Haweswater Aqueduct Resilience Programme - Proposed Marl Hill Section

Environmental Statement

Volume 4

Appendix 6.6: Arboricultural Impact Assessment

June 2021

Water for the North West

Jacobs

Haweswater Aqueduct Resilience Programme - Proposed Marl Hill Section

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Contents

Executive summary

The following points summarise the recommendations and conclusions contained within this report in relation to the anticipated tree impacts:

1. Potential tree loss is indicated in Figure 6.6: Preliminary Trees at Risk Plan (PTRP) and reported using traffic light colour symbology of Red Amber Green (RAG). Refer to Paragraph 11 of Section 1.6 for a summary of the RAG assessment methodology. The RAG assessment is a precautionary approach to reporting impacts for 'Red' or 'Amber' features at planning submission stage.
2. A total of 18 tree features, equating to around 39 % of potential tree loss at both compounds, comprises 'Red' category trees i.e. features falling within the boundaries of the indicative core working areas for the two construction compounds[1]. Of the 18 total tree features falling into this category, three are Grade A (one within Bonstone Compound and two within Braddup Compound), eight are Grade B (four within each of Bonstone and Braddup Compounds), seven are Grade C (only one of which is in Braddup Compound) and none are Category U.
3. A total of 28 tree features, equating to approximately 61 % of total potential tree loss at both compounds, comprises 'Amber' category trees i.e. features located outside the indicative proposed core working areas but within the planning application boundaries. Of the 28 total tree features falling into this category, seven are Grade A (all at Braddup compound), 12 are Grade B (10 of which are found at the Braddup Compound), eight are Grade C (only one of which is located at Bonstone compound) and one is Category U (within Braddup Compound).
4. It is anticipated that further consideration will be given to 'at risk' and notable features as the design process progresses and engineering constraints are further defined e.g. provision of a full topographical survey for existing vegetation. Specific opportunities for further retention are summarised in Section 6.3.
5. Overall, the Proposed Marl Hill Section (excluding off-site highways losses reported in Volume 5) could give rise to the loss of 46 tree features falling into all British Standard grades A – U. This is regarded as being a significant effect under the EIA Regulations. Of this total, approximately 65 % of all trees have been identified as being of high or moderate quality (i.e. British Standard grades A and B). This includes the potential loss of one potential veteran tree at Bonstone Compound and five potential veteran trees and four A grade features at Braddup Compound.
6. Approximately 25 % of all surveyed features within the Proposed Marl Hill Section, including three veteran trees and four A grade features, are considered encroached but retainable subject to pre-construction tree protection measures. Notable tree encroachment is summarised at each compound in Sections 5.2.2 and 5.2.4.
7. Retention of encroached features would be subject to incorporation of pre-construction protection measures as specified in a Site Specific Arboricultural Method Statement (SS-AMS) and shown on a Tree Protection Plan (TPP). Further mitigation measures designed to protect retained features can be provided by documents listed in Table 1.6 of Section 6.7.

[1] The indicative core construction areas are zones within the planning application boundary where construction activities would unavoidably be most concentrated at the Bonstone and Braddup Compounds. Within these zones opportunities to reduce arboricultural impacts through embedded mitigation are severely limited. For those areas outside the indicative core construction zones but still within the planning application boundaries, there are greater opportunities to avoid tree loss through embedded mitigation or good practice mitigation. Tree features within these areas have been identified as being at 'Amber' risk, thereby enabling the basis of assessment to factor in a reasonable worst case scenario.

1. Introduction

1.1 Programme Background

1) United Utilities is submitting detailed planning applications for the Haweswater Aqueduct Resilience Programme (HARP). As further described in Environmental Statement (ES) Chapter 3: Design Evolution and Development Description, the overall Proposed Programme of Works requires a detailed planning application and accompanying ES for five separate developments as listed below:

- Proposed Docker Section
- Proposed Swarther Section
- Proposed Bowland Section
- Proposed Marl Hill Section
- Proposed Haslingden and Walmersley Section.

1.2 Section Description

2) This Arboricultural Impact Assessment (AIA) has been developed for the Proposed Marl Hill Section of the overall Proposed Programme of Works.

3) The Proposed Marl Hill Section consists of two ground-level compounds, approximately 4 km apart, with Bonstone Compound to the north and Braddup Compound located at the southern end of the proposed tunnel. These compounds centre on proposed working platform areas for the launch/reception of subterranean tunnel boring operations associated with the Proposed Programme of Works.

4) Hereafter the main working area associated with surface works for the Proposed Marl Hill Section will be referred to as the proposed core working area. The combined design elements of the proposed core working area are specified within Appendix A and figuratively shown in the figures below within Volume 3 of the ES:

- Figure 6.5: Tree Constraints and Assessment Plan (TCAP)
- Figure 6.6: Preliminary Trees at Risk Plan (PTRP).

5) The Proposed Marl Hill Section is contained fully within the single local planning authority (LPA) of Ribble Valley Borough Council (RVBC).

1.3 Design Stage

6) Preliminary design information used to inform this assessment is considered fixed at the time of report writing. There is potential for further design detail and iterations to occur at future design stages relating to construction and demolition activities once a contractor is appointed. Further design development may require this AIA to be reviewed and updated accordingly by an appropriately qualified arboriculturist.

1.4 Deliverable Scope

7) Jacobs UK Ltd (Jacobs) was instructed by United Utilities to undertake a tree survey and provide an AIA for each section of the Proposed Programme of Works. Reference to trees in this AIA should be taken to include individual trees, woodland, tree groups and hedgerows where appropriate. The AIA has been produced with reference to 'BS 5837:2012- Trees in relation to design, demolition and construction – Recommendations'[2]. Scope requirements were to:

[2] British Standards Institute (2012). *British Standard 5837: 2012 Trees in relation to design, demolition and construction – Recommendations. London: BSI Ltd.*

- Survey and record information about trees that are potentially impacted by the Proposed Marl Hill Section
- Assess the potential impact on trees including tree removals, and to recommend where tree protection measures may be required for retained trees
- Provide an AIA report with all relevant information recorded and indicated on corresponding figures.

1.5 Survey Scope and Methodology

8) Baseline survey visits to multiple locations were undertaken by arboricultural surveyors between January and April 2020. The tree survey[3] was conducted in accordance with BS 5837:2012[4]. Full details of survey scope and methodology are detailed in Sections B.1 and B.2 of Appendix B. Four additional features (G139, G140, T142 and H165) were surveyed to the same scope and methodology during a site walkover with the client on 11th November 2020.

9) The spatial scope of surveys considers trees located within and up to 15 m from the planning application boundary referenced in Appendix A. Hereafter the spatial scope of surveys will be referred to as the 'assessment area' within this AIA. The assessment area excludes:

- All trees with a stem diameter of below 75 mm (measured at 1.5 m above ground level)
- Vegetation located above the tunnelled sections of the Proposed Marl Hill Section as outlined within Section 1.10 of this AIA.

1.6 Impact Assessment Methodology

10) An interim assessment of potential impacts is based on Figure 6.5: TCAP. The TCAP presents the existing tree Root Protection Area (RPA) or canopy constraints in relation to the indicative proposed core working area and planning application boundary. Potential impacts on trees were also informed by communications with the United Utilities design team plans referenced in Appendix A. Full details of the impact assessment methodology are provided in Section B.4 of Appendix B.

11) Potential tree impacts are reported using traffic light colour symbology of RAG based on parameters summarised below:

- Red features are trees subject to varying extents of removal based on their location within the proposed core working area
- Amber features are trees considered to be a 'Removal Risk Aiming to Retain' (RRAtR) and based on the proposed core working area or planning application boundary encroaching on existing tree constraints. For the purposes of the AIA, it is assumed that the RRAtR trees would be removed on a reasonable worst-case scenario basis. This is a precautionary approach because location-specific protection measures are not available for RRAtR trees at this planning submission stage. It is anticipated that further consideration will be given to RRAtR trees as the design process progresses and engineering constraints become further defined
- Green features are considered to be 'Retained with Protection Measures' (RwPM) due to either location-specific protection measures being available at planning submission stage or tree constraints being located on the margins of the planning application boundary. Encroached RwPM features, considered likely to require protection measures, are identified by an 'E' within the 'AIA' column of the Tree Survey Schedule (Appendix F). Non-encroached RwPM features, less likely to require protection measures, are identified by a 'N' within the 'AIA' column of the Tree Survey Schedule.

12) The extent of potential tree loss, trees at risk and tree retention within the planning application boundary are indicatively shown on Figure 6.6: PTRP. The spatial extent of tree removal, trees at risk and tree retention are based on the RAG status of a feature and proximity to the planning application boundary.

[3] British Standards Institute (2012). *op. cit.*

1.7 Embedded Mitigation and Good Practice

13) Embedded mitigation is inherent to the design, good practice measures are standard industry methods and approaches used to manage commonly occurring environmental effects. The assessments presented in Section 4 to 6 of this report are made taking into account embedded mitigation and the implementation of good practice measures (where these can be identified).

1.7.1 Embedded Mitigation

14) ES Chapter 3: Design Evolution and Development Description explains the evolution of the design with input from the environmental team, including mitigation workshops and the use of GIS based constraints data.

1.7.2 Good Practice Measures

15) Good practice measures are contained in ES Appendix 3.2: Construction Code of Practice (CCoP). The CCoP presents a suite of mitigation measures that would be adopted during construction. The key measures of relevance to the AIA are listed below:

- Trees to be retained should be adequately protected via a combination of tree protection measures as specified in a SS-AMS. Examples of potential mitigation measures within each compound are discussed in Sections 5.2.2 and 5.3.2 of this AIA
- In conjunction with the SS-AMS, a TPP should also be produced to provide schematic details of where protective measures (i.e. fencing or ground protection) will be installed
- The specification of stout 'fit for purpose' tree protection fencing would be agreed with the LPA and should preferably be prescribed as per section 6.2 of BS 5837:2012 (BSI, 2012). This would provide an adequate RPA/Construction Exclusion Zone (CEZ) that would allow its successful retention during and after the proposed works
- Any soft ground within RPA areas should be suitably protected as described in Section 6.4.2.3 of BS 5837:2012 (BSI, 2012). Areas of retained hard surfacing could act as sufficient protection for RPAs beneath and require no additional level of exclusion
- In the event any tree canopy pruning is required to facilitate the works these are to be undertaken by qualified and competent staff working to BS3998:2010. The LPA would be notified of any tree pruning required to enable the works to proceed prior to the pruning occurring
- Consideration should be given to a competent project arboriculturist or ACoW to oversee works relating to the protection of trees. Further details on this role are provided in Section 6.8 of this AIA.

1.8 Survey Limitations

16) Limitations to the tree survey include the following key points:

- Plotting the location of trees was based on surveyor use of a GPS-enabled survey tablet and open-source aerial imagery with no topographical information relating to tree positions available at the time of surveys. GPS locations are considered accurate to within 5 m therefore all tree positions must be assumed to be indicative for planning purposes only. Later stage verification of all tree feature locations will be required once a full topographical survey becomes available
- The assessment area is defined by the extent of the planning application boundary referenced in Appendix A. Any outstanding areas of survey coverage, due to post-survey development of the planning application boundary, are indicated on Figure 6.5: TCAP
- Due to restricted safe access, the stem diameter of some trees has been estimated where appropriate. This is identified by a '#' suffix within the stem diameter at breast height (DBH) column of the Tree Survey Schedule

- Indicative RPAs have been calculated for tree groups, hedgerows and woodland based on the maximum stem diameter taken for each collective feature. Limited individual tree data for trees within collective features was recorded e.g. stem count
- Additional arboricultural site visits for more detailed tree data recording may be required at a later stage to inform detailed design including:
  - The determination of accurate tree clearance limits where tree impacts are expected (including impacts to trees on the external margins of the planning application boundary)
  - The formation of a tree protection strategy (i.e. a SS-AMS)
- A BS5837:2012 tree survey does not include a specific veteran/ancient tree assessment methodology (see Section B.5 of Appendix B for details). Prospective veteran or ancient trees are reported as potential veteran or ancient trees within the Tree Survey Schedule and identified by a 'V' within the Age Class column. For the purposes of this assessment, all potential veteran and ancient trees are considered to be verified.

1.9 Assessment Limitations

17) Limitations to the assessment are identified as follows:

- Indicative tree impacts are informed by the overlay of tree constraints information relative to the proposed core working area and planning application boundary. Tree impacts are informed by reference sources defined in Appendix A and assessment methodology detailed in Section B.4 of Appendix B. In summary these sources include:
  - Tree survey information, the proposed core working area and the planning application boundary as presented as geo-spatial layers
  - Schematic design plans
  - Communications with the United Utilities design team on 18 June 2020 with regards to potential location-specific mitigation to accommodate tree retention
- The Tree Survey Schedule does not report canopy or branch height dimensions of tree survey features however this data can be provided on request. This information is considered more appropriate to a later design stage at a greater level of detail i.e. to determine specific associated pruning requirements. The PTRP should be provided as a reference document for any associated pruning works specification in line with BS3998:2010 'Tree Work – Recommendations'[5]
- The indicative rooting constraints of potential veteran/ancient trees are currently calculated in accordance with BS5837:2012 (which caps RPAs at a maximum radius of 15 m). Further protection measures should be considered in line with Governmental Standing Advice for ancient and veteran trees in England[6] hereafter referred to as Standing Advice. Standing Advice recommends a minimum 15 m protective buffer zone from Ancient Woodland and potentially greater protective buffer zones for individual ancient and veteran trees (see Section B.5 of Appendix B for further details)

1.10 Assumptions

18) Assumptions for this assessment are identified as follows:

- Tree surveys focus on trees with a stem diameter of over 75 mm. It is understood that the assessment of trees lost below this size threshold and other low-level vegetation are captured by existing Phase 1 ecology survey data and addressed within the Environmental Masterplan of Chapter 20: Environmental Mitigation

[5] British Standards Institute (2010). *British Standard 3998:2010 : 2012 Tree work – Recommendations. London: BSI Ltd.*
[6] Natural England and Forestry Commission (2018). *Guidance - Ancient woodland, ancient trees and veteran trees: protecting them from development*. [online] Available here: https://www.gov.uk/guidance/ancient-woodland-and-veteran-trees-protection-surveys-licences [Accessed on 14/07/20]

- The existing Haweswater Aqueduct (HA) would remain in-situ and therefore associated decommissioning impacts are excluded from this assessment
- The tunnelled sections of the Proposed Marl Hill Section are excluded from surveys. It is understood that tunnel boring operations would occur at a minimum depth of 7 m below ground level. This exclusion is based on principles of tree rooting systems[7] being typically shallow i.e. 90 % of roots are concentrated in the top 60 cm of soils and with average root depths typically being in the range of 1- 2 m
- This assessment is based on a fixed design however there is potential for additional construction details to become available at detailed design stage. Examples of additional elements/construction detail are:
  - Working widths for task-specific construction/demolition activities located within the planning application boundary but outwith the proposed core working area e.g. earthworks
  - Facilitation access requirements relating to visibility splays or turning circles
  - The diversion/removal/reinstatement of underground or overground utility services including outfalls
  - Highways improvements to the Strategic Road Network (SRN) including localised road widening, passing places or culverts
  - The alignment and construction detail of existing access tracks/roads to be improved.
  - The alignment and construction detail of new access tracks/roads or diverted public footpaths
  - The demolition of existing structures and hard surfacing located within the Proposed Marl Hill Section
  - Notification of project commitments e.g. confirmed working width reductions
- It is assumed that the above listed design detail would be positioned outside areas of retained tree features shown on the PTRP with no further assessment required.

[7] Dobson, M. (1995). Tree Root Systems Arboricultural Research Information Note 130/ARB/95. Arboricultural Advisory and Information Service: UK.

2. Regulatory and Planning Framework for Trees

2.1 Overview

19) BS5837:2012 provides a framework which sets out how trees should be considered in the context of development. LPAs in the UK have a statutory duty to consider the protection of trees as material considerations when considering planning applications.

20) The methodology and scope of this AIA (as described in Appendix B) has been developed in accordance with national and local policy objectives specified below as well as legislation referenced in Section 7 of this AIA.

2.2 Protected Trees

21) Trees which provide significant biodiversity value may be afforded protection based upon their location within a designated site. The Proposed Marl Hill Section is fully contained within the designated landscape of Forest of Bowland Area of Outstanding Natural Beauty (AONB) identified for its '*outstanding landscapes; unique and irreplaceable national assets*'[8]. No additional statutory designated sites of nature conservation are situated within or immediately adjacent to the assessment area of this AIA. Additional information on nearby ecological resources, designations and receptors can be found in Chapter 9: Ecology. At the time of writing, tree loss associated to any national or local designated site has not been specified within this AIA.

22) The Hedgerows Regulations 1997 protect most countryside hedgerows from being removed (including being uprooted or otherwise destroyed). The Regulations are administered by the LPA who decide if a hedgerow is important. The identification of important hedgerows is based on a number of ecological and cultural criteria as assessed within ES Chapter 9: Ecology and Chapter 10: Cultural Heritage. Reinstatement associated with any important hedgerow loss is indicated within the Environmental Masterplan supporting ES Chapter 20: Environmental Mitigation.

23) Trees which provide a significant amenity value to a local area may be afforded protection under the Town and Country Planning (Tree Preservation) (England) Regulations 2012 or Town and Country Planning Act 1990. Correspondence received from RVBC on 8 August 2020 confirms the absence of Tree Preservation Orders (TPOs) or Conservation Areas (CA) within or immediately adjacent to the assessment area.

2.3 Planning Policy Objectives

24) Section 15 paragraph 175c[9] of the National Planning Policy Framework (NPPF, 2019) states that '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'. The NPPF refers to veteran and ancient trees as irreplaceable habitat due to their "age, size and condition, is of exceptional biodiversity, cultural or heritage value". This objective aligns consistently with the combined policy objectives as outlined below.

25) Policy DME1[10] of RVBC's Core Strategy (RVBC, 2014) sets targets for zero loss of statutorily protected trees, ancient woodland and veteran and ancient trees as a result of development. Meanwhile the Forest of Bowland AONB Management Plan 2019 – 2024 recognises that existing trees, particularly broadleaf or clough woodland, substantially contribute to a landscape containing woodland cover well below the national average.

[8] Forest of Bowland (2019). Forest of Bowland AONB Management Plan 2019 – 2024.[online] Available at: https://www.forestofbowland.com/management-plan [Accessed: 08 October 2020]
[9] Ministry of Housing, Communities and Local Government (2019). National Planning Policy Framework
[10] Ribble Valley Borough Council (2014). Core Strategy 2008-2028. A Local Plan for Ribble Valley. Adopted Version. [online] Available here: https://www.ribblevalley.gov.uk/download/downloads/id/10010/adopted_core_strategy.pdf [Accessed: 08 October 2020]

26) Policy DME2[11] of RVBC's Core Strategy (RVBC, 2014) states that '*development proposals will be refused which significantly harm landscape or landscape features including… hedgerows and individual trees (other than in exceptional circumstances where satisfactory works of mitigation or enhancement would be achieved, including rebuilding, replanting and landscape management*)'

27) Policy DME1[12] of RVBC's Core Strategy (RVBC, 2014) seeks to protect its existing tree cover where potential developments are likely to have '*a substantial effect on tree cover'*. Where applications are likely to have a substantial cover, applicants are required to:

- Provide detailed arboricultural survey information on trees (in accordance with BS5837:2012) that could be influenced by the proposed development
- Provide a tree constraint plan and assessment of development impacts to any affected trees
- A detailed tree protection plan is submitted with appropriate levels of detail.

[11] Ribble Valley Borough Council (2014). Core Strategy 2008-2028. A Local Plan for Ribble Valley. Adopted Version. [online] Available here: https://www.ribblevalley.gov.uk/download/downloads/id/10010/adopted_core_strategy.pdf [Accessed: 08 October 2020]
[12] Ribble Valley Borough Council (2014). *op. cit.*

3. Site Observations and the Tree Survey

3.1 Ancient Tree Inventory

28) A desktop search, made on 23 June 2020, of the Woodland Trust's Ancient Tree Inventory (ATI) database indicates the absence of existing verified veteran or ancient trees within the assessment area. Nevertheless, it should be noted that the ATI is not a definitive database for veteran/ancient trees.

3.2 Treescape at Bonstone Compound

29) The proposed location of the Bonstone Compound is within open sloping landscape comprising agricultural fields and grassland. An existing access track, approximately 2.5 m wide, approaches Bonstone Compound from the east from Slaidburn Road. The assessment area is intermittently covered with scattered individual trees and mixed species woodland with land boundaries regularly margined by field boundary vegetation.

30) Approximately 45 % of the Proposed Marl Hill Section's surveyed trees are located at this compound location with the majority of surveyed trees assessed to be of at least mature age class. Surveyed tree stock is predominantly of moderate quality but contains five high quality trees including four potential veteran trees. These potential veteran trees are all situated at trackside or existing field boundaries including Illustrations 1 and 2.

Illustration 1: Potential veteran alder tree located on field boundary

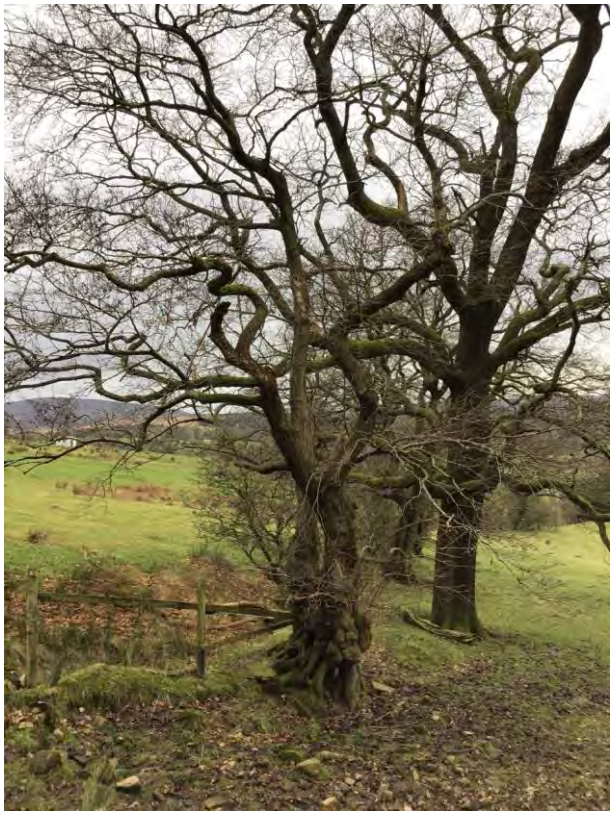


Illustration 2: Potential veteran beech tree located at trackside

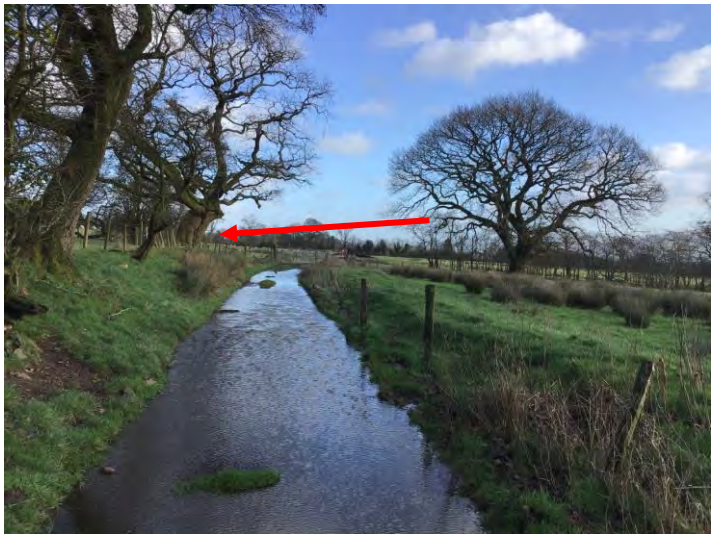
3.3 Treescape at Braddup Compound

31) The proposed location of the Braddup Compound is within open flat landscape comprising of agricultural fields and marshy grassland. The assessment area is intermittently covered with scattered individual trees and mixed species woodland with land boundaries heavily delineated by field boundary vegetation.

32) Approximately 55 % of the Proposed Marl Hill Section's surveyed trees are located at this compound with the great majority of surveyed features assessed to be of at least mature age class. Surveyed tree stock is predominantly of moderate quality but contains 15 high quality trees including six potential veteran trees.

33) An existing access track, approximately 2.5 m wide, approaches Braddup Compound from the east from Slaidburn Road. This track, as shown in Illustration 3, is intermittently flanked by verge-side trees of predominantly high quality including three potential veteran trees.

Illustration 3: Section of existing access track contiguously flanked either side by trees including three potential veteran trees. The largest tree stem at Braddup, a potential veteran oak, is red arrowed below



3.4 Quantitative Results of the Tree Survey

34) Table 1.1 summarises the number of trees surveyed and their relative grading categories within the assessment area.

Table 1.1: Totals table of tree survey features and grading categories

BS5837:2012 grades	Trees	Tree Groups	Woodlands	Hedges	Subtotals
A	15	5	0	0	20
B	26	23	6	2	57
C	13	17	1	1	32
U	0	1	0	0	1
Subtotals	**54**	**46**	**7**	**3**	**110**

35) Based on the grading methodology of BS5837:2012, 'A' grade trees are of high quality and value and should be prioritised for retention. 'B' grade trees are of moderate quality and value and should be considered for retention where possible, although care should be taken to avoid misplaced retention. Any development should take into account the retention and protection of trees, but also the tree's future growth. The 'C' grade trees are of low quality and value and should not place a constraint on development. U grade trees are those that are dead or are showing signs of significant, immediate, and irreversible overall decline.

36) Full tree survey results are described in the Tree Survey Schedule (Appendix F) and are indicated on Figure 6.5: TCAP. Explanation of terms used in the schedule can be found in Appendices C, D and E.

4. Arboricultural Impact Assessment (AIA)

4.1 Overview

37) The construction of the Proposed Marl Hill Section would result in the loss of trees through both permanent and temporary land-take. About 42 % of all surveyed vegetation of the Proposed Marl Hill Section is considered at risk of removal. The locations of impacted features are indicatively shown on Figure 6.6: PTRP.

4.2 RAG Assessment – tree removals

38) All features RAG assessed as 'Red' or 'Amber' are reported to be removed for the purposes of this assessment. At risk trees within the assessment area are summarised in Table 1.2 which breaks down trees into feature type, RAG status and category grading.

Table 1.2: Summary RAG status table of tree removals (Red and Amber)

Feature type	RAG status (Red and Amber)			BS5837:2012 grades			
	Removal	Partial removal	RRAtR	A	B	C	U
Tree (T)	9	0	14	7	10	6	0
Tree Group (G)	6	3	11	3	7	9	1
Hedgerow (H)	0	0	2	0	2	0	0
Woodland (W)	0	0	1	0	1	0	0
Subtotals	**15**	**3**	**28**	**10**	**20**	**15**	**1**

39) It should be noted that the RAG assessment is a precautionary approach to reporting impacts with location-specific protection measures not available for 'Red' or 'Amber' features at planning submission stage. It is anticipated that further consideration will be given to at risk features as the design process progresses and engineering constraints are further defined.

4.3 RAG Assessment – tree retention

40) Retained trees within the assessment area are tabulated in Table 1.3 which breaks down trees into feature type, RAG status and category grading.

Table 1.3: Summary RAG status table of tree retention (Green)

Feature type	RAG status (Green)		BS5837:2012 grades			
	RwPM - encroached	RwPM - not encroached	A	B	C	U
Tree (T)	12	12	7	12	5	0
Tree Group (G)	9	7	2	8	6	0
Hedgerow (H)	0	0	0	0	0	0
Woodland (W)	3	3	0	5	1	0
Subtotals	**24**	**22**	**9**	**25**	**12**	**0**

41) Retention of encroached features will be subject to incorporation of pre-construction protection measures as specified in a SS-AMS. Further mitigation measures designed to protect retained features can be provided by documents listed in Table 1.6 of Section 6.7.

42) Non-encroached features are reported as RwPM due to a general requirement to site verify all surveyed tree feature locations against topographical information at detailed design stage - see Section 6.5 for general recommendations.

5. Discussion

5.1 Significant arboricultural impacts

43) Schedule 4(4) of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 highlights the need to describe 'significantly affected…fauna…and landscape' however there is no recognised arboricultural methodology for assessing the significance of effects associated with tree loss. ES Chapter 6: Landscape and Arboriculture considers tree loss in the wider context of impacts to landscape character and visual amenity.

44) The Woodland Trust defines 'notable trees' to be *'usually a mature tree which may stand out in the local environment because they are large in comparison with other trees around them…in parts of the UK, where trees are less common, a tree may be relatively small…but notable because it is significant in its local environment'*[13]. In the context of national and local planning policy, significant tree loss is assessed where the following notable features are considered at risk of removal:

- Statutorily protected trees
- Veteran or ancient trees
- Ancient woodland
- High quality trees i.e. A grade features.

5.2 Tree Impacts at Bonstone Compound

45) Table 1.4 below summarises potential tree impacts by RAG status and category grading at the proposed Bonstone Compound location.

Table 1.4: Summary RAG status table of trees at Bonstone Compound

BS5837:2012 grades	RAG status			
	Removal/Partial Removal	RRAtR	RwPM	Subtotals
A	1	0	4	**5**
B	4	2	20	**26**
C	6	1	11	**18**
U	0	0	0	**0**
Subtotals	**11**	**3**	**35**	**49**

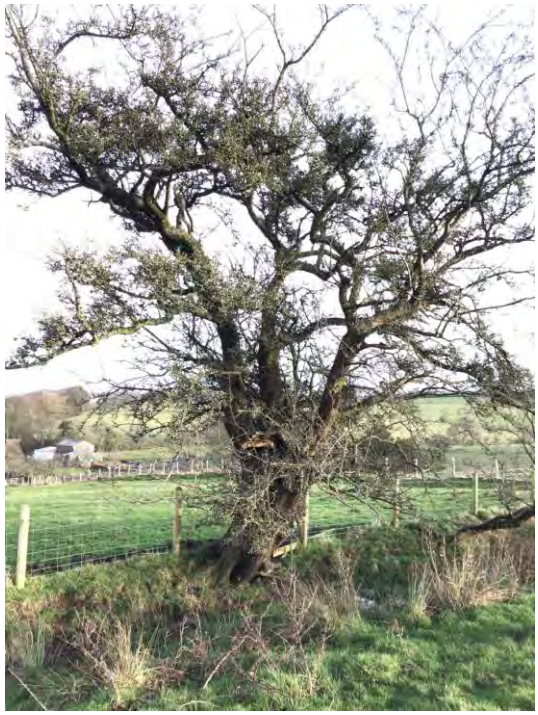
5.2.1 Notable trees at risk within Bonstone Compound

46) 29 % of trees surveyed at the proposed Bonstone Compound location are subject to varying extents of removal or assessed to be at risk of removal including one notable tree further discussed in Paragraph 47.

47) One potential veteran tree (Illustration 4) is to be removed due to its location within the indicative open cut section of the proposed core working area. This open cut section is required for new pipeline installation and connection work into the existing HA. It should be noted that the tree is located outside the proposed pipeline alignment but is fully encroached within the pipeline's indicative external works area approximately 20 m wide each side.

[13] Woodland Trust (2020) *Notable trees*. [online] Available at: https://ati.woodlandtrust.org.uk/what-we-record-and-why/what-we-record/notable-trees/ [Accessed: 06 October 2020]

Illustration 4: Potential veteran hawthorn tree to be removed at the proposed Bonstone Compound



5.2.2 Notable encroachment at Bonstone Compound

48) Approximately 33 % of trees surveyed at the proposed Bonstone Compound are considered encroached but RwPM including four trees assessed as notable. Encroached features are reported as retainable (Green within the RAG assessment) subject to pre-construction tree protection measures as detailed within a SS-AMS.

49) It is assumed that potential RPA impacts to encroached trees at the proposed Bonstone Compound, including three potential veteran trees and one A grade feature (Illustration 5), would be mitigated by a combination of:

- Investigating opportunities to reduce works areas of the planning application boundary outwith the proposed core working area, where possible
- Precautionary working methods to be adopted in line with National Joint Utility Group (NJUG) Volume 4[14]
- Establishment of CEZs around retained tree RPAs to include the use of ground protection, tree protection fencing and no soil stripping within the RPAs of retained trees
- Micro-siting of scheme components outside of constraints of retained trees under site supervision of an ACoW including potential facilitation pruning in line with BS3998:2010[15].

[14] NJUG (2007). NJUG Guidelines on Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees. NJUG:UK.
[15] British Standards Institute (2010). *British Standard 3998:2010: 2012 Tree work – Recommendations. London: BSI Ltd.*

Illustration 5: Encroached A grade oak tree at the propsoed Bonstone Compound. Two encroached potential veteran trees are located either side of this feature

5.3 Tree Impacts at Braddup Compound

50) Table 1.5 below summarises potential tree impacts by RAG status and category grading at the proposed Braddup Compound.

Table 1.5: Summary RAG status table of trees at Braddup Compound

BS5837:2012 grades	RAG status			
	Removal/Partial Removal	RRAtR	RwPM	Subtotals
A	2	7	6	**15**
B	4	10	17	**31**
C	1	7	6	**14**
U	0	1	0	**1**
Subtotals	**7**	**25**	**29**	**61**

5.3.1 Notable trees at risk within Braddup Compound

51) Around 52 % of trees surveyed at the proposed Braddup Compound are subject to varying extents of removal or assessed to be at risk of removal including nine trees assessed as notable. Paragraphs 52 to 55 below provide further explanation of notable tree impacts which include the potential loss of the following notable trees:

- Two potential veteran trees RAG assessed as 'Red' (as discussed in Paragraphs 54 and 55)
- Three potential veteran trees and four A grade features RAG assessed as 'Amber' (as discussed in Paragraph 53)

52) Approximately 80 % of potential tree loss at the proposed Braddup Compound is due to significant RPA encroachment by proposed improvements to the existing access track as shown in Illustration 3 of

Section 3.3. It is understood that the proposed track improvements would widen the existing 2.5 m wide access track to a 7.7 m wide tarmac road within an indicative 15 m wide working corridor.

53) The majority of trees at risk of removal are located on the grass verge located immediately north of the existing access track. Impacts resulting from proposed track improvements include the potential loss of three potential veteran trees (Illustrations 6 to 8) and four A grade features (examples in Illustrations 9 and 10).

Illustration 6: Potential veteran oak tree located on northern verge side of existing access track

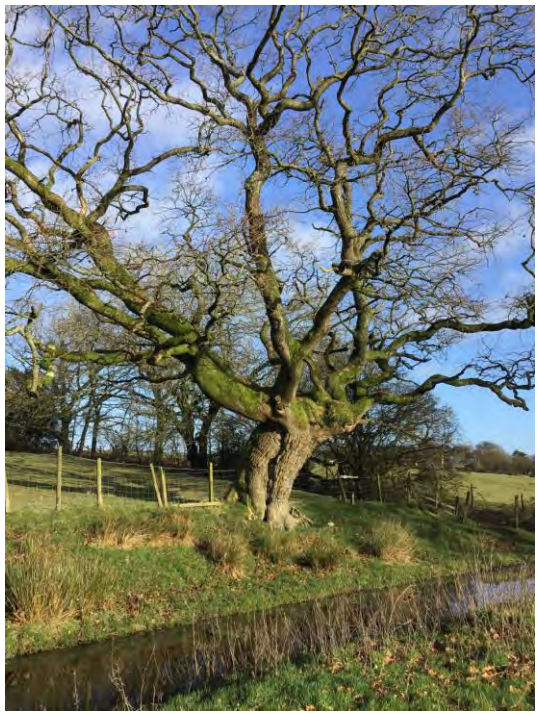


Illustration 7: Potential veteran alder tree located on northern verge side of existing access track

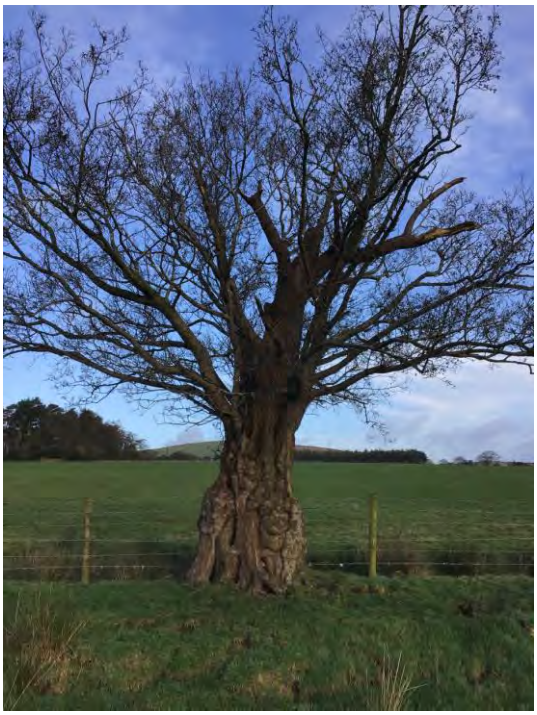


Illustration 8: Potential veteran alder tree located on northern verge side of existing access track

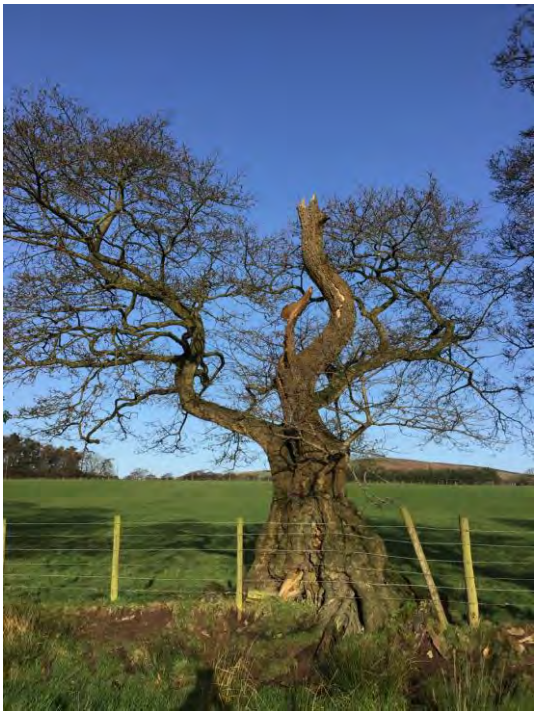


Illustration 9: At risk A grade oak tree located by track entrance to Slaidburn Road

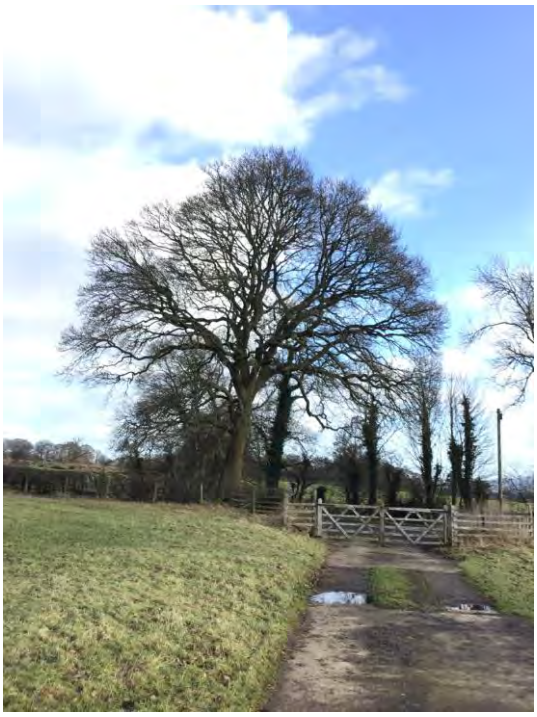
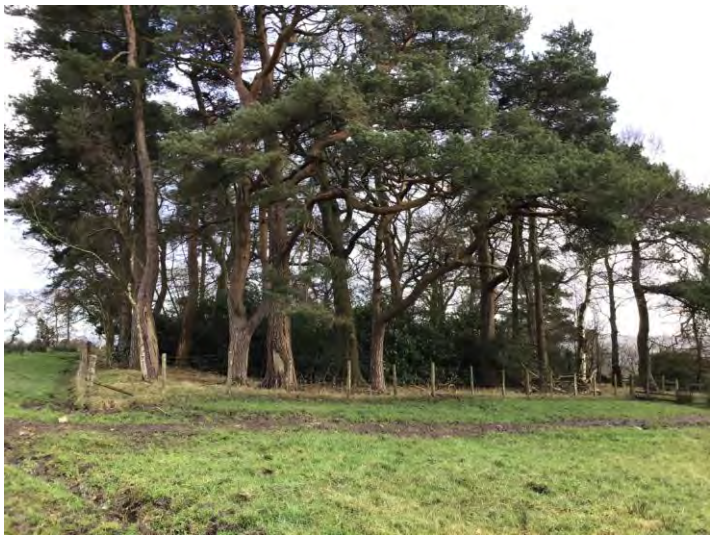
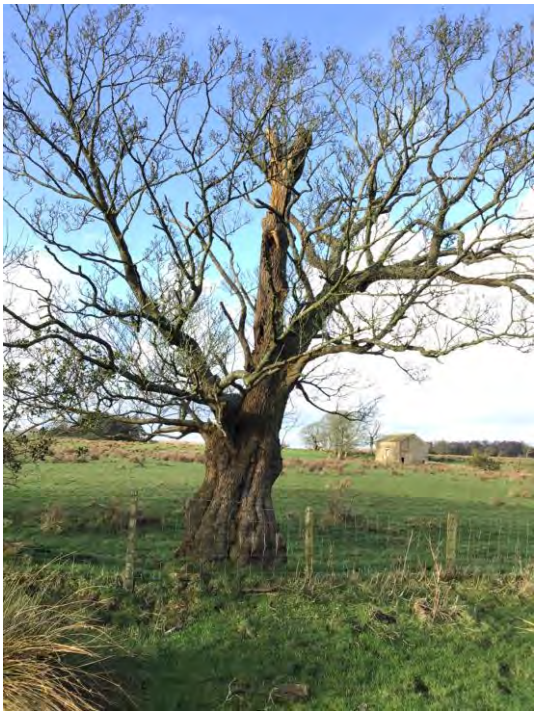


Illustration 10: At risk A grade woodland located on southern verge side of existing access track



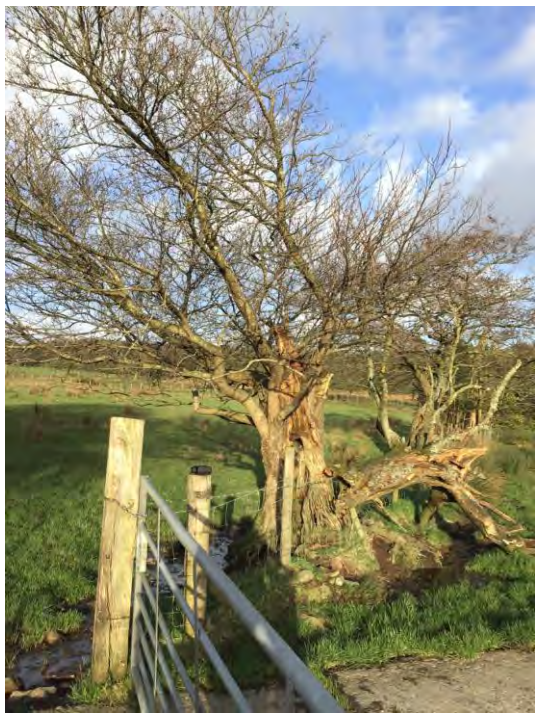
54) An additional potential veteran tree (Illustration 11) is at risk due to its location within the proposed alignment of a new section of tarmac road within the indicative 15 m wide working corridor.

Illustration 11: At risk potential veteran alder tree located on a field boundary.



55) An additional potential veteran tree (Illustration 12) is at risk due to its location within the associated works area for the proposed new tarmac road and proximity to the indicative site layout of the packaged water treatment plant.

Illustration 12: At risk potential veteran alder tree located on a field boundary adjacent to gate entrance.



5.3.2 Notable encroachment at Braddup Compound

56) Approximately 18 % of trees surveyed at the proposed Braddup Compound are considered encroached but RwPM including trees assessed as notable. Encroached features are reported as retainable (Green in the RAG assessment) subject to pre-construction tree protection measures as detailed within a SS-AMS.

57) It is assumed that potential RPA impacts to encroached trees at the proposed Braddup Compound, including three A grade features, would be mitigated by a combination of:

- Investigating opportunities to reduce works areas of the planning application boundary outwith the proposed core working area, where possible
- Precautionary working methods to be adopted in line with National Joint Utility Group (NJUG) Volume 4[16]
- Establishment of CEZs around retained tree RPAs to include the use of ground protection, tree protection fencing and no soil stripping within the RPAs of retained trees.
- Micro-siting of scheme components outside of constraints of retained trees under site supervision of an ACoW including potential facilitation pruning in line with BS3998:2010[17].

[16] NJUG (2007). NJUG Guidelines on Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees. NJUG:UK.
[17] British Standards Institute (2010). *British Standard 3998:2010: 2012 Tree work – Recommendations. London: BSI Ltd.*

6. Conclusion and Recommendations

6.1 Overview

58) Overall the Proposed Marl Hill Section would result in the potential loss of 46 tree features, approximately 42 % of surveyed trees within RVBC as indicated on Figure 6.6: PTRP. Around 65 % of overall tree loss is attributed to trees identified as being of high or moderate quality. Tree loss impacts are summarised for each compound in Sections 6.1.1 – 6.1.2 with further opportunities for retention discussed in Section 6.3.

59) Overall the Proposed Marl Hill Section would result in the potential loss of the following notable trees:

- One potential veteran tree at the proposed Bonstone Compound
- Five potential veteran trees and four additional A grade features at the proposed Braddup Compound

60) Overall the Proposed Marl Hill Section includes approximately 25 % of surveyed vegetation considered encroached but RwPM. It is understood that encroached vegetation considered RwPM would be subject to pre-construction tree protection measures specified in a SS-AMS and shown on a TPP. General protection measures that may reduce soil compaction and excavation damage within RPAs of encroached trees are highlighted in Paragraphs 49 and 57 of Section 5. Notable tree encroachment is summarised for each compound in Sections 6.1.1 – 6.1.2.

6.1.1 Summary of Impacts – Bonstone Compound

61) Up to 14 tree features, approximately 29 % of trees surveyed at the proposed Bonstone Compound are subject to varying extents of removal or assessed to be at risk of removal including one potential veteran tree discussed in Paragraph 47 of Section 5.2.1.

62) Approximately 33 % of surveyed vegetation at Bonstone Compound is considered encroached but RwPM including four notable features comprising of three potential veteran trees and one A additional grade feature.

6.1.2 Summary of Impacts – Braddup Compound

63) Up to 32 tree features, approximately 52 % of trees surveyed at Braddup Compound are subject to varying extents of removal or assessed to be at risk of removal including nine trees assessed as notable. This includes five potential veteran trees and four additional A grade features.

64) Approximately 18 % of surveyed vegetation at Braddup Compound is considered encroached but RwPM including three notable features comprising of three A grade features.

6.2 Preliminary Removals

65) A total of 18 tree features, 39 % of total tree loss, comprises of trees RAG assessed as 'Red' i.e. features located within the indicative proposed core working areas of the planning application boundary. This total includes the potential loss of three potential veteran trees as further discussed in Sections 6.2.1 and 6.2.2. The Proposed Marl Hill Section design is considered fixed however specific consideration should be given to retain these assets as design proposals develop. Further mitigation for these prominent assets can be provided by documents listed in Table 1.6 of Section 6.7.

6.2.1 Notable Tree Loss – Bonstone Compound

66) In the first instance, it is recommended that the open cut works area at the proposed Bonstone Compound are micro-sited to avoid RPA encroachment of one potential veteran tree. Unavoidable construction/demolition activities in close proximity to retained tree RPAs should also be mitigated through the combination of protection measures specified in a SS-AMS which could include:

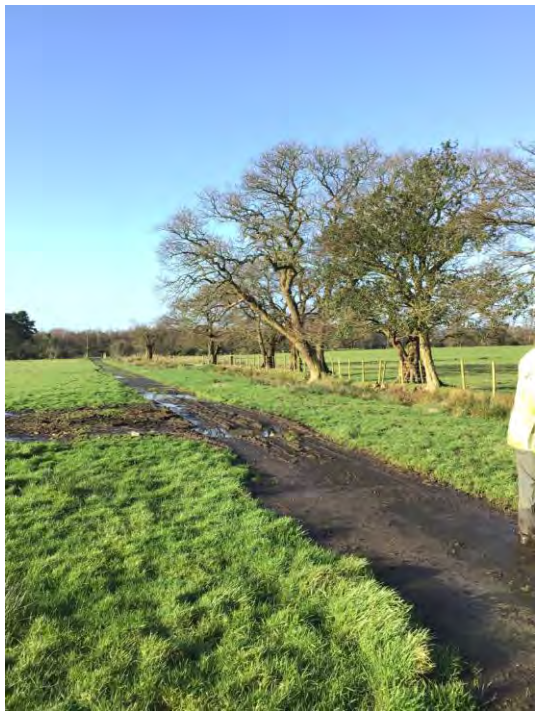
- Investigating opportunities to reduce works areas of the planning application boundary outwith the proposed core working area, where possible

- Establishment of CEZs around retained tree RPAs to include the use of ground protection, tree protection fencing and no soil stripping within the RPAs of retained trees.
- Precautionary working methods to be adopted in line with National Joint Utility Group (NJUG) Volume 4
- Micro-siting of scheme components outside of constraints of retained trees under site supervision of an ACoW including potential facilitation pruning in line with BS3998:2010 .

6.2.2 Notable Tree Loss – Braddup Compound

67) In the first instance, it is recommended that the new road alignment (approximately 1.5 km long) and associated works corridor (approximately 15 m wide) are micro-sited to avoid RPA encroachment upon verge-side trees including three potential veteran trees. As illustrated in Illustration 13, around 90 % of the existing verge length to the south of the access track is devoid of tree cover.

Illustration 13: section of access track flanked on single side by limited tree cover



68) Potential design considerations within the planning application boundary that may reduce site impacts include:

- Localised reduction in design widths/depths/re-alignment of the proposed 7.7 m wide road including the incorporation of passing places
- Investigating opportunities to incorporate existing access track surface. depths, widths and alignment to reduce excavation/compaction damage to RPAs
- The construction of the new road design based upon a 3D cellular confinement system installed with 'no-dig' methods
- A combination of protection measures specified in a SS-AMS for works within the 15 m wide works corridor as outlined in Paragraph 69

69) Unavoidable construction/demolition activities in close proximity to retained tree RPAs should also be mitigated through the combination of protection measures specified in a SS-AMS including:

- Investigating opportunities to reduce works areas within the planning application boundary, where possible

- Establishment of CEZs around retained tree RPAs to include the use of ground protection, tree protection fencing and no soil stripping within the RPAs of retained trees
- Precautionary working methods to be adopted in line with National Joint Utility Group (NJUG) Volume 4
- Micro-siting of scheme components outside of constraints of retained trees under site supervision of an ACoW including potential facilitation pruning in line with BS3998:2010.

70) Two potential veteran trees (Paragraphs 54 and 55 of Section 5.3.1) are at risk due to their full encroachment by the new road's associated works corridor and indicative layout of the packaged water treatment plant. In the first instance, it is recommended that these design elements are micro-sited to avoid any RPA encroachment. Similar recommendations as outlined in Paragraphs 64 and 65 would also be considered.

6.3 Further Opportunities for Retention

71) A total of 28 tree features, equating to approximately 61 % of total potential tree loss at both compounds, comprises 'Amber' category trees i.e. features located outside the indicative proposed core working areas but within the planning application boundaries. This figure includes three potential veteran trees and four additional A grade features which are all associated with proposals for Braddup Compound as outlined in Section 5.3.1.

72) Further consideration should be given to 'Amber' trees as the design process progresses and engineering constraints are further defined. RRAtR trees are identified by an amber colour in the 'RAG status' column of the Tree Survey Schedule and the PTRP.

6.4 Tree Protection Measures

73) At this stage in the design process, details relating to specific tree protection measures and construction techniques recommended to retain encroached vegetation is not required. General tree protection principles are outlined in Section 1.7 with potential mitigation measures highlighted as part of the Construction Code of Practice (CCoP).

6.5 General Recommendations

74) It is recommended that site verification of all assessed survey features should reference a full topographical survey of existing stem locations at a later design stage.

75) Prior to the removal of the trees or groups listed in this report, or any tree surgery works being undertaken, it is essential that the trees are subsequently checked again for legal protected status. These include TPOs and CAs, locally or nationally designated sites or ancient woodland.

76) Established trees, especially those of mature and above age class, should be prioritised for retention wherever possible. Ideally all works should be sited outside the more sensitive RPAs of these trees.

77) Alternative working practices should be considered where construction/demolition activities are in close proximity to retained tree RPAs and cannot be avoided. Further mitigation measures designed to protect retained features can be provided by documents listed in Table 1.6 of Section 6.7.

6.6 Ancient/Veteran Tree Assessment

78) All potential veteran/ancient trees would require a bespoke tree assessment to verify these designations (see Section B.5 of Appendix B for further details). This should be an industry accepted assessment methodology or trees could be verified via the Woodland Trust's ATI program.

6.7 Arboricultural Action Required

79) Table 1.6 lists the standard elements, as referenced in BS5837, to satisfy arboricultural concerns for this development if planning permission is granted. These standard elements are recommended to ensure appropriate tree protection is considered and applied throughout the duration of the works.

Table 1.6: Follow up arboricultural input relating to the proposed development

Recommended Arboricultural Input	Purpose	Timing
Continued arboricultural support for the project	Technical advice provided during the detailed design phase to avoid tree impacts.	Following any major design changes or advance works design development.
Site Specific Arboricultural Method Statement (SS-AMS)	The SS-AMS provides contractors with works information to implement aspects of development that are either within the RPA or has the potential to result in loss of or damage to a tree to be retained e.g. ground protection, 'no-dig' construction methods, hand-digging areas or site supervision.	Following final design agreement and all construction detail being made available.
Tree Protection Plan (TPP)	Provide schematic details of where protective measures (i.e. fencing or ground protection) will be installed.	Following final design agreement in conjunction with the SS-AMS.
Site monitoring and supervision by the project arboriculturist or Arboricultural Clerk of Works (ACoW)	Ensure protection measures and the method statement are being implemented correctly i.e. for encroached retained features	At agreed intervals before and during the construction phase of the project.

80) It is recommended to maintain contact with the project arboriculturist throughout the planning and design stage for the relevant additional input to be addressed at the appropriate point.

81) Impacts to the trees, as outlined within this AIA report, could alter with any changes to the current design proposals. Tree impacts should therefore be reviewed as the design process progresses with all relevant parties informed of the changes, where appropriate.

6.8 Site Supervision

82) Consideration should be given to a competent project arboriculturist or ACoW visiting the site and monitoring the works at a time agreed at the pre-commencement site meeting. The role of the project arboriculturist/ACoW role is to monitor compliance with arboricultural protection recommendations and providing on site advice on any tree problems that arise or modifications that become necessary.

83) The key stages requiring supervision should be agreed at the pre-commencement site meeting, but would usually include:

- Tree pruning
- On-site tree marking for felling operations to help identify the extents of what can be safely retained
- Installation of tree protection barriers or ground protection
- Significant excavation/ground level change works within retained tree RPA
- Mitigation measures for retained or at risk trees i.e. veteran and ancient trees
- Regular monitoring of compliance.

6.9 Highways Works

6.9.1 Ribble Valley Borough Council

84) The indicative reporting of tree loss for the proposed highways works contained at ES Volume 5 shows would result in the removal of 11 trees and one hedgerow for removal plus 11 tree groups and six hedgerows for partial removal. This is due to their location within the proposed highways works' planning application boundary.

85) An additional one tree, ten tree groups and three hedgerows, located outside the proposed highways works' planning application boundary, are identified as at risk of removal due the extent of their encroachment from proposals. In order to reduce arboricultural impacts, an arboricultural method statement would re-assess design impacts upon all arboricultural features and detail tree protection measures.

6.10 Proposed Ribble Crossing

86) An additional Arboricultural Impact Assessment is contained at ES Volume 6 for the Proposed Ribble Crossing. The indicative reporting of tree removals for the Proposed Ribble Crossing contained at ES Volume 6 reports a total of nine arboricultural features identified for removal, three features for partial removal and three features identified as at risk.

7. References

Ancient Tree Inventory online database. Available at: https://ati.woodlandtrust.org.uk/tree-search

British Standards Institute (2010). British Standard 3998: 2010 Tree Work – Recommendations. London: BSI Ltd.

British Standards Institute (2012). British Standard 5837: 2012 Trees in relation to design, demolition and construction – Recommendations

Countryside and Rights of Way Act 2000. London: HMSO.

Dobson, M. (1995). Tree Root Systems Arboricultural Research Information Note 130/ARB/95. Arboricultural Advisory and Information Service: UK.

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Hedgerows Regulations 1997. London: HMSO.

Lonsdale, D. (1999). Principles of Tree Hazard Assessment and Management

Lonsdale, D. (ed.) (2013). Ancient and other veteran trees: further guidance on management. London: The Tree Council.

Mattheck, C. (1994). The Body Language of Trees, Research for Amenity Trees No 4. London: TSO

Ministry of Housing, Communities and Local Government (2019). National Planning Policy Framework

National Joint Utilities Group (NJUG) (2007). NJUG Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees Volume 4. NJUG: UK

National Tree Safety Group (2011). Common Sense Risk Management of Trees

Natural England/Forestry Commission (2018). Ancient woodland, ancient trees and veteran trees: protecting them from development. Standing advice. Available here: https://www.gov.uk/guidance/ancient-woodland-and-veteran-trees-protection-surveys-licences

Ribble Valley Borough Council (2014). Core Strategy 2008-2028. A Local Plan for Ribble Valley. Adoptions Version Adopted Version. Available here: https://www.ribblevalley.gov.uk/download/downloads/id/10010/adopted_core_strategy.pdf

Town and Country Planning Act 1990 (as amended). London: HMSO.

Town and Country Planning (Environmental Impact Assessment) Regulations 2017. London: HMSO

Town and Country Planning (Tree Preservation) (England) Regulations 2012. London: HMSO.

Appendix A. Reference Material

Reference name within AIA	Description	Date produced	Date of assessment	Reference name within AIA	Description
Tree survey information	Tree survey information used in the assessment of tree impacts was taken from the following GIS spatial layers entitled: • 'Individual Trees within 20m' • 'Individual Trees within 20m RPAs' • 'Tree Group Canopies within 20m' • 'Tree Group Canopies within 20m RPAs'	n/a	n/a	08/07/20	22/07/20
Planning Application Boundary	The planning application boundary is understood to be based on the geo-spatial layer entitled 'TR4 Red Line Boundary' (updated 21/07/20).	n/a	n/a	21/07/20	22/07/20
Proposed Core Works Area	At the time of writing the Proposed Core Working Area is assumed to comprise of the following PM layers: • 'TR4 (21/07/2020)' last updated on 21/07/2020) • 'TR4 Compound Boundaries' last updated on 21/07/2020)	n/a	n/a	12/05/20-21/07/20	22/07/20

Appendix B. Scope and Methodologies

B.1 Spatial Scope

The assessment area was identified during desktop assessments based on high-resolution aerial imagery and design envelope information provided by United Utilities. The spatial scope of surveys considers trees located within and up to 15 m from the planning application boundary as provided in late February 2020. The assessment area has been refined by the exclusion of vegetation located above the deep tunnel bored sections of the Proposed Marl Hill Section.

B.2 Survey Methodology

Table 1.7 lists the tools and techniques used to conduct the tree survey and the parameters measured.

Table 1.7: Survey tools and techniques used

Parameters Recorded	Tools Used or Estimated
Tree height and cardinal points	Metres measured from ground level using a clinometer and laser distance measure. Cardinal points for tree groups/hedgerows and woodland features are typically reported on the greatest single lateral crown spread found within the feature.
Stem diameter at breast height (DBH) taken from 1.5m at ground level for trees over 75mm DBH. (Unless specified otherwise in tree schedule).	Diameter measuring tape and recorded in millimetres (mm)
Structural and physiological condition	External visual tree assessment (from the ground) – The Body Language of Trees, Research for Amenity Trees No 4 (Mattheck, 1994).
Root Protection Area (RPA)	Calculation method in BS 5837:2012 (BSI, 2012)
Tree quality assessment	Cascade chart and grading methodology in BS 5837:2012 (BSI, 2012) – see Appendix D.
Tree location data capture	ArcGIS collector app software on GPS-enabled survey tablet for plotting of features using open source high resolution aerial imagery.

Individual trees are recorded individually if they represent standout features in terms of their age class, DBH or BS5837 category grading outlined in Appendix D.

At planning submission stage it is considered appropriate to collectively group tree stems when features are the same BS5837 category grading/feature type, similar size/age class/DBH range and are located close together. For tree group, hedgerows or woodland features, the largest visible stem near the outer margins of each feature was measured. The DBH of this measured tree will then provide the basis of the collective RPA of this group.

The health and condition of trees can change rapidly and all trees, even healthy ones, are at risk from unpredictable climatic and man-made events. The assessment is based on the observed health and structural condition of the trees at the time of survey by suitably qualified inspectors. The health, condition and safety of trees should be checked on a basis commensurate with the level of risk and preferably on an annual basis, as recommended in Common sense risk management of trees (National Tree Safety Group, 2011). The tree survey conducted for this report is not a tree health and safety survey and should not be used as such.

B.3 Tree Constraints and Assessment Plan Methodology

The TCAP visually represents baseline data clipped up to 20 m from the planning application boundary and depicts the existing above ground and below ground constraints posed by surveyed trees. Corresponding tree survey data is tabulated within the Tree Survey Schedule of Appendix F.

Each surveyed feature has been provided with unique reference number, based on its relative location to the Proposed Programme of Works, running from north to south using an automated GIS script. Each survey feature number will be prefixed with a 'T', 'G', 'H' or 'W' to identify their feature type as an individual tree, tree group, hedgerow or woodland respectively.

The TCAP provides indicative Root Protection Area (RPA) dimensions as calculated using formulae in BS5837:2012. RPAs are applied radially as a circular area measured from an individual tree or as an off-set from indicative canopy extents of a collective feature i.e. tree groups, hedgerows or woodlands.

At the time of writing no survey features has been repositioned to Ordnance Survey (OS) base mapping or topographical survey. No RPA modification has been undertaken when producing the TCAP. Deviation in the RPA (Section 4.6.3 of BS 5837) from the original would have to consider the following factors whilst still providing adequate protection for the root system:

- Morphology and disposition of the roots, when influenced by past or existing site conditions e.g. the presence of roads, hard surfacing, ditches, footings
- Topography and drainage
- The soil type and structure
- The likely tolerance of the tree to root disturbance or damage, based on factors such as species, age, condition and past management.

B.4 RAG Assessment Methodology

An interim assessment of potential impacts was made by overlaying the existing tree RPA or canopy constraints with the indicative proposed core working area as referenced in Appendix A. Potential impacts on trees were also informed following communications with the United Utilities design team with regards to:

- The flexibility of the indicative proposed core working area to accommodate notable tree features including boundary vegetation
- Potential location-specific mitigation measures for encroached features located outside of the proposed core working area e.g. CEZ or reduced soil stripping.

The locations of features to be removed are indicatively shown on Figure 6.6: PTRP with preliminary impacts based on RAG principles detailed in Table 1.8 below.

Table 1.8: Summary table of RAG status

RAG status	Parameter/s	Reporting
Red	Survey features to be fully or partially removed (for tree groups, hedgerows or woodlands) due to their location within the proposed core working area.	Red features will be reported to be removed as indicated on the PTRP. Trees to be removed or requiring partial removal are identified within the Tree Survey Schedule's 'AIA' column with an 'R' or 'P' respectively plus a red coloured cell within the 'RAG status' column.

RAG status	Parameter/s	Reporting
Amber	Survey features considered at risk due to: ▪ Their encroached location to proposed core working area margin ▪ Their encroached location within the residual planning application boundary outwith the proposed core working area ▪ No location specific protection measures have been agreed by the United Utilities design team at this planning submission stage.	Amber features are reported as a 'Removal Risk Aiming to Retain' (RRAtR). This is a precautionary approach however it is anticipated that further consideration be given to RRAtR trees as the design process progresses and engineering constraints become further defined. RRAtR features will be reported to be removed for the purpose of this AIA as indicated on the PTRRP plus an amber coloured cell within the 'RAG status' column of the Tree Survey Schedule. All encroached features are identified within Tree Survey Schedule's 'AIA' column by an 'E'.
Green	**Scenario 1:** Survey features considered retainable due to feature location-specific protection measures being agreed by the United Utilities design team despite: ▪ Their encroached location relative to the proposed core working area margin ▪ Their encroached location within the residual planning application boundary outwith the proposed core working area; **Scenario 2:** Survey features considered retained due to: ▪ Their location within the assessment area ▪ Non-encroachment by the Proposed Marl Hill Section	Green features are reported to be 'Retained with Protection Measures' (RwPM). RwPM features will be reported as retained for the purposes of this AIA and are indicated by a green coloured cell within the 'RAG status' column of the Tree Survey Schedule and the PTRRP. All encroached RwPM features are identified within Tree Survey Schedule's 'AIA' column by an 'E'. Non-encroached RwPM trees are identified by a 'N' within the 'AIA' column

B.5 Ancient/Veteran Tree Assessment Methodology

Arboricultural surveys at this stage of the project have been undertaken based on BS5837: 2012 surveying guidance. The initial assessment of potential ancient and veteran trees is determined by surveyor experience, site surveyors' observations/comments and site photographs. Arboricultural surveyors determine this potential status of trees using visual tree assessment methods and the observation of features that include but are not limited to the list below:

- Tree species
- Life stage and tree size
- Extensive decay/hollowing
- Crown retrenchment/senescence
- Large quantity of crown deadwood
- Major limb fractures/storm damage
- Habitat spaces such as decay holes/hazard splits/crevices
- Presence of fungi, sap runs/slime flux
- Presence of epiphytic plants/lichens
- Bark loss/lightning strikes
- Water pools/aerial rooting.

Within publications and guidance offered by various organisations and government bodies such as the Woodland Trust and Natural England there is no agreed definition on what constitutes an ancient or veteran tree. Based on Annex 2 of the NPPF, as adopted by the Arboricultural discipline, the definition is of an ancient or veteran tree:

'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'

The emphasis within the above statement is on the word "exceptional", which by its own definition creates a level of subjectivity amongst arboriculturists and other disciplines such as ecology.

Following on from the Veteran Tree Initiative (English Nature 1996-2000), there have been various publications detailing tree characteristics associated with aging trees. In addition, some systems have been published and used to formalise surveying of ancient, veteran and notable trees such as Special Survey Method (SSM) developed by Treework Environmental Consultancy and Recognition of Ancient Veteran and Notable Trees (RAVEN) developed by Forbes Laird Arboricultural Consultancy. At the time of writing no recognised method to survey ancient/veteran trees (i.e. RAVEN) has been agreed or used to substantiate the quantity/quality of individual features associated with any given tree identified as a potential ancient/veteran by the projects arboricultural surveyors.

Indicative RPAs are reported based on the guidance provided within BS5837:2012 and shown figuratively in the TCAP and PTRP. Indicative protection buffers based on Governmental Standing Advice for ancient and veteran trees in England should also be considered at a later stage to inform detailed design. These greater protection zones are also shown figuratively in the TCAP and PTRP as a separate legend item entitled 'Standing Advice Buffer Zone'. Governmental Standing Advice recommends a minimum 15 m buffer zone from Ancient Woodland and potentially larger distances for ancient and veteran trees which is:

- calculated as a minimum of 15 times larger than the diameter of the tree; or
- 5 m from the edge of the tree's canopy if greater than the above value.

Appendix C. Technical Glossary of Terms

AIA: Arboricultural Impact Assessment.

AMS: Arboricultural Method Statement.

Ancient tree: An ancient tree is exceptionally valuable attributed with great age/size/cultural heritage/biodiversity value as a result of significant wood decay and the habitat created from the ageing process. All ancient trees are veteran trees with very few trees of any species reaching the ancient life-stage.

Bark: A term usually applied to all the tissues of a woody plant lying outside the vascular cambium.

Basal flare: The region at the base of a tree where the major lateral roots join the stem, with buttress-like formations on the upper side of their junction.

Coppice: A traditional woodland management technique of periodically cutting trees to ground level in order to stimulate new growth from the base. Native broadleaf species are often coppiced for as a conservation practice or for sustainable timber production.

Condition: An indication of the physiological vitality of the tree. Where the term 'condition' is used in a report, it should not be taken as an indication of the stability of the tree.

Conservation Area: A designated area that requires notice (currently six weeks) to be given to the local planning authority prior to the commencement of any tree works.

Construction exclusion zone: Area based on the Root Protection Area (in square metres) to be protected during development, by the use of barriers and/or ground protection.

Crown/Canopy: The main foliage bearing section of the tree.

Crown retrenchment: Die-back of the outer crown, giving rise to deadwood and stag-heads. A tree's crown retrenches after it reaches late maturity, or owing to some prejudicial episode (root damage, summer drought, insect infestation etc.) from which the tree may or may not recover.

Defect: In relation to tree hazards, any feature of a tree which detracts from the uniform distribution of mechanical stress, or which makes the tree mechanically unsuited to its environment.

Dieback: The death of parts of a woody plant, starting at shoot-tips or root-tips.

Disease: A malfunction in or destruction of tissues within a living organism, usually excluding mechanical damage; in trees, usually caused by pathogenic micro-organisms.

DBH (Diameter at Breast Height): Stem diameter measured at a height of 1.5 metres (UK) or the nearest measurable point. Where measurement at a height of 1.5 m is not possible, another height may be specified.

Deadwood: Branch or stem wood bearing no live tissues. Retention of deadwood provides valuable habitat for a wide range of species and seldom represents a threat to the health of the tree. Removal of deadwood can result in the ingress of decay to otherwise sound tissues and climbing operations to access deadwood can cause significant damage to a tree. Removal of deadwood is generally recommended only where it represents an unacceptable level of hazard. Minor deadwood is considered to be a diameter less than 25 mm and or unlikely to cause significant harm or damage on impact with a target beneath the tree.

Epicormic: Adventitious shoot growth from a tree stem or branch characteristic of some native broadleaf tree species. Shoots typically arise from suppressed buds in bark and are often stimulated to grow as a result of stress

Epiphyte: an organism that grows on the surface of a host plant but does not derive resources directly from the host. Presence on trees is often indicative of the tree's wider ecosystem/habitat value.

Fungi: Plural form of any known species within the kingdom Fungi. Presence on trees is associated with maturing features and tree condition.

Harp tree: A tree with multiple upright regenerative stems.

Hazard beam/split: An upwardly curved part of a tree in which strong internal stresses may occur without being reduced by adaptive growth; prone to longitudinal splitting.

Notable tree: Usually a mature tree which may stand out in the local environment because they are large in comparison with other trees around them. In parts of the UK, where trees are less common, a tree may be relatively small but notable because it is significant in its local environment.

Pollarding: is the removal of the tree canopy, back to the stem or primary branches. Pollarding may involve the removal of the entire canopy in one operation or may be phased over several years. The period of safe retention of trees having been pollarded varies with species and individuals. It is usually necessary to re-pollard on a regular basis, annually in the case of some species.

Primary branch: A major branch, generally having a basal diameter greater than 0.25 x stem diameter.

Pruning: The removal or cutting back of twigs or branches, sometimes applied to twigs or small branches only, but often used to describe most activities involving the cutting of trees or shrubs.

Root Protection Area (RPA): A layout design tool indicating the minimum area around a tree deemed to contain sufficient roots and rooting volume to maintain the tree's viability, and where the protection of the roots and soil structure is treated as a priority.

Slime Flux: Liquid, bacterial-based exudation from a tree.

Stem/s: The main supporting structure/s, from ground level up to the first major division into branches.

Stress: In plant physiology, a condition under which one or more physiological functions are not operating within their optimum range, for example due to lack of water, inadequate nutrition or extremes of temperature.

Tree Preservation Order (TPO): Is an order made by the local authority and placed on individual trees, groups of trees or areas of trees. The local authority must usually grant permission prior to any works undertaken to affected trees.

Understory: A layer of vegetation beneath the main canopy of woodland or forest or plants forming this.

Veteran tree: A loosely defined term for an old specimen that is of interest biologically, culturally or aesthetically because of its age, size or condition and which has usually lived longer than the typical upper age range for the species concerned.

Wind-throw: The blowing over of a tree at its roots.

Appendix D. Cascade Chart of Tree Quality Assessment (taken from BS5837:2012)

Category and definition	Criteria (including subcategories where appropriate)		
Trees unsuitable for retention (see note)			
Category U			
Those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years	Trees that have a serious, irremediable, structural defect, such that their early loss is expected due to collapse, including those that will become unviable after removal of other category U trees (e.g. where, for whatever reason, the loss of companion shelter cannot be mitigated by pruning) Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline Trees infected with pathogens of significance to health and/or safety of other trees nearby, or very low quality trees suppressing adjacent trees of better quality NOTE Category U trees can have existing or potential conservation value which it might be desirable to preserve.		
Trees to be considered for retention			
	1 Mainly arboricultural qualities	**2 Mainly landscape qualities**	**3 Mainly cultural values including conservation**
Category A			
Trees of high quality with an remaining estimated life expectancy of at least 40 years	Trees that are particularly good examples of their species, especially if rare or unusual; or those that are essential components of formal or semi-formal arboricultural features (e.g. the dominant and/or principal trees within an avenue)	Trees, groups or woodlands of particular visual importance as arboricultural and/or landscape features	Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e.g. veteran or semi-formal arboricultural trees or wood-pasture)
Category B			
Trees of moderate quality with an remaining estimated life expectancy of at least 20 years	Trees that might be included in Category A, but are downgraded because of impaired condition (e.g. presence of significant though remediable defects, including unsympathetic past management and storm damage), such as they are unlikely to be suitable for retention for beyond 40 years; or trees lacking the special quality necessary to merit the category A designation	Trees present in numbers, usually growing as groups or woodlands, such that they attract a higher collective rating than they might as individuals; or trees occurring as collectives but situated so as to make little visual contribution to the wider locality	Trees with material conservation or other cultural value
Category C			
Trees of low quality with an remaining estimated life expectancy of at least 10 years, or younger trees with a stem diameter below 150mm	Unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories	Trees present in groups or woodlands, but without this conferring on them significantly greater collective landscape value; and/or trees offering low or only temporary/transient landscape benefits	Trees with no material conservation or other cultural value

Appendix E. Tree Survey Schedule Key

Column Header	Explanation
Tree ID and Est.	T – Tree G – Group W – Woodland H - Hedgerow # – DBH measurements estimated due to access restrictions or safety concerns. Observations limited to those made from a distance or full access to tree impeded (e.g. prolific ivy, uneven ground, brambles etc.).
Diameter at breast height (DBH)	Tree stem diameter measured at 1.5 m from the ground. This reported figure relates to either single stemmed trees or the calculated DBH for multi-stemmed trees. In some instances, DBH will be taken from a different height as specified in 'Observations'
Canopy spread – N E S W	Canopy extents from main stem of individual tree will be shown using cardinal points in metres i.e. N (north) 7, E (east) 6, S (south) 5, W (west)7. Single largest canopy extent reported for groups/woodland/hedgerows.
Age Class	Young (Y) – A tree in the first quarter of its life span. Semi Mature (SM) – A tree in the latter stages of its first quarter, well established. Early Mature (EM) – A tree half-way through its life span, significant further growth potential. Mature (M) – A tree at or near its potential maximum size which is still growing vigorously in its third quarter of life span. Over Mature (OM) – A tree in decline in its final quarter of life span. Potential Veteran (V) – A tree which, because of its age, size and condition, is of exceptional biodiversity, cultural or heritage value. Refer to Section B.5 of Appendix B for more context.
Structural Condition (S)	Good (G) - No signs of decay or structural weakness. Fair (F) - Minor defects not causing structural weakness. Poor (P) - Severe decay in the main stem or branches/structurally weak.
Physiological Condition (P)	Good (G) - Showing no adverse risk of failure/defects. Fair (F) - Showing minor signs of deterioration. Poor (P) - Unlikely to recover to a good condition.
Estimated Remaining Contribution (ERC)	<10 - Less than 10 years of normal life expectancy remaining. 10+ - Between 10 and 20 years of normal life expectancy remaining. 20+ - Between 20 and 40 years of normal life expectancy remaining. 40+ - Tree would normally expect to live for more than 40 more years.
Root Protection Area (RPA) radius	Root Protection Area dimensions as calculated using formulae in BS5837:2012. Applied as either radially from an individual tree stem (individually surveyed trees) or as an off-set from the canopy extents of a collective feature (tree group, hedgerow or woodland).
AIA	R - Remove P – Partial removal E - Encroached RPA/canopy N - No encroachment
RAG status	Refer to symbology explained in Appendix B Section B.4 Table 1.8

Appendix F. Tree Survey Schedule including AIA Results

Tree Ref. No.	Species	Height (m)	DBH (mm)	Canopy spread (m)				Age class	Struc cond.	Physiol cond.	General Observations and Comments	ERC	Category grading	RPA radius (m)	AIA	RAG status
				N	E	S	W									
G139#	Hawthorn	4	120	1	1	1	1	SM	F	F	Flanking watercourse	10+	C3	1.4	N	GREEN
G140#	Hawthorn, holly, alder	6	280	3	3	3	3	EM	F	F	North of watercourse	20+	C3	3.4	N	GREEN
G141#	Prunus spp.	5	450	4	4	4	3	M	F	F	Maintained orchard trees located in non-accessible land parcel.	20+	B3	5.4	N	GREEN
T142#	Hawthorn	6	287	3	3	3	3	EM	F	F		20+	C2	3.4	N	GREEN
G142#	Hawthorn	5	318	2	2	2	2	M	F	F	Scattered linear feature some collapsing stems	20+	C3	3.8	E	GREEN
T143	Alder	10	600	4	6	3	4	M	F	F	Stem hollowing and snap outs. 600 mm max. DBH reported.	40+	B2	7.2	E	GREEN

Tree Ref. No.	Species	Height (m)	DBH (mm)	Canopy spread (m)				Age class	Struc cond.	Physiol cond.	General Observations and Comments	ERC	Category grading	RPA radius (m)	AIA	RAG status
				N	E	S	W									
G143	Hawthorn, holly, ash	9	500	4	4	4	4	M	F	F	Hawthorn understory. 150-500 mm stem range. Max. DBH 500 mm. Numerous stem hollow and moderate deadwood flake brake	40+	B2	6.0	E	GREEN
T144	Hawthorn	9	807	5	4	5	6	V	F	F	Potential veteran. Stem hollowing. Fungal bracket on tear out. Secondary canopy form and stem ribs some exposed heart wood. Knot holes. Aerial rooting DBH range 600 mm.540 mm	40+	A3	9.7	R	RED
G144	Hawthorn	5	230	3	3	3	3	M	F	F	Max. DBH 230 mm reported. Bordering ditch dry at time of survey	20+	C2	2.8	N	GREEN
T145	Ash	13	1000	3	4	5	4	V	F	F	Potential veteran. Stem break approx. 3-metre-tall bulge. Max. DBH reported 1000 mm. Basal flare and bulge. Major deadwood snap outs and knot holes. Bacterial galls	40+	A3	12.0	E	GREEN
G145#	Hawthorn	5	350	2	2	2	2	M	F	F	Linear Hawthorn feature	20+	C3	4.2	R	RED
T146	Oak	23	850	9	9	9	9	M	F	F		40+	A2	10.2	E	GREEN

Tree Ref. No.	Species	Height (m)	DBH (mm)	Canopy spread (m)				Age class	Struc cond.	Physiol cond.	General Observations and Comments	ERC	Category grading	RPA radius (m)	AIA	RAG status
				N	E	S	W									
G146	Alder	16	720	8	8	8	8	M	F	F	Large basal flares and bulges some snap outs. 720 mm max. DBH	40+	B2	8.6	E	GREEN
T147	Alder	7	750	3	5	3	3	V	F	F	Potential veteran. Abundant deadwood. Rust lichens and fungi. Stem hollows and aerial rooting. Livestock damage at base. Stem epicormic. Major deadwood flushing brackets and snags. Potential deadwood retrenching canopy. 2 x 530 mm.	40+	A3	9.0	E	GREEN
G147	Hawthorn, alder	9	514	4	4	4	4	M	F	F	Linear row of trees following ditch.	40+	B3	6.2	E	GREEN
T148	Oak	8	670	5	8	7	6	M	F	F	Moderate deadwood and squat form canopy. Moderate deadwood	40+	B2	8.0	R	RED
G148	Hawthorn	7	400	4	4	4	4	M	F	F	Significant livestock damage	40+	C3	4.8	R	RED

Tree Ref. No.	Species	Height (m)	DBH (mm)	Canopy spread (m)				Age class	Struc cond.	Physiol cond.	General Observations and Comments	ERC	Category grading	RPA radius (m)	AIA	RAG status
				N	E	S	W									
T149	Ash, blackthorn	6	539	4	4	4	4	M	F	F	Ash 400 mm DBH, blackthorn 300mm DBH. Ash has stem hollowing	40+	B3	6.5	N	GREEN
G149	Ash and blackthorn	6	540	4	4	4	4	M	F	F	Ash 400 mm DBH, Blackthorn 200-300 mm DBH. Ash has stem hollowing	40+	B3	6.5	E	GREEN
T150	Oak	7	400	4	4	4	4	M	F	F	400 mm Max. DBH reported. One harp tree. Significant livestock damage to group. Oak has stage head and stem hollow. some flaky bark on oak.	40+	C3	4.8	R	RED
W150	Alder, Ash, Scots pine, hawthorn, sycamore	15	700	7	7	10	7	M	F	F	700 mm max. DBH. Stems min 4 metre from fence line. Tear outs snags and branch hollows.	40+	B2	8.4	N	GREEN
T151	Ash	11	600	4	8	6	6	M	F	F		40+	B2	7.2	N	GREEN
G151	Alder and hawthorn	12	570	3	4	6	4	M	F	F	Max. DBH 570 mm reported. Group has stem bulges and livestock damage aerial rooting. Stem and branch hollows. Major deadwood.	40+	B2	6.8	R	RED

Tree Ref. No.	Species	Height (m)	DBH (mm)	Canopy spread (m)				Age class	Struc cond.	Physiol cond.	General Observations and Comments	ERC	Category grading	RPA radius (m)	AIA	RAG status
				N	E	S	W									
T152	Ash	9	570	4	4	4	4	EM	F	F	Stem branch epicormic. Moderate deadwood some stem tear out.	40+	B2	6.8	N	GREEN
G152#	Hawthorn	6	250	3	3	3	3	M	F	F		20+	C3	3.0	R	RED
T153	Alder	11	600	6	6	6	6	M	F	F	Stem bulge and knot holes.	40+	B2	7.2	E	AMBER
G153	Alder	12	600	6	6	6	6	M	F	F	Max. DBH 600 mm reported. Linear row of alder following relic field boundary.	40+	B2	7.2	E	GREEN
T154	Ash	9.5	660	7	5	7	5	OM	F	P	Bacterial gall. Tree in decline. Bird tree present. Major dead wood and knot holes with some tear outs	40+	C3	7.9	E	GREEN
G154#	Hawthorn	6	250	3	3	3	3	M	F	F	Scattered throughout field.	40+	C3	3.0	R	RED

Tree Ref. No.	Species	Height (m)	DBH (mm)	Canopy spread (m)				Age class	Struc cond.	Physiol cond.	General Observations and Comments	ERC	Category grading	RPA radius (m)	AIA	RAG status
				N	E	S	W									
T155	Hawthorn	3	200	2	2	2	2	SM	F	F	DBH range 130 mm, 130 mm, 80mm. In field. Hawthorn following fence line in close proximity to woodland.	20+	B2	2.4	N	GREEN
G155	Hawthorn	4	184	2	2	2	2	M	F	F	90-160 mm DBH range.	20+	C3	2.2	N	GREEN
T156#	Ash	20	700	12	10	10	10	M	F	F	Large stem tear out and sparse inner canopy.	40+	B1	8.4	E	GREEN
G156	Hawthorn	6	250	3	3	3	3	M	F	F	Scattered in field Hawthorns with stem hollowing throughout. 250 mm-150 mm DBH range. Max. single stem reported.	40+	C3	3.0	R	RED
T157	Beech	11	870	0	6	3	3	V	F	F	Large deadwood and exposed heart wood, flaky bark, tree fern and large basal flaring.	40+	A3	10.4	E	GREEN
G157	Hawthorn	5	318	2	2	2	2	M	F	F	220 mm-230 mm DBH range. Scattered linear feature some collapsing stems, stem hollows and rot holes.	20+	C3	3.8	E	AMBER

Tree Ref. No.	Species	Height (m)	DBH (mm)	Canopy spread (m)				Age class	Struc cond.	Physiol cond.	General Observations and Comments	ERC	Category grading	RPA radius (m)	AIA	RAG status
				N	E	S	W									
T158	Ash	12	650	7	4	4	3	M	F	F	Basal flaring, abundant stem flushing. Canopy in decline. Minor to moderate deadwood and knot holes.	40+	C3	7.8	E	GREEN
G158	Ash, alder	12	450	8	6	6	6	M	F	F	Knot holes, stem ribs and snap outs. Max. DBH 450 mm reported	40+	B2	5.4	P	RED
T159#	Alder	4	300	2	2	2	2	SM	P	P	Some veteran characteristics. Extensive tear outs and large basal hollow. Present as a linear feature along a bank	10+	C3	3.6	N	GREEN
G159	Hawthorn	6	450	2	2	2	2	M	F	F	Remnant field boundary. ranges between 90 mm and 450 mm DBH. Max. single stem reported. Understory group.	20+	B2	5.4	E	GREEN
T160	Ash	10	430	4	4	4	4	M	F	F	Large stem callous roll. Open stem cavity approximately 4 metre high	40+	B3	5.2	E	GREEN
W160	Oak, sycamore, wild cherry, ash, silver birch	18	580	5	5	7	5	EM	F	F	Includes standing dead tree by poly tunnel. Max. DBH 580 mm. Stems immediately adjacent to fence. Knot holes tears outs and moderate deadwood throughout woodland.	40+	B2	7.0	N	GREEN

Tree Ref. No.	Species	Height (m)	DBH (mm)	Canopy spread (m)				Age class	Struc cond.	Physiol cond.	General Observations and Comments	ERC	Category grading	RPA radius (m)	AIA	RAG status
				N	E	S	W									
T161	Alder	5	200	4	3	4	3	OM	F	F	Large open stem breach exposing heart wood. Aerial rooting and swelling.	40+	C3	2.4	N	GREEN
G161	Oak, sycamore, willow, ash, silver birch	17	700	7	5	5	5	M	F	F	540 mm average DBH. 700 mm max. DBH reported. Same comment as adjacent woodland	40+	B2	8.4	N	GREEN
T162	Alder	8	470	4	5	4	4	M	F	F	Single Alder present within linear Hawthorn hedgerow	40+	B2	5.6	E	AMBER
G162	Hawthorn	3.5	320	2	2	2	2	M	F	F	Linear row adjacent to ditch on bank. 320 mm max. DBH reported	40+	B2	3.8	P	RED
T163#	Alder	10	550	6	6	6	6	M	F	F	Mature Hawthorn growing directly adjacent approx. DBH 300 mm-150 mm	40+	B2	6.6	N	GREEN
G163	Holly, hawthorn, rowan, elder	6	243	2	2	2	2	SM	F	F	3 x 80 mm and 200 mm. Max. DBH reported. Interspersed by young undersize planting.	40+	B2	2.9	N	GREEN

Tree Ref. No.	Species	Height (m)	DBH (mm)	Canopy spread (m)				Age class	Struc cond.	Physiol cond.	General Observations and Comments	ERC	Category grading	RPA radius (m)	AIA	RAG status
				N	E	S	W									
T164	Beech, sycamore	22	810	8	8	8	8	M	F	F	max DBH 810 mm. Roadside verge group.	40+	B2	9.7	E	GREEN
G164	Alder	10	778	6	8	6	6	M	F	F	Max DBH reported 1000 mm. Major deadwood and snap outs on mature alder. 2 x 550 DBH for other 2 Alders.	40+	B2	9.3	N	GREEN
T165	Oak	21	1000	8	8	8	8	M	F	F	Bird box present on tree.	40+	A1	12.0	E	AMBER
H165#	Holly, ash, willow, hawthorn	6	120	1	1	1	1	Y	F	F	Contains some undersize stems	20+	C2	1.4	N	GREEN
T166	Alder	9	1105	7	7	7	7	M	F	F	DBH ranges 450,420,500,61 and 470	40+	B2	13.3	E	GREEN
G166#	Beech, copper beech, eucalyptus, larch, silver birch and sycamore	22	810	8	8	8	8	M	F	F	Max ban reported from beech. Roadside verge group. Surveyed by roadside. Includes part of residential garden.	40+	B2	9.7	E	GREEN

Tree Ref. No.	Species	Height (m)	DBH (mm)	Canopy spread (m)				Age class	Struc cond.	Physiol cond.	General Observations and Comments	ERC	Category grading	RPA radius (m)	AIA	RAG status
				N	E	S	W									
T167	Alder	13	550	6	6	6	6	M	F	F		40+	B2	6.6	N	GREEN
H167#	Hawthorn, blackthorn, hazel	1.5	140	1	1	1	1	SM	F	F	140 mm max DBH. Managed roadside hedgerow.	20+	B2	1.7	E	AMBER
T168	Alder	6	637	5	5	5	5	M	F	F	DBH 430 mm and 470 mm. Twin stem Alder on banking to flowing water course.	40+	B3	7.6	N	GREEN
G168	Alder, ash	12	768	3	3	3	3	M	F	F	Linear feature previous pollard managed. 500 mm, 500 mm, 300 mmDBH taken at 0.5 metre. Ash to the south of group is 610 mm.	40+	B2	9.2	N	GREEN
T169	Ash, rowan	19	777	7	8	7	6	M	F	F	Observable Cattle damage. Large basal flare. DBH range 710 mm, 180 mm, 260 mm	40+	B2	9.3	N	GREEN
G169#	Hazel, hawthorn	3	180	3	3	3	3	SM	F	F		40+	C3	2.2	N	GREEN

Tree Ref. No.	Species	Height (m)	DBH (mm)	Canopy spread (m)				Age class	Struc cond.	Physiol cond.	General Observations and Comments	ERC	Category grading	RPA radius (m)	AIA	RAG status
				N	E	S	W									
T170	Ash	17	922	12	12	10	12	M	F	F	600-700 mm DBH. Ash located near water course.	40+	B2	11.1	N	GREEN
G170	Holly, rowan, ash	8	289	3	3	3	3	M	F	F	130 mm,170 mm,160 mm, 110 mm DBH. Understory group following flowing water ditch. Present on steep banking	40+	C3	3.5	E	AMBER
T171	Sycamore	8	810	7	7	7	7	OM	P	P	In significant decline with moderate deadwood. Stem hollow flared base and hollow	40+	C3	9.7	N	GREEN
W171	Larch, silver birch, sycamore, holly, alder	17	740	8	8	8	8	M	F	F	Woodland dominated by Rhododendron. Average stem. Average DBH 460 mm. Max DBH 740 mm.	40+	B2	8.9	E	AMBER
T172	Oak	15	980	9	6	9	9	V	F	F	Twin stem Oak with significant stem bulge. Moderate to major deadwood. Open cavities at the base.	40+	A3	11.8	N	GREEN
H172#	Hawthorn, blackthorn and hazel	1.5	140	1	1	1	1	SM	F	F	140 mm max. DBH. Managed roadside hedgerow. Some laid hedge present.	20+	B2	1.7	E	AMBER

Tree Ref. No.	Species	Height (m)	DBH (mm)	Canopy spread (m)				Age class	Struc cond.	Physiol cond.	General Observations and Comments	ERC	Category grading	RPA radius (m)	AIA	RAG status
				N	E	S	W									
T173	Sycamore	15	640	6	6	6	6	EM	F	F	Group of three sycamore max. 640 mm. DBH range 580,110, 80 mm	40+	B2	7.7	N	GREEN
G173	Hawthorn	4	422	4	4	4	4	M	F	P	Mature Holly central to two Hawthorns on relic boundary. Max DBH 260, 240 and 230 mm	20+	C3	5.1	N	GREEN
T174	Hawthorn	4.5	352	3	2	3	3	SM	F	F	DBH range 120, 160, 290 mm. Multi-stem Hawthorn on top of banking leading down to flowing water course.	20+	C3	4.2	N	GREEN
G174	Hawthorn	5	396	3	3	3	3	M	F	F	310.170.140.110 mm DBH range	20+	C3	4.8	E	AMBER
T175	Field maple	8	223	3	3	3	3	EM	F	F	170,80 and 120 mm DBH	40+	C2	2.7	E	AMBER
G175	Beech, alder	13	442	3	6	3	6	EM	F	F	DBH range 340,190, 170 and 120 mm. Linear row of Beech and Alder.	40+	B2	5.3	N	GREEN

Tree Ref. No.	Species	Height (m)	DBH (mm)	Canopy spread (m)				Age class	Struc cond.	Physiol cond.	General Observations and Comments	ERC	Category grading	RPA radius (m)	AIA	RAG status
				N	E	S	W									
T176	Oak	16	1540	13	11	0	12	V	F	F	Major deadwood. Large stem hollowing on northern aspect. Historic main leader snapped out. High volumes of grass, lichens and mosses present. 4 metre from track edge	40+	A3	18.5	E	AMBER
G176	Silver birch	16	400	5	5	5	5	SM	F	F	400 mm max observed DBH	40+	B2	4.8	N	GREEN
T177	Hawthorn	5	210	2	2	2	2	SM	F	F		20+	C2	2.5	E	AMBER
G177	Holly, hawthorn, alder	7	500	4	4	4	4	M	F	F	Maximum single stem reported 500 mm DBH. Linear row understory group following water course.	40+	B2	6.0	E	AMBER
T178#	Alder	12	640	6	6	6	6	M	F	F		40+	B2	7.7	E	AMBER
G178	Alder	11	610	6	6	6	6	M	F	F	Max DBH 610 mm (northern Alder)	40+	A2	7.3	E	AMBER

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				N	E	S	W									
T179	Oak	21	1100	12	11	13	11	M	G	G	Major deadwood, bird trees and tree ferns. Snags and stem bulges. Present on banking adjacent to watercourse. 15 metre from road edge	40+	A1	13.2	E	GREEN
G179#	Ash, rowan	6	120	2	2	2	2	Y	P	P	Max DBH 120 mm. Potential ash dieback observed	<10	U	1.4	E	AMBER
T180	Hawthorn	3	280	2	5	2	0	M	F	F	DBH at base 120, 240 and 80 mm	20+	C3	3.4	E	AMBER
G180	Oak, sycamore	12	810	8	8	8	8	M	F	F	Max. DBH recorded 810 mm.	40+	A2	9.7	E	GREEN
T181	Oak	17	980	8	9	9	10	M	F	F	Major deadwood. Snap outs also present. Basal flare and stem tear outs. Single holly bird tree	40+	A2	11.8	N	GREEN
G181	Alder, holly, oak	14	920	6	6	8	6	M	F	F	Average DBH range between 600-900 mm. 920 mm max. DBH reported. Located on existing historic boundary including remnant stone wall. Stem/branch holly and snap outs	40+	A2	11.0	E	AMBER

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				N	E	S	W									
T182	Alder	6	580	5	5	5	5	M	F	F		40+	B2	7.0	E	AMBER
G182	Ash	17	610	6	6	6	6	M	F	F	Max. DBH 610 mm. Major snap out and stem hollows and basal flares	40+	B2	7.3	N	GREEN
T183	Holly	6.5	330	3	3	3	3	M	F	F	Mature Holly on remnant boundary	40+	B2	4.0	E	AMBER
G183	Hawthorn, rowan	6	380	3	3	3	3	SM	F	F	DBH range of 140, 250 and 250 mm. Under-story group following water course.	40+	C3	4.6	N	GREEN
T184	Alder	5	920	3	2	3	3	V	F	F	Potential veteran. 920 mm above bulge. Flare 1200 mm. Major deadwood with secondary canopy forming. Large basal flare with aerial rooting, ink cap at base and jelly ear present on stem. Flaky bark, major stem hollowing. Present on historic wall.	40+	A3	11.0	E	AMBER

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				N	E	S	W									
G184	Holly, beech, rowan, hawthorn	8	270	4	4	4	4	M	F	F	DBH range 220,120 and 100 mm. Some collapsed stems. Linear understory group following water course.	40+	C3	3.2	E	AMBER
T185	Alder	6	960	5	4	5	4	V	F	F	Potential veteran, DBH 960 mm. Large basal flare with multiple stem hollows. Secondary canopy formed. Blushing bracket fungi.	40+	A3	11.5	E	AMBER
W185	Larch, Scots pine, willow, beech, silver birch, goat willow, rowan, common alder	18	575	8	8	5	5	EM	F	F	Average DBH recorded 370 and 430 mm. Overgrown with Rhododendron. Broadleaved margin dominated by Managed beech trees. Some dead trees and windthrow in NW corner of woodland.	40+	B2	6.9	E	GREEN
T186	Alder	6	610	3	3	3	1	OM	F	F	Significant stem opening approx. 3 metre high.	40+	C3	7.3	E	AMBER
G186	Oak, alder, silver birch, larch	16	600	5	5	5	5	EM	F	F	Moderate deadwood and tear outs. Include one Oak in field. Max. DBH of 600 mm reported.	40+	B2	7.2	E	GREEN
T187	Alder	5	800	3	5	5	4	V	F	F	Retrenching canopy stem hollow. Basal flare 2 metre breach. Bird tree, degraded fungal bracket and flared base	40+	A3	9.6	R	RED

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				N	E	S	W									
G187	Alder, silver birch, oak	12	700	6	6	6	6	M	F	F	Max. DBH 700 mm. Riparian group following water course. Stem branch cavities. Moderate deadwood present.	40+	A2	8.4	E	GREEN
T188	Holly	6	146	3	3	3	3	M	F	F	110 mm DBH old holly coppice. Suckering from holly stools predominantly undersize.	20+	C3	1.8	R	RED
G188#	Larch, silver birch	17	850	3	3	3	3	M	F	F	Average stems of 450 mm DBH. Max. stem of 850 mm DBH. Woodland dominated by Rhododendron.	40+	B2	10.2	E	AMBER
T189	Alder	7	550	4	5	5	5	M	F	F	Stem hollows and moderate deadwood	40+	B2	6.6	R	RED
G189	Alder, holly	15	791	7	7	7	7	M	F	F	Average DBH range 450-650 mm. Stem hollows and moderate deadwood. Some aerial rooting	40+	B2	9.5	P	RED
T190	Alder	7	808	4	4	4	4	V	P	P	Potential veteran. 480-650 mm DBH range. Structural damage with significant stem split. Veteran characteristics, snapped out main leader, retrenched canopy, aerial rooting, exposed deadwood, livestock damage at the base.	20+	A3	9.7	R	RED

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				N	E	S	W									
G190	Larch, Scots pine, ash, beech, silver birch, rowan, elder, oak, alder	30	940	10	10	10	10	M	F	F	Max. 940 mm DBH recorded. Average stem 640 mm DBH on northern margin. 2 metre from fence line moderate deadwood and snap outs with wet depression on the woodland centre. Rhododendron dominant in the north west margin of the woodland.	40+	A2	11.3	E	AMBER
T191#	Sycamore	18	950	9	9	9	9	M	F	F		40+	B2	11.4	E	GREEN
G191	Alder, ash, larch, oak, holly, rowan	23	750	6	6	6	6	M	F	F	750 mm Max. DBH recorded. Mature line of alder closest to the fence line.	40+	B2	9.0	E	AMBER
T192	Alder	9	660	5	4	4	4	M	F	F	Basal flare and stem ribbing. Minor deadwood.	40+	B2	7.9	R	RED
W192	Larch, holly, rowan	12	410	3	3	3	3	SM	F	F	Max. DBH recorded 410 mm. Linear row between fence line and watercourse	40+	B2	4.9	E	GREEN

Tree Ref. No.	Species	Height (m)	DBH (mm)	Canopy spread (m)				Age class	Struc cond.	Physiol cond.	General Observations and Comments	ERC	Category grading	RPA radius (m)	AIA	RAG status
				N	E	S	W									
T193#	Oak	12	680	7	7	4	7	M	F	F	Snap out and major dead wood	20+	B2	8.2	E	AMBER
W193#	Larch, silver birch	10	300	4	4	4	4	SM	F	F	Woodland belt flowing brook. Max. DBH recorded	40+	C2	3.6	E	GREEN
T194	Oak	15	810	10	10	8	8	M	F	F	Some snap outs and knot holes	40+	A2	9.7	N	GREEN
W194	Holly, pedunculate oak, lime, larch, beech, rowan, silver birch, sycamore, alder, horse chestnut, wych elm,	20	760	8	8	8	8	M	F	F	Eastern edge has trees, typically between 400 – 760 mm DBH. Max. DBH reported. This woodland group is intersected by watercourse, stone walls and boundary fencing. Himalayan balsam present in the north side of the woodland	20+	B2	9.1	N	GREEN
T195	Pedunculate oak	13	980	5	7	7	7	M	F	F	In field. Oak with large branch canopy. Moderate deadwood throughout.	40+	B2	11.8	R	RED