VH1	650	1	1
VH2	550[29]	1	1
VH3	740	1	2

[27] I say this figure should be 1,530mm

[28] I say this figure should be 620mm

[29] Figure not given in JFL 5, therefore derived from JFL6, in which VH2 and VH8 have same buffer zone which must be a function of the same diameter

Tree	Size (>570mm required)[28]	Primary (FL requires 1)	Or, Secondary (FL requires 4)
VH4	620	1	2
VH5	510	1	1
VH6	700	1	2
VH7	660	3	2
VH8	560	3	1
VH9	550	2	2
VH10	620	3	1
VH11	570	3	1

6.48 The above tables demonstrate an assessment that heavily relies on a small number of features to achieve its conclusions. It does not describe an abundance of features that strongly support a veteran assessment with change to spare. In many cases, this agrees with my own assessment, which also found that the hawthorn trees tend to have one or two features of interest. I say that these are insufficient to constitute exceptional biodiversity value and therefore insufficient to activate national planning policy 180.

6.49 Veteran trees are a complex assemblage of habitats. One feature of interest is not sufficient to classify a veteran tree. My judgement in this is endorsed by the Natural England method, which requires at least four significant and measurable features. The habitats these provide are the product of a number of factors which, over time, can develop exceptional value, partly through the complexity and number of species they can support; literally, biodiversity.

6.50 It is notable how few Secondary features are claimed (not enough to satisfy the assessment criteria in the absence of Primary features in any case). There are also six trees which have the lowest possible score to qualify, a single claimed Primary Feature.

6.51 JFL5 includes some supporting text describing the trees and features in the 'notes' column. In addition, the feature definitions themselves include some quantitative refinement. However, other than by taking the claimed features at face value and assuming they meet the stated definition, there is very little evidence by which to evaluate these features.

Primary and Secondary Features

6.52 JFL 5 and the above Table 8 demonstrate that the condition assessment of the hawthorn trees relies entirely on Primary features (i.e. no tree has more than 2 secondary features, where 4 would be needed to classify a veteran according to the FL method).

6.53 In my view, the Primary/Secondary feature approach risks downplaying the importance of a range of features in the same tree to the complexity and functionality of assemblages, and therefore both exceptionalness and habitat quality. In other words, this approach may place too great an emphasis on a single veteran characteristic, and even a single expression of that characteristic in a tree. In turn, this also makes this approach more vulnerable to user error or misjudgement. A single false positive Feature would be quite likely to change the result, especially if it is a Primary Feature.

6.54 Since the secondary features that are claimed ultimately have no significance to the conclusions of the assessment methodology, I will not explore them in great detail. My own site investigation and detailed assessment of each tree drew somewhat different conclusions, and I would generally dispute one or two claimed Secondary features per tree. In the case of T6, I would *add* one that FL did not claim – the tree has beefsteak fungus at the main branch union. This cannot be seen except by aerial inspection so I would not have expected FL to be aware of it, except by reasonable conjecture, given the nature of his inspection.

6.55 The Primary features that are most commonly claimed are extensive decay (claimed for all trees), significant hollowing (claimed for 6 trees) and significant retrenchment (claimed for 5 trees). I set out where I agree or disagree with these claims in Appendix C.

Extensive decay

6.56 Extensive decay is a large volume of material that is being degraded by the action of fungi, and to a lesser extent, the weather and activity of other microbes and microorganisms. As a relatively small species, hawthorn does not commonly support extensive decay, although its wood is fairly well suited to it.

6.57 Hawthorn is often multi-stemmed, as is the case on this site. This reduces the available diameter of material for decay and increases the rate of structural deterioration it causes in the host tree. As a result, the volumes of decay on this site are generally small, except in the oaks. All of the actively decaying material from all 11 of the hawthorns would comfortably fit into an average wardrobe.

6.58 By surface area, it is not explicit in the guidance whether the decay sites should each be larger than 400cm^2 individually or cumulatively. It is my

experience that a cumulative total of 400cm^2 is a very low bar indeed. A sheet of A4 paper is 623.7cm^2. It does not seem reasonable to me to describe a cumulative total area of decay about the size of a hardback book as 'extensive'. However, in the interests of conservativeness, that is how I have measured decay area. Even using this aggregated approach, two trees fail to meet this threshold. This demonstrates how difficult it is for trees of this species and form to achieve the conditions required for exceptional biodiversity. By comparison, T5 (an oak) has a single area of decay more than fifteen times larger than this threshold.

Hollowing

6.59 Significant hollowing refers to the effect of decay within the primary stem or branches. Significantly, hollowing is therefore caused by the removal of material and is a void that was previously part of the tree. For reasons of small size, multi-stemmed form, and wounding that begins decay in places where it will not lead to hollowing, it is not common in hedgerow hawthorn.

6.60 Significant hollowing is uncommon on this site, and is only clearly present on one hawthorn. This is VH11, which is different from most trees in that is does not show signs of former hedge management. It therefore has a single upright stem with the capacity to persist with an internal, albeit quite exposed, void.

6.61 Other trees tend to have either very small hollows, or gaps that have opened between stems rather than by the removal of material by decay (such as VH8 and VH10). These features are functionally different to hollowing, not least because they are entirely exposed, and the adjacent stems are generally intact, and covered by bark rather than decaying.

Retrenchment

6.62 Retrenchment is the process by which a tree at and beyond full maturity reduces its outward dimensions. This is done by a process of actively managed decline and has a role in prolonging life by avoiding catastrophic failure, and by maintaining a balance between the ratio of dynamic to static mass in the tree and the available resources and mechanical loads. The main indicators of retrenchment are (in roughly chronological order) reduced vigour and extension growth, increased dead wood in the canopy, branch shedding, the development of a secondary or internal canopy, and stag heading (where the secondary and primary scaffold branches extend beyond the foliage bearing branches of a newer secondary canopy).

6.63 Significant retrenchment is more than a reduction in vigour and an increase in dead wood. These are features of both maturity, and decline. Retrenchment only occurs where the early conditions of retrenchment

persist for long enough for the later conditions to develop. This has not occurred in any of the hawthorn on this site. Some have met the earlier conditions, but none are significantly progressed. None of the hawthorns are outwardly much different than middle aged to mature hawthorns in general. This is partly because their canopies are relatively young.

6.64 In general, the findings of the FL assessment appear to record presence rather than significance, and to over-report some features. The consequence of this is a difference between the FL evidence and my position with regards to some trees. These are summarised at Appendix C. Notwithstanding these differences, my assessment and that at JFL5 both find insufficient veteran characteristics to satisfy the Natural England Biodiversity Metric minimum criteria.

Claimed features

6.65 Without prejudice to, or agreement or otherwise on, methodology for assessment, or conclusions drawn thereby, I set out in Appendix C which of the claimed features in JFL5 I agree with, and which I do not.

Comparison of FL to Natural England's criteria

6.66 The term "condition" refers to a range of tree features recorded under Natural England's Specialist Survey Method[30]. These features are recorded on the RAVEN forms at FL Appendix JFL5, spread amongst the "Additional Primary Features" and "Secondary Features" categories.

6.67 I differ from FL on identification of some of features. For the FL methodology, this only matters for the Primary features, because those are the basis for its veteran classification in this case. I consider the consequences for the Natural England method below.

6.68 The FL method appears to provide suitable opportunities to collect all of the information that is needed to make an assessment against the Natural England method. However, it groups attributes and 'weights' them differently in the way it draws conclusions. Significantly, it only requires one veteran characteristic feature, rather than four. This means that a tree with a single decay cavity of modest size could be classified as a veteran.

6.69 It is quite conceivable that a large tree with a single feature of interest for biodiversity, could be classified as a veteran under the FL approach. Presumably, the safeguards against this are embedded in professional judgement and sensible checks and balances, including through the 'exceptional biodiversity' and 'irreplaceable habitat' tests. This approach appears rather vulnerable to error, or confirmation bias.

[30] *(PDF) Veteran Trees - Specialist Survey Method (researchgate.net)*

6.70 The Natural England method is to be preferred in my view (for reasons that I have already referred to and given Natural England's status as the Government's statutory nature conservation body) and requires multiple features of biodiversity interest. It gives a quantifiable means of assessing biodiversity, as part of a substantial body of work representing the government's recommended tool for precisely this purpose. It is surely a matter of common sense that exceptional biodiversity value in veteran trees must be the product of *multiple* high value features or characteristics, particularly when those features are not the exclusive preserve of veteran trees.

6.71 RAVEN was developed in 2018. FL para 4.2.3 references two appeal decisions, both relating to the same site, which accepted it in general terms. Whilst the inquiries were not specifically testing RAVEN and the facts are different, the inspector agreed with conclusions that were drawn using the RAVEN system, (with some reservations about one tree). The latter of these appeal decisions was in March 2021. The Natural England Metric 3.0 Technical Supplement was first published in July 2021 and Metric 3.1 in April 2022. The 5 criteria for classification of veteran trees were first set out in metric 3.0 and carried forward to metric 3.1.

6.72 The Technical Supplement for Metric 3.1 (Natural England JP039) is therefore not only specifically designed to give guidance on classification of veteran trees for the purposes of biodiversity assessment, and from a higher authority than RAVEN, it is also *later* than the inferred endorsement of the appeal decisions and would not have been available to the Inspector in those cases. Whilst there is much agreement between the two, in my view the Natural England criteria should be preferred where there is any disagreement, including on the number of veteran characteristics required.

6.73 The alleged veteran hawthorns fall short of condition criteria needed to demonstrate exceptional biodiversity value, even using FL's own survey data.

6.74 I agree that oak tree T5 meets the condition criteria demonstrating exceptional biodiversity value. I do not classify it as a veteran because it is too small. In any event, it would be retained.

Conclusions on tree condition

6.75 In my experience, the Natural England size thresholds are not difficult to achieve for a veteran tree. It is therefore reasonable for Natural England to expect a tree to provide at least four of the five eligible features at or above the relevant threshold. Trees meeting 4 or 5 criteria have demonstrable current and future biodiversity value.

6.76 Further, the definition of irreplaceability under NPPF requires a consideration of whether these arboreal habitats satisfy tests of "uniqueness, species diversity or rarity" either in their own right or by virtue of the species supported. There is nothing in the RAVEN assessment that claims uniqueness or rarity of habitats and biodiversity, and I would not describe any of the trees using these terms.

6.77 I have visited the site to assess the hawthorns against the Natural England criteria and found reasons to challenge the RAVEN findings on a number of features. However, even taken at face value the FL assessment shows that the hawthorns fail to meet the relevant condition criteria and do not have exceptional biodiversity value. On the basis of my own assessment, they fail by a greater margin.

6.78 The hawthorns display very few positive characteristics against other veteran criteria (described by FL as 'Secondary Features'). None of them have enough features to qualify as a veteran on grounds of Secondary Features, even using the FL assessment results. I contest some of these findings, but they do not alter the outcome of the assessment. Only VH1 has a single very small dry habitat space and I consider this to be due to overlapping stems, rather than anything inherently associated with the age or size of the tree. Lichens are recorded on a presence/absence basis, but the species thereof are not recorded, and they are certainly not present in significant quantities. My observations are that lichen growth is limited and covers a small percentage of bark.

6.79 In at least two instances, there is at least reasonable doubt that a candidate veteran hawthorn is a single tree. VH2 and VH11 are probably each two trees. This has the effect of further dividing veteran characteristics between trees and reducing the number each has in its own right. Both trees have clear gaps at ground level between stems, which would have been significantly larger when the stems were smaller, and no fusing or connection between the two parts above ground. In the case of VH11, the gap is 300mm at ground level and the two trees have notably differing vigour and condition.

6.80 The modest biodiversity value of the hawthorn trees is corroborated by evidence from TEP's ecological field surveys. The bat roost assessment[31] recorded no potential roost features such as cavities or loose and lifted bark in the hawthorns. The Breeding Bird survey[32] did not record any species dependent on such features, with any possible breeding only related to conventional nest sites in tree canopies. The invertebrate survey[33] recorded very few species associated with long-established

[31] CD 1.21j

[32] CD 1.21g

[33] CD 1.21h

hedgerows. The only species strongly linked to such habitats is the Lesne's earwig, which is not associated with dead wood. The botanical survey recorded few and patchy occurrences of ground flora associated with long-established hedges and woodlands.

6.81 Appendix C has an illustrated TEP tree-by-tree analysis of the hawthorns, which confirms they do not meet Natural England's condition criteria, nor do they show any other notable biodiversity value.

7.0 Conclusion on Veteran and Ancient Tree Status

7.1 Based on my analysis of the trees in question I confirm the following:

7.2 Oak tree T6 is a veteran in relation to NPPF, as it meets criteria of age, size and condition; all of which provide it with exceptional biodiversity value. It requires a buffer zone of 15 times the stem diameter.

7.3 Oak tree T5 is not a veteran under NPPF. It meets criteria of age and condition, but falls short in respect of size. However, in recognition of its local importance, I confirm that it could reasonably be provided with the same level of protection as if it were a veteran i.e. with a buffer zone of 15 times the stem diameter.

7.4 None of the alleged veteran hawthorns are ancient, nor are veteran under NPPF. I do not accept the age estimations provided by FL, for reasons explained above, but I accept they could be of an age concomitant with veteran status. However, they fall short in relation to size and condition criteria, and are not exceptional in either regard. In fact I consider the condition of the hawthorns to be consistent only with mature specimens of the species, and strongly resist the idea that their condition is exceptional in relation to biodiversity.

7.5 The Council do not specifically identify whether they consider the hawthorns are of exceptional value in relation to heritage or culture (rather than biodiversity), but I have seen no evidence that this is what they propose, nor that they merit such status.

7.6 Accordingly I consider that NPPF 180c is not engaged. Nevertheless, the hawthorns have a collective biodiversity value, so any losses should be justified and minimised and be dealt with under the mitigation hierarchy and compensated on (or less preferably) off site. Mitigation to avoid deterioration of retained mature hawthorns should be secured by provision of appropriate buffer zones.

8.0 Loss, Deterioration and Buffer Zones

8.1 Despite my position expressed at Chapter 7, the Inspector may prefer the evidence of FL. The narrative in this chapter is based upon the alleged veteran trees all being regarded as such, and thus regarded as irreplaceable habitat, for which NPPF 180c is engaged.

8.2 The hawthorn locations in FL's appendices are indicative. TEP has used the topographical survey to place VH1 to VH11 at accurate locations, together with dimensions of crown, root protection areas and veteran tree buffer zones. Refer to my Drawing 1 (Ref D7507.43.004).

Loss

8.3 Based on the illustrative masterplan, I agree that four hawthorns VH1, VH4, VH5, and VH6 would be lost.

8.4 Noting that this is an outline application, it is open for the Inspector to impose a condition requiring retention of these trees with an appropriate buffer zone. With this in mind, the appellant has produced an alternative masterplan with information about consequential design changes that can retain the hawthorns. This is found at Appendix 7 of Mr Charles Crawford's rebuttal proof of evidence, dated 24th January 2023.

8.5 In Chapter 9, I provide a brief narrative confirming how the alternative masterplan can secure the hawthorns.

Deterioration

8.6 Appendix JFL6 sets out FL's calculation of veteran tree buffer (VTB) zones. These are calculated on the basis of a horizontal radius, centred on the stem, equivalent to 15 times the diameter of the stem, as measured at breast height (the DBH). FL calculates these on the basis of his measurements, which give larger VTB's than I think follow the guidance.

8.7 It is important when designing buffer zones to have regard for their purpose, which is to prevent harm. A nominal circular area around a tree is a proxy for the area in which such harm might arise, but this may be adjusted depending on the context of tree, and what is proposed. An effective buffer zone should be defined as the area within which a harmful effect will not be permitted. The shape and size of this area will depend on what that effect is, and whether the tree is vulnerable to it.

8.8 If the term 'buffer zone' is used to mean a sacrosanct area around a tree within which no activity may occur whatsoever, it should be noted that there are a number of scenarios in which it would be entirely reasonable to use a smaller dimension than 15 times the stem diameter. For

example, this would include any instance in which a harmful effect has already occurred and continuation of it would not amount to deterioration. In other words, the ultimate test of efficacy is not whether the '15 times' area is preserved, but whether there would be actual harm (i.e. deterioration of the habitat).

8.9 Calculation of the buffer zone is in line with the method used by BS5837 to calculate Root Protection Areas. For a non-veteran tree the standard method is to multiply the stem DBH by 12. Thus a tree with a stem diameter of 1000cm would have a standard RPA radius of 12m. If it were a veteran, the buffer zone would be expanded to 15m in accordance with Natural England advice[34].

8.10 On this basis, I agree with the Veteran Tree Buffer Zone (VTB) for oak tree T6, which is shown as 15 times the diameters of 1,450cm.

8.11 T5 was measured differently in the amount of 20mm, with FL preferring 1,140mm. The resultant difference in VTB would be 16.8m vs 17.1m. It is very unlikely that such a small difference at this scale would be of any consequence either way.

8.12 However, as I noted earlier at Chapter 3, FL has not followed BS5837 protocol, and has used the basal diameter, rather than DBH for calculation of the VTB. This gives larger results with which I do not agree.

8.13 When my preferred stem diameter measurements are used as the basis for calculation of a veteran tree buffer zone, a different picture emerges. Table 9 shows these, the standard BS5837 Root Protection Area (12xDBH), the VTB (15xDBH), and corresponding FL figure that I do not accept.

Table 9: Alleged Veteran Hawthorns – correct Veteran Tree Buffer Zones

Tree	Dbh BS5837 (cm)	Standard RPA (m)	Correct VTB (m)	*JFL6 VTB (m)*
VH1	474	5.7	7.1	*9.8*
VH2	520	6.2	7.8	*8.3*
VH3	457	5.5	6.9	*11.1*
VH4	400	4.8	6.0	*9.3*

[34] *Ancient woodland, ancient trees and veteran trees: advice for making planning decisions - GOV.UK (www.gov.uk)*

Tree	Dbh BS5837 (cm)	Standard RPA (m)	Correct VTB (m)	*JFL6 VTB (m)*
VH5	410	4.9	6.1	*7.7*
VH6	474	5.7	7.1	*10.5*
VH7	351	4.2	5.3	*9.9*
VH8	297	3.6	4.5	*8.3*
VH9	368	4.4	5.5	*8.4*
VH10	349	4.2	5.2	*9.3*
VH11	406	4.9	6.1	*8.6*

8.14 Standing Guidance also suggests that "crown spread plus 5m" can also be used to denote a veteran tree buffer zone if this is larger than the 15xDBH buffer. Since crown spread is somewhat eccentric, I have plotted this 5m zone on Drawing 1. For some hawthorns, but not oak trees T5 and T6, a larger buffer zone is actually determined by the "crown plus 5m" formula.

8.15 The function of crown and stem-derived buffer zones may be different because they are each protecting a different part of the tree, which may be vulnerable to different effects. Effects that would harm tree roots or soil but have no effect on branches should inform the design of 'stem component' of the buffer zone, and vice versa. This is how Natural England guidance operates, but the proper result is not a combined area with homogenous restrictions.

8.16 Buffer zones for tree canopy protection assumes the canopy is an irreplaceable habitat and/or has exceptional biodiversity value. In the case of the hawthorn trees, the 5m canopy offset element makes no significant additional contribution to the protection effect of the buffer because the younger tree canopy does not contain any of the veteran characteristic features. For hawthorn trees deemed to be veterans, the 15x stem diameter buffer would be appropriate (or 12x stem diameter for ordinary trees), plus 1m outside canopy, whichever is the larger.

8.17 No layout elements are proposed within the illustrative masterplan that could not be resolved via detailed design and delivered in such a way as to avoid deterioration.

8.18 FL bases his impact assessment on the isopachyte drawings supplied by the Appellant to the Council for the purpose of providing some assistance with estimation of level changes on the site.

8.19 However, these drawings are not for determination and their purpose is to estimate cut and fill balance. Contrary to FL's understanding at his paragraph 5.33, the isopachyte drawings do not provide a detailed design for finished levels. They can be used to identify possible conflicts between RPA's and future earthworks, but such conflicts can be designed out at later stages e.g. by changing gradients, use of retaining structures, use of no-dig technology.

8.20 I have looked at the FL's assertions regarding loss and deterioration and make the following comments in relation to impacts arising from the illustrative masterplan.

Trees Vulnerable to Deterioration

8.21 VH2: The crown of the tree would not require any pruning as it has already reached maximum extension and the tree can be satisfactorily maintained in green infrastructure. Construction of a formal path west of the tree and ground level changes associated with a domestic curtilage on the east are within the VTB. TEP's assessment in the AIA is that, if managed correctly through an Arboricultural Method Statement, the effect of these works insofar as they affect the standard RPA, would not be adverse. The tree is part of hedge H1 which would be retained as part of the GI and subject to construction-stage ecological protections and a sensitive lighting strategy as part of its long-term retention in green infrastructure to be managed under the LEMP.

8.22 Nevertheless I accept that if VH2 is regarded as a veteran, an additional level of caution should apply. To avoid risk of deterioration, minor changes to the illustrative masterplan could be made to ensure provision of a buffer zone within which no construction or changes in level would apply, and the buffer zone to be incorporated into the site's green infrastructure. This could be secured through a planning condition.

8.23 VH3: The VTB would be affected by the back garden of one residential unit and a parking area. The crown and RPA would not be affected, and construction works could be controlled by AMS. However, as per VH2, if regarded as a veteran tree, risk of deterioration could be avoided by demarcation of a VTB buffer zone to limit the size of the garden.

8.24 VH7: as per VH2

8.25 VH8,9 and 11: The VTB might be affected by paths within green infrastructure. As the Design Evolution Document demonstrates, the indicative location of paths has been selected to "target" existing gaps in hedge 1. The proposed east-west footpath connection already makes use of boardwalks. There are various options for dealing with paths at reserved matters stages, including avoidance of the VTB, or use of no-dig installations and other means that avoid trampling damage. These can be

secured through planning condition. There is already a footpath at the location adjacent to VH11, which is immediately adjacent to a galvanised steel kissing gate.

8.26 Oak Trees T5 and T6: I draw attention to Mr Crawford's revised parameter plans, appended to his proof of evidence[35]. These confirm that no excavations need take place within the VTB for T5 or T6. The SuDS areas can be constructed outside the VTB. The main east – west footpath would run north of the SuDS basin so would not affect the VTBs. The alternative low-key footpath south of the SuDS basin is not intended to involve intrusive installation, it may be as simple as a hedged grass path. If it requires some formalisation, any edging or boardwalks can be installed well outside the RPA with no material changes in ground level and no deterioration. I note the existing right of way passes right by these trees.

8.27 At his paragraph 5.5.3, FL suggests this is contrary to BS5837. However Standing Advice says that *'You can allow access to buffer zones if the habitat is not harmed by trampling*.' BS is a recommendation, and in general terms is a good one. However, the relevant test is whether loss or deterioration would actually occur. This is a function of the nature of the tree in question and the nature of its context before and after development. In the case of T5 and T6, I contend that controls can be put in place to ensure no harms to the buffer zone, and by extension, no harm to the trees.

8.28 FL (at paragraph 5.5.4) suggests that any activity in buffer zones carries a risk which should not be allowed. He cites an appeal case. However, that case involved significant overlap between development and buffer zones. The decision notes the construction of drains proposed within RPAs, and gardens covering a significant proportion of buffer zones. Neither applies in this case. Of particular importance though, was that the development would lead to greater access. In the case of this development, there is already significant public access, which does not follow defined paths and causes observable damage to the soil. Regularising this activity would lead to no increase in risk than is already present. The trees were, for most of their lives, adjacent to grazed pasture and regularly cut as a hedge. Growing old gracefully with occasional pedestrian admiration is no great punishment.

8.29 Deterioration is not a 'deemed' effect of entry into an area that is calculated without reference to the extant conditions. To be actionable, deterioration must be of an identified thing, by an identified mechanism. This judgement is partly a function of context and the type of construction, use and management. The buffer zone is the area in which a harmful activity must be controlled, not a circle on a plan. Activities

[35] CD12.7 – refer to Appendix 1 page 8 – Landscape Parameter Plan Drawing 7456_102 Rev PL2

that do not cause harm can be allowed within the 15x stem diameter area (i.e. by definition, the buffer zone does not 'buffer' non-harmful effects). There is no 'in principle' obstacle to citing pedestrian infrastructure through such an area if it is constructed, managed and used appropriately. The use of boardwalks to avoid contact with the ground or interference with habitats is one example of a construction method that may be appropriate, particularly where it is at the margins of a buffer zone, or only within the canopy offset and would not harm tree roots or important soils.

Suitable Compensation Strategy - General

8.30 It is open for the Inspector to grant permission resulting in the loss of irreplaceable habitat in wholly exceptional circumstances, providing there is a suitable compensation strategy.

8.31 A suitable compensation strategy must take account of the features of exceptional biodiversity value (the irreplaceable habitats) that would be lost.

8.32 The actual habitats provided by the hawthorn boles are not particularly old; the boles are generally in good condition with few decay features. The decay features present are in the relatively early stages of decay.

8.33 Hawthorn is perhaps the most common and widespread native tree species capable of becoming a veteran, thus it is not unique, nor are the veteran features currently present on the trees.

8.34 Similarly, the hawthorns do not appear to support any particular diversity or rarity of flora or fauna or decay feature.

8.35 Taking the above into account, if an individual hawthorn was lost, the decay features can be replaced relatively quickly by creation of decay sites on other non-veteran hawthorns in the retained hedges on site. This is the process of veteranisation which is the artificial wounding of trees to accelerate the natural or stochastic processes where trees become wounded.

8.36 It would also be possible to preserve much of the biomass and decaying material in the trees that would be lost. Their small size and the availability of similar receptor sites makes relocation relatively straightforward. Where these features do not depend on living material for their biodiversity, this could be done with limited or no harm to habitats.

8.37 In this specific case, there is also a strong argument that the value of the hawthorns as habitats is provided in the collective, and is not attributable to individual trees. Individually the boles are of small size and the species is the smallest normally considered as capable of becoming a veteran.

The number of habitat features that contribute to Natural England's definition of veteran status is not met by any one hawthorn.

8.38 For the four hawthorns that would be lost as a consequence of implementing the illustrative masterplan (VH1, VH4, VH5, and VH6) there are currently:

8.39 3 rot sites >400cm^2, of which the majority is on VH4.

8.40 Up to 2 occurrences of fungal fruit bodies, on FL's evidence, although I did not observe fungal fruiting bodies on VH4 and what I observed on VH6 was one small instance of a common and widespread species.

8.41 No significant dead wood, hollowing or holes and water pockets would be lost.

8.42 Of the other features of biodiversity interest which fall outside the scope of Natural England's classification of veterans for the biodiversity metric, no aerial roots or slime fluxes would be lost, one small dry habitat space would be lost (VH1) and the hawthorns have very limited cover of epiphytes (lichens and moss).

Suitable Compensation Strategy - Proposal

8.43 Nevertheless a suitable compensation strategy should address the risk of failure, and this is generally achieved by provision of "replacements" on a 2:1 basis. I propose the strategy should include:

8.44 VH4: Translocation of the dead stems to retained habitat on the southern boundary – only the currently dead stems provide biodiversity value.

8.45 VH1, VH5 and VH6: live translocation of lower stem and rootball after a period of formative crown-pruning and crown reduction, to retained habitat on southern boundary; although survival cannot be guaranteed, the retention of the boles in a woodland setting will ensure the developing decay features continue to be available to invertebrates and fungi;

8.46 A veteranisation programme which will create wound sites and holes on mature retained hawthorns, to create at least double the number and extent of "lost" wound sites;

8.47 Collection and bundling of dead wood >10cm from any areas of hawthorn to be lost for development, with it being placed in retained habitat in hedge H1;

8.48 Collection and bundling of lower stems (up to height 1.5m) of any other hawthorn lost to development, with the stems being placed in retained

habitat; up to a total biomass of at least double the biomass of the four stems to be lost[36] (i.e. ensure >2.75m^3 bundled wood);

8.49 Measures to encourage the development of biodiversity and habitats of the type associated with veteran trees within remaining hedgerow, including bird and bat box, log pile, and refugia creation;

8.50 Inclusion of retained veteran trees in a veteran tree habitat management plan, as a subset of the LEMP already required under planning condition.

8.51 For each veteran hawthorn lost, new planting of Individual hawthorn trees in accordance with the Bristol Tree Replacement Standard, on site, or at a location to be agreed with the Council;

8.52 Note that the commitment to 10% biodiversity net gain already exceeds adopted policy, and for hedgerows, can be delivered through an on-site increase in net length of hedgerows of at least 347m. These will include hawthorn as a significant component of the mix.

[36] Estimated at 1.375m^3

9.0 Amendments to Illustrative Masterplan

9.1 Mr Charles Crawford has produced an amended illustrative masterplan that shows how the proposed development could be brought forward in the event that the Inspector preferred the evidence of FL in all regards relating to veteran trees.

9.2 His evidence also shows that there are design options for each alleged veteran that avoid the VTB, including both the 15xDBH and 5m canopy offset approaches.

9.3 VH1 lies in the area which would need to be traversed by the primary street giving access between the western and eastern parts of the site. There are two options for alignment of the primary street, either to the north of VH1 by using a single-carriageway road with a single-sided pedestrian verge, or to the south by using a standard width carriageway with 2 pedestrian verges.

9.4 The northerly option is marginally preferable in ecological terms since it would retain VH1 as part of hedge H1. However, the southern option allows VH1 to be retained as a part of hedge H3.

9.5 I note that the ground in this area has been subject to repeated disturbance. The wartime aerial photos show the hedge was breached and subject to much disturbance south of VH1, and it is now used as the main access between the west and east part of the site. North of VH1, the ground was disturbed when earthworks were carried out to form the school boundary. I therefore do not consider that either option would be likely to result in any disturbance to soil hydrological regimes in the hawthorn rootzone, bearing in mind also that hawthorn is a small tree with a relatively limited root area.

9.6 A small footpath to the east of VH1 can be routed to avoid its VTB.

9.7 Removal of one plot within the illustrative masterplan would increase the stand-off around the tree such that garden space would not be within the VTB. It would be retained in its current context, between T19 and other hedgerow trees.

9.8 VH2, VH7, VH8, VH9, VH4 and VH5 could be retained within an alternative configuration of green space and surrounding plots.

9.9 VH6 could be retained within the surrounding section of hedgerow within an alternative configuration of green space and surrounding plots.

10.0 Response to Criticism of Survey Endeavour

10.1 FL's assertion that TEP's tree survey in 2020 was inadequate rests almost entirely on his view that the hawthorns are veteran, which I have shown not to be the case.

10.2 He implies that insufficient effort was made to access the hedgerows through the surrounding scrub. This is not the case; our survey was carried out by an experienced Arboricultural consultant, now a member of the Institute of Chartered Foresters, who has experience of surveying veteran trees, including the hawthorns. Whilst not every hawthorn was accessed and measured, the majority were, and certainly enough to gain an understanding of the nature of the hawthorns across the site and observe the composition of the hedgerow.

10.3 It is apparent from my site visits of 5th and 18th January 2023 that the decay features on the hawthorns are generally small and isolated, certainly not typical of veteran trees.

10.4 The TEP tree survey was presented to the Council's Tree Officer during a site visit in October 2020. The Tree Officer noted the value of the hawthorn population in terms of their active regeneration and their value as a nectar source, but at no time was potential veteran status highlighted.

10.5 During desktop record searches, the hawthorns have not been flagged as veterans by the Bristol Region Environmental Records Centre. The hawthorns are not included on the national Ancient Tree Inventory.

10.6 During 2020, 2021 and 2022, the inner parts of the hedgerows, including the hawthorns in question, were accessed by experienced specialists with knowledge and understanding of veteran trees as part of other habitat and species surveys. None flagged up any significant veteran features; this is not because of multiple oversight, but simply because these features are limited in scale and number and not very remarkable.

10.7 Bat Roost surveys checked the hawthorns for holes, cavities, dead bark on 14th July 2020[37], 23rd November 2022[38] and again when facilitating the Council's veteran tree inspection on 5th January 2023. No suitable cavities were found. The surveyors are highly experienced ecologists and would have flagged up the possible presence of veteran trees if sufficient evidence had been found or suspected.

[37] CD1.21j – para 2.10

[38] CD12.5 – page 16 – Appendix B para 1.2

10.8 Botanical surveys[39] on 26th May 2021 focussed on the hedgerow woody species and ground flora. The surveyor is a highly experienced botanist, familiar with the concept of veteran trees. They also would have flagged the presence of epiphytes leading to potential veteran trees for further investigation had it been considered necessary to do so.

10.9 The invertebrate survey[40] was carried out in May, July and August 2021 including a scoping assessment of habitats likely to support notable species. This included an inspection of hedgerows; in fact a pitfall sample point was installed close to VH2. The surveyor would have flagged the presence of veteran features such as large and attached dead wood, if such features had been frequent; as my site visits have shown, such features are not significantly present.

10.10 The results of these and other generalist ecological surveys also demonstrate that there is little evidence of any flora or fauna dependent on cavities, dead wood or decay features.

10.11 At paragraphs 4.3.14 and 4.3.15, FL assert that TEP's stem measurements are significantly below the actual size of trees, and FL refers to the scale visible near the base of the trees on his Figures 10 and 11. Again this shows the inappropriateness of using the basal stem for measurement. TEP's measurements, taken in accordance with BS5837:2012, were of the individual stems, above the point of distortion by the division into multiple stems.

10.12 TEP's AIA[41] records individual stem diameters of up to 220mm in G10 (i.e. VH2, VH7, VH8, VH9, VH10 and VH11) and up to 240mm in G24. On my recent site visits, I measured each stem (see Appendix C). Out of a total of 34 measured stems only three were outside of the range reported in the AIA (one stem on VH9 and two on VH1). I do not consider this to be an egregious difference and certainly not one that suggests the hawthorns were simply not considered in the design process.

10.13 In any event, the buffer zones that are shown within the AIA significantly exceed the minimum radii based on these stem diameters because they are based on the combined diameters and the canopy spread. The RPA shown on the Tree Constraints Plan is approximately 8m in width at VH1 and 6m in width at VH2. These equates to a stem diameter of up to 670mm for VH1 and 500mm for VH2, which are adequate for the actual sizes of these trees. So the effect of this point of difference is null, even if it remains.

[39] CD1.21c – see paragraph 2.1

[40] CD 1.21h – see paragraph 2.2 Table 1

[41] CD 2.2

10.14 I simply do not recognise the statements made by FL at 4.3.16 and 4.3.17 that the hawthorns exhibit such a range of textbook veteran features that they should have been recognised as such and incorporated into the design. My evidence clearly shows the features are limited in number and scale, on any single tree.

10.15 Nevertheless, the advice of the Tree Officer in October 2020 regarding the collective value of hawthorns was taken and the Design Evolution Document[42] demonstrates how hedgerow H1 (G10/G24) within which most of the alleged veterans are present, was identified as the most important for retention and incorporation.

[42] CD12.7 – see Appendix 2 of Mr Charles Crawford's proof of evidence on landscape and design

11.0 Summary and Conclusions

Presence of Veteran and Ancient Trees

11.1 The Council contends that oak tree T5 and hawthorns VH1 to VH11 are veteran trees of exceptional biodiversity value because of their size, age and condition. Further they contend hawthorns VH2, VH3 and VH10 are ancient.

11.2 I disagree. Using evidence from the Council's witness (FL) and my own measurements and assessments, I show they are not of exceptional value in respect of size. FL used an inappropriate method to calculate and interpret size of multi-stemmed trees.

11.3 FL's estimates of age are unreliable and inflated because they are directly derived from the size calculations without caveat. I conclude that, while the hawthorns may be of an age concomitant with veteran status, they do not have age-related features of exceptional value.

11.4 In terms of condition, I show that the hawthorns do not have sufficient veteran characteristics to meet Natural England's criteria for classification of veterans.

Oak Tree T5

11.5 This is a large, mature single-stemmed boundary oak. FL accepts T5's girth falls short of size criteria, but argue its growth was held back by historical pollarding, so it should qualify under size and age criteria. I agree it meets condition criteria; it has several features which are providing habitat for a diversity of flora and fauna.

11.6 TEP always recognised T5 to be an important tree with veteran characteristics of high biodiversity value that should be retained. Whilst not accepting FL's point on size, for the avoidance of unnecessary debate, parameter plans have been amended[43] to demarcate a veteran tree buffer zone.

Hawthorns VH1 to VH11

11.7 These hedgerow hawthorns were managed by cutting to a height of around 1.5m above ground until at least 1946. Regular cutting ceased later and branches sprouted to form a crown now typically 6-7m high. These are all multi-stemmed trees, with between 3 and 11 stems at the point of measurement (1.3m above ground). The mature wood that could

[43] CD 12.7 – see Drawing no. 7456_102 Landscape Parameter Plan Rev PL2 in Appendix 1 of Mr Charles Crawford's evidence – trees T5 and T6 are on southern site boundary.

display veteran characteristics is below 1.5m (the "bole") and associated rootstock.

Size

11.8 FL measures size in terms of girth at the base of the tree[44]. This is not best practice and is not recommended by the relevant sources of guidance on veteran tree assessment and management[45]. A basal girth will always overstate the tree's girth at 1.3m because of basal swelling, inclusion of voids between multiple stems and other reasons.

11.9 The appropriate method is to measure the diameter of each stem at or near 1.3m, avoiding swellings, and then to apply a formula that calculates an equivalent girth. When this method is used, a significantly lower size is calculated and all hawthorns fall short of normally accepted thresholds for classification as a veteran[46]. What those thresholds should be, is also a point of disagreement. I am of the view that FL uses unduly low thresholds, due to misinterpretation of the guidance and other reasons.

11.10 Also for these hawthorns, the potential veteran wood is only that which grows below 1.5m. This is a very small biomass, partly because of the hawthorns' relatively low size, and partly because hawthorn is an inherently small/moderate tree. Despite being a common tree species, it is relatively uncommon as a veteran.

11.11 Thus these particular hawthorns do not have great size i.e. biomass capable of supporting exceptional biodiversity value.

Age

11.12 FL estimates age based on basal girth. As described above, this is an incorrect starting point for calculating size and estimating age. Thus the FL method generates a much greater age than should be used. Even if basal girth is used, FL should have given a caveat or margin of error around the age estimate.

11.13 Thus I do not accept the age estimates. In relation to the specific assertion that three hawthorns are ancient, even on FL's own evidence, this is based on an incorrect reading of the girth required for a hawthorn

[44] CD13.2 – refer to Appendix JFL5 – column 5 shows measurement in mm, with epithet "base"

[45] CD8.8 (Estimating the Age of Large and Veteran Trees in Britain) see paragraph 7 and Figure 2. Also CD8.9 (BS5837:2012) – see Annex C – Figure C.1 diagram e) for multi-stemmed trees. Also English Nature's Specialist Survey Method section 4.2.2 for measuring multi-stemmed trees.

[46] Refer to Tables 2 and 4 of my evidence

to be considered ancient. This threshold is 2.5m[47], whereas FL's largest basal girth is 2.32m, on VH3[48].

11.14 FL estimate the hawthorns are aged between 197 and 312 years (average 251 years)[49]. Considering these are hedgerow hawthorns, a sense check should also be made of the realistic prospect that this is the same stem that started growing at the postulated date of origin. Aerial photography shows that prior to 1946, hedges were maintained by cutting[50]. Taking FL's average age of 251, these trees would have been 175 years old in 1946. I consider it very improbable that the original hawthorn would have survived under a hedgerow cutting regime for 175 years. It is far more probable these are younger stems that grew following replanting, or natural regeneration, or coppicing.

11.15 My own experience is of assessing and managing hawthorns at Hulton Park, Bolton which are known to have been planted in the period between 1772 and 1808. These hawthorns have much further advanced senescence and many larger and more well-developed decay features, than those on the appeal site. The Brislington Meadows hawthorns do not bear the scars of great age.

Condition

11.16 For a tree to support biodiversity of exceptional value, there must be a measurable diversity and scale of "veteran characteristics" which support biodiversity. These define the "condition" of a tree.

11.17 Natural England provides guidance on the five key characteristics and associated threshold measurements needed to classify a tree as veteran[51]. Natural England state that four of the five characteristics should be present. FL's survey forms contain his data on these characteristics[52].

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[47] CD8.20 Refer to Figure 1.4 on page 6 which pictures an ancient hawthorn with the caption explicitly stating "hawthorn can be considered ancient where its girth exceeds about 2.5m…"

[48] CD13.2 – Appendix JFL5 shows VH3 has a diameter (base) of 740mm which equates to a girth at base of 2.32m

[49] CD13.2 Appendix JFL5 - RAVEN form Column 24 has estimated age and Column 25 has estimated year of origin.

[50] CD12.5 Francis Hesketh's Proof of Evidence – see narrative and photos at Appendix J.

[51] CD11.6f – refer to page 180 and 181, specifically Footnote 2 which lists five features (rot sites >400cm2, holes and water pockets >5cm, dead wood >15cm, hollowing and fruit bodies of decay fungi)

[52] CD13.2 Appendix JFL5 – RAVEN form Columns 6,7,8 deal with rot sites, column 17 deals with water pockets, column 12 deals with dead wood, column 9 deals with hollowing and columns 19 and 20 deal with fungi.

11.18 On FL's own evidence, I show that none of the hawthorns have more than three of these Natural England characteristics[53]. Most, including the four that would be lost to the illustrative masterplan, have only one or two characteristics. I broadly agree with the evidence collected by FL against the Natural England characteristics, although for some trees the evidence falls at or below the lowest measurement threshold, and I do not agree that all of the characteristics he identifies are present.

11.19 FL prefers the RAVEN system for identification of veteran trees. RAVEN is a useful checklist, but I consider the Natural England characteristics and thresholds should be the primary point of reference whether a candidate veteran tree meets condition criteria for exceptional biodiversity value.

11.20 In summary, the hawthorns are mature and are beginning to develop characteristics which could support significant biodiversity in future, but they are still some way short of having sufficient number and extent of these characteristics.

Conclusion on hawthorn veteran status

11.21 The hawthorns fall short of age, size and condition criteria that would classify them as veteran trees with exceptional biodiversity value. Nor are they ancient. This conclusion gains even more confidence when considering the results of other detailed ecological surveys of bats, birds, hedgerow flora and invertebrates[54] which do not indicate the hawthorns are providing habitat to specialist species dependent on ancient or veteran trees.

11.22 The hawthorns are correctly assessed as mature trees which contribute to the local biodiversity value of the hedgerows they are in, but they have no higher status. As they are individually small, with potential veteran interest confined to their lower boles, their value is in the aggregate of the habitat provided in lower boles.

Deterioration and Buffer Zones

11.23 If the Inspector prefers my evidence on the hawthorns, the illustrative masterplan and the parameters plans provide confidence that there would be no deterioration to the seven retained hawthorns.

11.24 If the Inspector prefers FL's evidence, then these seven hawthorns would require a wider veteran tree buffer (VTB), on a precautionary basis.

[53] Refer to Table 6 in my evidence

[54] CD1.21a (Hedgerow Assessment), CD1.21e (Habitat Condition Assessment), CD 1.21g Breeding Bird Survey, CD 1.21h Invertebrate Survey, CD1.21j Bat Surveys

11.25 In my evidence[55] I confirm that these VTB's could be secured through a planning condition.

Loss and the Alternative Masterplan

11.26 If the Inspector prefers my evidence, then the loss of four hawthorns (VH1, VH4, VH5, VH6) to the illustrative masterplan is as reported in the Outline EcIA and Outline AIA i.e. it is part of the loss of hedgerow that is considered necessary for access, circulation and place-making to deliver the allocation. It satisfies the mitigation hierarchy. Compensation is provided through replacement hedgerow tree planting and enhancement of retained hedges.

11.27 If the Inspector prefers FL's evidence, then these hawthorns should be retained. Mr Charles Crawford provides an alternative illustrative masterplan demonstrating that development can retain and incorporate them within the network of retained hedgerows, with an appropriate VTB.

[55] Refer to Table 9 of my evidence which defines the veteran tree buffer zones

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